Transportation Investment and Japan's Experience

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Investment and Demand

Error of overestimating demand

Investment in transportation facilities promises benefits, but at the same time, it can also impose a large burden. Even entirely independent transport companies operating under genuine market principles can overestimate demand, or underestimate construction costs, causing later financial difficulties. When the investment is by central or local government, politics comes into play and the burden is often borne by taxpayers.

This happened to the Japanese National Railways (JNR) prior to March 1987, when JNR was privatized partly as a result of losses incurred due to huge investment.

Normally, transportation investment begins when the future seems bright. In the JNR case, the future was promising until the Tokaido Shinkansen was completed in 1964; JNR's financial hardship could have been avoided if the shinkansen construction had been limited to the lucrative section between Tokyo and Osaka. However, the interests of factions within JNR favouring extension of shinkansen services to other areas coincided with the interests of some politicians, and the shinkansen was extended to the Sanyo region (between Osaka and Fukuoka). By the time the extension was completed in 1975, JNR had dug itself into a serious financial hole beyond recovery. This type of unjustifiable investment was not only made in the shinkansen; it was also made in conventional railways. The situation was made worse because investments were not financed by increasing fares. Instead of increasing fares in line with the price index, JNR was forced to keep fares low as part of a national price control policy.

Investment in transportation facilities usually starts in a high-demand area to correct the capacity shortage. However, the massive required investment causes a sharp and immediate rise in costs, but income rises only very slowly. Therefore, the financial condition of the business may decline for several years.

Politics is another element. Politicians often demand that similar transportation services be provided in all areas even if there is no capacity shortage. Such political demands can be readily rejected by a private company, but not by a publicly-owned body such as the old JNR. Likewise, construction costs increase with time, but politicians require fares in new sections to be held at the same level as those in sections completed earlier, making losses inevitable. A railway company might survive if it can offset such losses by profits from lucrative lines, but if the loss is very high, or if the company is forced to operate under a price control policy, it is soon operating in the red.

Railways versus expressways

The situation was made worse by competition with other means of transporta-

Nagoya-Kobe expressway with Tokaido Shinkansen in 1964 *(Transportation Museum)*

tion. The completion of the Tokaido Shinkansen coincided with the rapid growth in car ownership and air networks in Japan. Railway demand began falling in most areas, but politicians kept demanding shinkansen, even in low-demand areas.

A further factor affecting both the railways and all other means of transportation equally, was the shift in the national economy from high to low growth. Demand was expected to increase substantially as a result of the high growth period in the 60s, but the expectation proved wrong in the 70s. The oil crisis in October 1973 marked the start of a low-growth economy. As a result, JNR's deficits kept rising until 1987 marked its privatization.

Among the different means of transportation, JNR suffered the largest deficit, which is understandable because it was the oldest service provider. Any transportation provider would have experienced similar problems when investing in non-profitable areas.

Growing car ownership required an expressway along the old Tokaido Road. At that time, expressways were to be independent of each other in terms of financing, expenditure and income. However, in 1972, a new toll pool system was introduced by which profits from the Tokyo-Osaka Expressway would be used to extend expressways in other areas. Today, expressways in Japan total approximately 6,000 km. The expressway network was extended into regions with low transport demand. At the same time, the Tokyo-Osaka Expressway needed a capacity increase. Financial independence was difficult to achieve in both cases because of the low demand in the former case and the extremely high construction costs in the latter. The lack of financial independence was exactly what JNR had experienced.

Another factor experienced by JNR was the short supply of land (or space) in heavily-populated large cities. This prevented JNR from building additional facilities along the tracks. The situation was even worse for construction of expressways in large cities and for expanding airport capacity in the Tokyo metropolis. The various efforts to provide means of transportation in Japan over the past 50 years were soon limited by the short supply of land in areas where the need was the highest and by financial problems in low-demand areas.

Cost Sharing

Various cost-sharing methods

In Japan, investment in roads includes both the construction, improvement and maintenance costs; investment in railways includes only the construction costs—maintenance costs are treated as part of operating costs.

In the case of railways, transportation investment is reflected in railway expenditure only in terms of depreciation and funds for paying interest and dividends. The interest or dividend payment depends on whether the investment was made out of own capital (shares) or debt. During the JNR days, there was no concept of dividends. Interest was included in the operating costs and both interest and depreciation were defined collectively as capital-related costs. Today, interest is considered non-operating expenditure by the JR companies (JRs).

During the JNR era, costs were divided into operating costs (staff costs, costs for energy, materials, etc.), and capital-related costs. When investing in railways, the cost-sharing method must be determined first.

All these costs were to be borne in Japan by the users, which had been a fundamental principle ever since the start of railway construction. This principle is also endorsed in today's law. However, it takes many years from when a railway is built until passenger and freight demand increases to the break-even point. In some areas, the break-even is never reached. Therefore, other cost-sharing means must be developed if a railway must be built in low-profit areas.

If just the capital-related costs must be reduced, some or all of the investment may be borne by taxpayers. This method has been used in Japan in the form of subsidies for part of construction costs. Once a railway is built, survival may be difficult due to changes along the railway or due to competition with other means of transportation. Consequently, part of the operating costs is sometimes subsidized. This may be the only effective measure if a local railway is to survive competition with cars.

In contrast to users bearing both operating costs and capital-related costs, all such costs can be borne entirely or almost entirely by taxpayers. An example can be found in Tokyo's Musashino City where a circular bus service covering 4 km charges a very low fixed fare, with deficits borne from the city's budget.

Cost sharing by taxpayers

If one has to choose, the obvious preference is for users to bear the costs entirely. JNR started construction of the Tokaido Shinkansen in 1959 based on this assumption.

Nevertheless, the government insisted (probably because it was the easier choice) on the same method for the Sanyo Shinkansen where it was obvious that such a method would never work, and marked the start of JNR's ultimate demise.

The role of railways can be categorized as (1) long-distance and inter-city passenter transportation, (2) passenger service in large cities, (3) passenger transportation by local railways, and (4) freight transportation. When it is time to build a new railway without jeopardizing financial independence, new construction

may be feasible if it serves one of roles 1, 2, or 4, assuming that: (a) demand is high, and (b) the construction cost is kept to a minimum. Condition (a) becomes harder to meet with the progress of motorization and air transportation. If a railway must be built at the risk of financial independence, the next resort is cost sharing by taxpayers.

Investment in railways for freight transportation (role 4) with taxpayers bearing the cost, is still unthinkable in Japan. Although there is an argument for reliance on railways to reduce pollution from trucks and to cut energy, the amount of freight that can be carried by Japanese railways is limited by line capacity and loading gauge, etc., and does not seem sufficient to produce the required effects. This leaves roles 1 and 2 for investment in railways to be supported by taxpayers. Indeed, there was a strong opinion around 1970 to invest more in shinkansen between large cities (role 1). Sooner or later, a similar demand will most likely be raised by politicians as demonstrated in late 1996.

In Japan, as in many other countries, subways are built to provide intra-city transportation (role 2), and about half the construction cost is borne by taxpayers. It is unclear whether operating costs are subsidized by local communities although many communities operating both subways and buses are reportedly suffering from overall deficits in transport services.

However, with few exceptions, until recently, construction costs were never subsidized whether in the case of JNR/JR or private railway companies. This is because existing railways were used heavily and the burden of new investment was relatively small, so financial independence could be maintained by modest fare increases. However, despite the magnitude of the need, investment aimed at reducing congestion is very slow because construction costs are huge and space is limited.

Investment by JNR and JR

Last golden era

The capacities of land transportation by automobiles was very low in pre- and post-war Japan. Both railways and shipping were devastated and could not play the leading role they had before the war. Japan had to first recover rail and shipping capacities while gradually building road and air capacities.

The country enjoyed high economic growth from the mid-1950s to the late 1960s with a sharp increase in transportation demand, and investment in transportation created still greater demand.

JNR invested in strengthening its capacity; income and expenditure were balanced for 7 years from 1957 to 1963 thanks to increasing demand in both passenger and freight transport and appropriate fare increases. The future seemed bright and completion of the Tokaido Shinkansen in October 1964 gave financial and engineering confidence to JNR executives.

The equilibrium would have been maintained if train fares had been increased to a reasonable level and investments kept within the scope of financial independence. But the Japanese and their government demanded investment of every possible kind from JNR, which rushed to achieve many things at once, including passenger and freight transport, inter-city and intra-city transportation, mainline and local railways.

To make things worse, the public liked the high speeds of the Tokaido Shinkansen and demanded more shinkansen even in areas covered sufficiently by existing tracks. Even this was not the end; the public wanted an undersea tunnel between Honshu and Hokkaido as well as tracks on the road bridge connecting Honshu and Shikoku.

The railway market had matured in the mid-1960s and Japan should have relied on automobiles for local and freight transportation. However, the government was reluctant to accept such a transition and forced continued investment by JNR in these markets.

Granted, there was a need to convert single tracks between large cities to double tracks and to increase capacity in large cities to meet increasing population. But the completion of expressways during and after the 1970s reduced demand for inter-city transportation by rail. Moreover, although the investments in increasing the capacity of intra-city rail transportation are highly evaluated today, they imposed a heavy burden on JNR.

During the 1960s, JNR suffered from increasing liability for investments and a sharp increase in interest payments. In fiscal 1960, the amount of long-term debt was 0.89 times the operating revenue, but it had risen to 2.27 times by fiscal 1970. Similarly, interest payments increased from 5.9% of operating revenue in 1960, to 13.3% in 1970.

These burdens did not stop the government from maintaining two conflicting policies comprising increased investment and suppressed fares. As the result, in fiscal 1971, JNR's operation sank into loss before depreciation meaning it had to worry about additional liability. By fiscal 1980, long-term debt had risen to 4.86 times the operating revenue with interest payments reaching 24.9%. At that stage, special measures were taken including shelving part of the debts, but they did not prevent losses accumulating.

Destruction of JNR

By the mid-1960s, JNR had already lost the power to finance its own investments. Had investment been truly necessary for some reason, subsidy measures similar to those introduced for subways shortly afterwards should have been taken.

Table 1 Investment in Transportation Facilities

(Billion yen)

FY	JNR/JR (a)	Private railways/ subways (b)	Roads	Ports	Airports (c)
1975	943.1	394.3	2,955.0	268.8	90.2
1980	1,376.6	484.2	5,829.0	441.5	224.1
1985	565.3*	538.8*	7,187.4	458.9*	216.6*
1990	579.2	565.8	10,732.8	588.7	316.6
1991	661.4	620.2*	11,464.3	600.5	466.5
1992	788.6		13,392.1	729.7	453.3
1993	799.6		15,064.2	890.0	558.4
1994	842.1		13,930.6		

* Not strictly comparable due to change in data collection method

Notes:
(a) Passengers only (JR)
(b) 14 Private railway companies, Teito Rapid Transit Authority subway, public subways
(c) New Kansai International Airport excluded

JNR Audit Report up to FY1985; Transportation Economic Statistics Summary, Railways in Figures, Facts about Private Railway Companies, and Roads Pocket Book for FY1990 and later

Table 2 Modal Split of Transport

(Million yen)

[Passenger-km]

FY	JNR/JR	Other railways	Buses	Cars	Ships	Air
1975	215,289	108,511	110,063	250,804	6,895	19,148
1980	193,143	121,399	110,396	321,272	6,132	29,688
1985	197,463	132,620	104,898	384,362	5,753	33,118
1990	237,657	149,821	110,372	552,412	6,275	51,623
1994	244,378	151,954	99,781	591,048	5,946	61,289

[Freight tonne-km]

FY	JNR/JR	Other railways	Trucks	Coastal shipping	Air
1975	46,577	770	129,701	183,579	152
1980	36,961	740	178,901	222,173	290
1985	21,410	509	205,941	205,818	482
1990	26,728	468	272,157	244,546	799
1994	24,077	416	278,509	238,540	871

When the government demanded continued investment without offering necessary subsidies, JNR should have disclosed the difficulty to the public and convinced them that it could not make further investments. However, in the national land planning policy introduced from the mid-1960s to early-1970s, the government had already overestimated the demand for JNR due to the continued high economic growth. If demand had been as high as estimated, increased operating revenue would have offset the accumulated deficits. In reality, JNR chose continued massive investments.

JNR's freight transportation peaked in fiscal 1970 and then began to decrease. Passenger transportation peaked 4 years later in fiscal 1974, and the peak was never achieved again. But JNR kept making huge investments until the early-1980s. Comparison of investment and transportation volume between different means of transportation after fiscal 1975 clearly shows the position of JNR at that time and its failure to quickly switch to a new direction for survival (Tables 1 and 2).

Although JNR had experienced a favorable cycle in which investment increased operating revenue which in turn, increased the opportunity for further investment, the cycle moved from JNR to road transportation after the 1960s. Growth of motor transport brought increasing revenues from the Fuel Tax which was used exclusively for road construction, generating more revenue from the Tax. The situation is shown in the amount of investments (Table 1) and volume of transportation (Table 2).

JNR's freight transportation lost the competition to trucks in fiscal 1966. Similarly, JNR's passenger transportation lost the competition to passenger cars 5 years later in fiscal 1971. Afterwards, the gap between JNR and road transportation increased year-after-year.

Railway operators in Japan were fortunate in having large passenger volumes,

Chain of combined rail and road bridges between Honshu and Shikoku *(Honshu-Shikoku Bridge Authority)*

resulting from areas with large populations and high densities. Railway companies other than JNR grew more than JNR because their markets were limited to large cities. But in the case of freight transportation, there is no such massive and concentrated market for the railway, and Japan's geography allows coastal shipping to carry most bulk cargoes.

Role of Shinkansen

Tokaido Shinkansen

The capacity of the old Tokaido Line had reached its limit and the region needed at least one additional double-tracked railway. This was the main reason for building the shinkansen. However, if a new line had to be built, it should be as fast as possible. And the very high demand was not expected to be affected by the completion of the Tokyo-Osaka expressway.

However, it should have been realized that even the Tokaido Shinkansen would cease to grow once the volume passed a certain point. This oversight was regretted even more in the case of other shinkansen (Sanyo Shinkansen, etc.) completed after private car ownership and road networks were consolidated.

To make matters worse, the fare increases in and after 1976 to amend the losses resulting from the previous price control policy discouraged people from riding trains.

Table 3 shows shinkansen use after the JNR privatization. The Tokaido Shinkansen's service in fiscal 1988 was higher than fiscal 1975, but the result for fiscal 1991 only registered a 19% increase. In the case of the Sanyo Shinkansen, there was a 10% decrease. These results show that speed is not the only factor in winning the competition.

The results for the Tohoku and Joetsu Shinkansen reflect the increased population in metropolitan Tokyo, but the results in the early-1990s are expected to remain unchanged through the years to come, although there may be an increase when services are extended to Nagano and Akita.

One serious issue is the low transportation densities and hence low revenues of the Sanyo Shinkansen and other shinkansen completed later. These lines had much higher construction costs but the same fares are applied. For example, the Sanyo Shinkansen's transportation density is only 35.2% that of the Tokaido Shinkansen but the construction cost was more than 2.5 times greater (Table 4).

Table 5 shows the financial balance for both the shinkansen and existing lines for fiscal 1985. The old Tokaido Line operation was in the red, but the combined balance between the old line and shinkansen operations was in the black. The Sanyo Shinkansen was in the black but the surplus was not large enough to offset the red from the older line. Both the old and new line were in the red in the case of the Tohoku and Joetsu Shinkansen.

These results show that JNR should not have attempted to finance the Sanyo and subsequent shinkansen lines. It should have obtained a guarantee of public subsidies prior to construction.

Table 3 Changes in Number of Passenger-km of Shinkansen

(Million)

	1975	1987	1988	1989	1990	1991	1992	1993	1994
Tokaido	35,200	32,123	36,299	37,404	41,341	41,841	40,655	40,504	38,907
Sanyo	18,200	13,153	14,792	15,002	16,064	16,277	16,161	16,026	13,310
Tohoku	—	8,929	9,677	9,892	10,678	11,689	11,837	11,695	11,763
Joetsu	—	3,209	3,583	3,666	4,089	4,413	4,408	4,339	4,267
Total		12,138	13,260	13,558	14,767	16,102	16,244	16,034	16,030

Notes: 1. The section between Tokyo and Ueno was completed on 20 June 1991.
2. Figures for FY1994 reflect the effects of the Great Kobe Earthquake on 17 January 1995.

Table 4 Shinkansen Construction Costs and Transport Density

	Construction cost per kilometer (Million yen)	(Completion year)	One-way transportation density per kilometer-day (persons) (FY1992)	
Tokaido	640	(1964)	100,781	(100.0)
Sanyo	1,643	(1975)	35,518	(35.2)
Tohoku	5,358	(1991)	30,292	(30.1)
Joetsu	6,048	(1982)	19,889	(19.7)

Over-expectation of shinkansen

The next issue is the effect of the shinkansen on other means of transportation. One point is very clear: air transportation has been eliminated between any two points that are 2 or less hours apart on the shinkansen. However, the air route between Tokyo and Osaka (3 hours by shinkansen) was only slightly affected shortly after the Tokaido Shinkansen began operating and there was no subsequent effect due to the overall increase in demand.

Shinkansen operation does not seem to have had any effect on expressways—both shinkansen and expressways are used equally. The slight decrease in passengers on the Sanyo Shinkansen might reflect the effect of the Chugoku Expressway.

During the mid-1960s, both JNR and

Joetsu Shinkensen in snow country *(JR East)*

Table 5 Balance between Shinkansen and Conventional Line Operations within Same Sections (FY1985)

(Billion yen)

Item	Section	Tokyo–Hakata			Tohoku	Joetsu	Total
		Tokaido	Sanyo	Total			
Shinkansen	Revenue	6.756	2.843	9.599	2.076	0.815	12.490
	Expense	2.857	2.065	4.922	3.667	1.594	10.183
	Profit and loss	3.899	0.778	4.677	–1.591	–0.779	2.307
	Operating ratio	0.042	0.073	0.051	0.177	0.195	0.082
Conventional	Revenue	3.386	1.563	4.949	1.533	0.608	7.090
	Expense	4.943	3.449	8.392	2.520	1.068	11.980
	Profit and loss	–1.557	–1.886	–3.443	–0.987	–0.460	–4.890
	Operating ratio	0.146	0.221	0.170	0.164	0.176	0.169
Total	Revenue	10.142	4.406	14.548	3.609	1.423	19.580
	Expense	7.800	5.514	13.314	6.187	2.662	22.163
	Profit and loss	2.342	–1.108	1.234	–2.578	–1.239	–2.583
	Operating ratio	0.077	0.125	0.092	0.171	0.187	0.113

Note: Figures reflect ordinary profit and loss after sales of fixed assets and other extraordinary profits and losses.
Source: JNR Audit Report - FY1986

other administrative agencies seem to have had too much confidence in the railways. They thought time reductions would attract more passengers which, in turn, would help the local communities prosper. Actually, the greater effect was concentration in Tokyo.

If so, why was the shinkansen extended to the less favourable Sanyo area and why were matters made even worse by extending it to Tohoku and Joetsu?

There are at least two reasons. First, the leaders and planners around 1960 did not understand motor transportation. They had done the necessary research in other countries, but since Japan's land area is small and the population density is very high, they thought Japan was the last country where private car ownership would boom so expressways were built primarily for transporting freight. Second, high-speed trains on the Tokaido and Sanyo lines had been planned in the late-1930s, and it was taken for granted that it was only natural to extend the shinkansen to the Sanyo area. Careful study would have shown that the Sanyo Shinkansen was never a reasonable proposition.

Nevertheless, the JNR officers had other ideas. They wanted to expand the shinkansen network to all parts of the country, build an undersea tunnel between Honshu and Hokkaido, and connect the two by shinkansen.

Naturally, the plans excited the nation. JNR took the easy route leading to its final demise on the assumption that the popularity of the plans would persuade the politicians to provide subsidies.

Needless to say, government financing had its limits. In 1970, a law was legislated enabling construction of 7,000 km of shinkansen network but the network in 1996 totals only 1,835 km. Even politicians could not beat the trend of the times.

Political Pitfalls

Technologies to dig a long undersea tunnel, build a long bridge, or run high-speed trains are very costly and their application requires the highest level of judgment.

Japan was already in the motor age when new legislation was passed in 1970 to build a nationwide shinkansen network including the Seikan (Honshu-Hokkaido) Tunnel and Seto (Honshu-Shikoku) Bridge. Both JNR and the politicians should have been aware of the heavy financial burden that the new technologies would impose.

JNR turned to the politicians for help, and the politicians who were inclined to use construction projects as bait to collect more votes, approved increasing the deficit further.

That JNR's destruction is attributable to this corrupt link between business and politics is not just my personal view. To

quote Atsushi Kusano in *JNR Reformation* (Chuo Koronsha, 1989):

'First, the Finance Ministry's approval is needed before JNR's requests are reflected in the budget draft. With its expectation for government support to put an end to the worsening finances growing higher and higher, JNR had to rely on the influence of the ruling Liberal Democratic Party (LDP) members on the Finance Ministry.

'Since the goal of Diet members is reelection, no wonder LDP members, when asked to use their influence, expected some sort of vote-catching favour in return. JNR was aware of this and acted accordingly even when the politicians did not make explicit requests.

'Budgets were not the only issue. Until fiscal 1977, any revision in train fares, which was the main source of income, had to be approved by the Diet. The cheer-leading team consisting primarily of LDP members was a most reliable group for JNR.'

The regional division and privatization of JNR in April 1987 aimed to minimize political control over the enterprise, or, in other words, to break the corrupt link between business and politics. It sought recovery of management independence and autonomy.

However, some politicians continued exercising their influence in local areas by favouring resumed construction of more shinkansen, some of which actually occurred, but their scale was small and half the construction cost was borne by central and local government. A future issue is whether such a measure is sufficient for solving the problems and some new attempts may be introduced in the 1997 budget.

Today, taxpayers are in no position to assume such responsibility. The government must settle JNR's historic debts held by the JNR Settlement Corporation and now amounting to ¥28 trillion (of which ¥20 trillion is to be borne by taxpayers).

Seikan Tunnel between Honshu and Hokkaido *(Japan Railway Construction Public Corporation)*

This debt is only a part of the government's total liabilities which approach the nation's GDP. Before making further investment in railways, the government must solve these problems.

Three Honshu JRs in Profit

Shinkansen cost sharing

Luckily, the three Honshu JRs have the existing shinkansen and have maintained sound management for the past 10 years. They have managed to stay in the black and two are listed on the stock market. How is the shinkansen operation contributing to these three JRs?

In terms of the transportation volume, the shinkansen accounted for 12.6% and 29.7% of the total volume of JR East and JR West, respectively. The amount was 79.4% for JR Central (Table 6). In terms of operating revenue, the figures must be substantially higher.

JR East's 838.9 shinkansen route kilometers is greater than the JR Central 552.6 kilometers or JR West's 623.3 kilometers. However, the transport volumes do not necessarily match the route kilometers as shown in Table 6, causing the difference in transportation density shown in Table 4. Shinkansen operation accounts for somewhat lower ratios in transportation volumes in the case of JR East and JR West because JR East has a massive volume of passenger transportation primarily in the

Table 6 Ranking of Shinkansen in Number of Passenger-km for Three JRs

(Million passenger-km)

	Total volume of transportation (A)	Shinkansen (B)	B/A
JR East	128,486	16,245	12.6%
JR Central	51,201	40,655	79.4%
JR West	54,423	16,161	29.7%
Total	234,110	73,061	31.2%

Note: Tohoku and Joetsu Shinkansen operated by JR East, Tokaido Shinkansen operated by JR Central, and Sanyo Shinkansen operated by JR West

Tokyo area, and JR West primarily in the Osaka area.

Nevertheless, the financial balance of the shinkansen operation during the JNR days was poor (Table 5). Both the Tohoku and Joetsu Shinkansen services were in the red, and JNR's Sanyo section with the conventional and shinkansen lines combined, was also in the red. These results would have imposed a very heavy burden on JR East and JR West had the deficits been directly inherited.

Initially, a special measure was introduced to impose a greater burden on JR Central and a lesser burden on the other two companies with regard to the cost of operating their respective shinkansen services. When the three companies purchased the shinkansen in 1991, the purchase price was set higher than the replacement value for JR Central and lower for the other two. The figures below indicate the purchase price and replacement value per kilometer.

(Million yen/km)

	Purchase price	Replacement value
JR East	4,056	5,769
JR Central	9,887	5,741
JR West	1,759	3,249
(Average)	5,001	5,001

The cost per user is still higher for JR East, which is understandable given the variation in the transport densities, as shown by the purchase price per passenger-km in fiscal 1992 given below.

JR East	¥191.26	¥272.03
JR Central	¥125.34	¥72.78
JR West	¥60.28	¥111.30
(Average)	¥125.60	¥125.60

The figure for JR Central, having a higher transportation density, falls very close to the average, despite higher purchase price per route-km.

Epilog

Before closing, I would like to express two personal views.

First, JNR was lucky to have the Tokaido area with such a high population density. Without it, the JRs would face a serious financial crisis. At the same time, the shinkansen concept itself would have never been envisaged. In that case, JNR would have maintained sound operation and survived as a public corporation.

For reference, the Tokaido area consists of thirteen prefectures covering 65,247 km^2 accounting for 17.28% of the entire nation. The population of the area was 40,977,000 in 1960, rising to 65,346,000 in 1990. This is 43.45% to 52.86% of the nation's population. It is equivalent to the entire French population and more living in an area equal to Belgium and Holland.

Second, before starting a large-scale project, it is important to confirm whether demand justifies investment, and whether the users and taxpayers can bear or are willing to bear the cost.

The Tokaido Shinkansen enjoyed demand close to capacity until 1975 despite the rapid growth of car ownership. It remained profitable although the sluggish growth after 1975 was unexpected.

In the case of the Seikan Tunnel between Honshu and Hokkaido, the maximum transportation volume by ferry operation was 4.99 million passengers in fiscal 1973, and 8.55 million tons of freight in fiscal 1971. These are the results when the tunnel construction started. The project planners believed the figures would continue to grow, but they were wrong. The tunnel began operation in March 1988. The number of passengers topped 3.04 million that year, but was only 61% of the result in fiscal 1973. The freight transportation was 5.67 million tons in fiscal 1991, representing only 66% of the result in fiscal 1971.

In planning a project of this scale, it is essential that there is somebody to bear the cost even when demand drops. Planners of big projects must be very cautious.

End of era

As symbolized by the shinkansen, the past 50 years have seen the fruition of revolutionary ideas in transport such as private car ownership, jet aircraft and supertankers accompanied by the development of expressways, international airports and big deepwater ports. The development of new districts in cities such as Shinjuku in Tokyo, La Défense in Paris and Canary Wharf in London created new demand for transport in general.

However, in the 1990s, revolutionary ideas in transportation supply and demand seem to have dried up and it has also become practically impossible to acquire new space for transportation. The situation is especially bad in highly-populated Japan. The era when technical revolutions in transportation can change society is coming to an end.

People in the 21st century may say as far as transport is concerned '... there is no new thing under the sun.' (Eccles. 1:9) ■

Ryohei Kakumoto

Dr Kakumoto was born in Kanazawa in 1920. After studying law at the University of Tokyo, he joined the Ministry of Railways in 1941. After Leaving JNR as a Member of the Audit Board, he served as President of Japan Transportation Economics Research Centre. He was a visiting professor at Waseda University for many years, and wrote a number of books on transport policy, urban transport, railway management, etc. Dr Kakumoto was one of the earliest advocates of JNR reform. In the late 1970s, he proposed splitting JNR into several regional networks. He served on the government's commissions for JNR reform as an advisor.