Transition of Railway Freight Transport in a Competitive Environment

Kiyoshi Okada

1. Introduction

The Japanese economy grew rapidly from the 1960s to the early 1970s at an annual rate of over 10%. This growth was led mainly by the private sector, particulary by heavy and chemical industries (steel, shipbuilding, petrochemical, etc.) and by light industries (automotive, electrical appliances, machine tools, etc.). Switching from coal to oil gave easy access to cheap energy, and new industries were established in waterfront and urban areas. These new factories have been highly productive as a result of using technologies from the USA and European countries. However, during the 1960s, agricultural regions in Japan suffered from high unemployment due to relative overpopulation. As the national economy became industrialized, young agricultural workers rushed to the industrial and urban areas looking for jobs. Japanese economic growth was promoted during the late 1960s by domestic demand and exports.

The economic growth during the early 1960s was the result of a fortunate combination of three elements: abundant and cheap labour, cheap energy, and new technologies. In addition, the selective and intensive loans made by banks supported the economic growth ("capital concentration" hypothesis). Such a background produced signs of change in the late 1960s. One was the further shift to mass production after expansion of factory size. Large enterprises that had grown more confident during the early economic growth period eagerly expanded production facilities. Cars, colour TVs, and many other consumer goods appeared in quick succession during this period. The other change was generous and large-scale government investment in social capital (roads, ports, airports, housing, etc.). These changes stimulated the high economic growth until the country was hit by the oil crisis in 1973.

The railway played an important role in supporting the high economic growth. The Japanese economy was already growing rapidly in 1959, but there was a chronic shortage of transport whether on tracks, by land, or sea ("bottle-neck" theory of transport). People feared this would hinder growth, while investment in transport sectors was urgently needed. All transport facilities were running at nearly full capacity from the late 1960s to the first oil crisis. Public investment was made in building railways, roads, and ports, and the shortage of transport was prevented from seriously hindering growth. However, the first oil crisis caused a substantial change in the Japanese economy and a long-term decline in railway transport. This decline is analysed below in terms of external and internal factors.

2. Investment policy before 1965

The freight railway policy from the 1950s to the early 1960s had two themes: modernization of aging postwar railway facilities, which meant introducing electric railways and diesel cars and renewing rail cars, and meeting the increasing transport demand to support rapid economic growth.

To meet these goals, three-phase investment was planned. In the first 5-year plan (1957-1961), priority was placed on modernization of facilities rather than on increasing capacity. But the need to raise the scale became obvious and the plan was modified accordingly. In the second 5-year plan (1960-1964), priority was put on increasing capacity to a level commensurate with economic growth. However, this plan did not yield the expected result and a new plan had to be re-established. The original plan failed because of suppression by national budgets. In addition, it failed because higher priority was placed on constructing the Tokaido Shinkansen rather than on investment in freight facilities. Consequently, a third long-range plan (1960-1971) was introduced. But again, the main emphasis was on increasing passenger capacity such as commuters in urban areas. There was a greater demand for freight transport than the existing facilities could meet. As a result, the increasing demand could be met only to the extent achievable by maximizing use of existing facilities.

Very limited investments were made in modification of existing facilities and construction of new ones. Within these financial limits, new freight stations were built by separating the freight portion from existing stations, and large marshaling yards were built. These projects continued on a national scale through the 1970s, but they did not create enough capacity to stop the on-going shortage of freight transport during the rapid economic growth period. At the same time, new efforts were initiated to introduce a new transportation system called the "coordinated transport system" combining trucking and the railway. Around 1960, the importance of implementing "door-to-door" streamlined transportation using containers and pallets carried on freight trains was recognized. People in the transport industry were amazed by the large-scale coordinated system that had been implemented in the USA. The shock was soon overtaken by recognition of the urgent need to introduce a similar system in Japan where the motorisation age was about to begin. This called for the need to unitize freight (containers and pallets).

The first attempt to reach that goal

■ Heavy Trucks on Tokyo-Nagoya Expressway *(H. Morokawa)*

was the container freight train that began operation on 19 November 1956. Then, on 5 November 1959, a larger-scale container freight train called the Takara (meaning treasure) began running between the two major freight stations of Shiodome in Tokyo and Umeda in Osaka. The first pallet freight car was completed on 22 October 1960. But their use never passed the trial stage during most of the 1960s. It was not until 1969 that they were introduced on a regular and high-speed commercial basis. Therefore, the period from 1960 to 1969 saw the transition to a new age of container transport.

3. Aggressive management policy after 1965 (1)

The truck industry grew rapidly in the 1960s in step with the economic growth, especially between Tokyo, Osaka, and other large cities. There were no expressways at that time, but an increasing number of trucks were crowding Route 1. They travelled punctually from Tokyo to Osaka in 14 hours and this punctuality-based reliability helped the truck operators steadily gain new customers. Trucks carried electric appliances, medical supplies, daily goods, and other LTL (less-than-truck load) cargo of a high service cost. Prior to the shift to trucks, such commodities were mixed (consolidated car load) with other goods and carried on freight trains. The transport cost on the railway was relatively high, and the trucking companies found it possible to offer similar services on trucks at the same or even lower fares. As a result, fierce competition developed in the early 1960s between conventional LCL (less-than-carload) transportation on railways and LTL transportation by trucks.

Under such circumstances, the Japanese National Railways (JNR) (before privatization) took some active steps. The speed of freight train operation, especially LCL transportation, was increased after 1 October 1965. At the same time, the conventional LCL transportation system was entirely revised. The nationwide geography was divided into 90 blocks with 160 container yards to launch a coordinated transport system. It was a very active strategy in that it marked the start of containerization in Japan's railway transportation. The strategy to establish a new transport system using 5-ton containers was meant primarily to construct an all-new transportation system rather than to shift the existing LCL business to containers in order to compete with trucking companies. However, the shift to containerized transport led to the destruction of the conventional and historical LCL transportation system. It did not work as an LCL marketing strategy. It only encouraged customers to shift from railways to truck companies, contributing to their rapid growth. The strategy of introducing a new type of transportation system was intended to promote modern, containerized transportation. And it was supposed to stimulate customers to shift from mixed-load LCL to containerized transportation in one step. Unfortunately, most of the LCL customers resorted to truck transport because of the mismatch between the railway's LCL market and the containerized system. That was not all. The rail freight forwarders, who earned most of their revenue from the railway LCL market, suffered a sudden drop in income. Such a drop could not be filled by shifting to containerized cargo and their business was jeopardized. They decided to

Table 1 Growth of containerized transport (1964 - 1972)

Year	Tonnage (1,000)	Index	Ton-km (million)	Index
64	1,145	100	672	100
65	1,906	166	1,197	178
66	2,964	259	1,944	289
67	4,673	408	3,183	474
68	5,970	521	4,170	621
69	7,314	638	5,229	778
70	8,715	761	6,301	938
71	10,292	899	7,626	1135
72	12,394	1082	9,419	1402

JNR Audit Report 1969 - 1974

shift their business focus from railways to trucks entirely. As a result, the railway had to abandon the small-shipment market.

Nevertheless, the new containerized transport system grew rapidly as more container trains were introduced. Table 1 shows that it grew at a very fast rate after 1964; the first jump was from 1965 to 1967, increasing 2.67 fold (ton-km base). In October 1968, JNR increased the number of non-stop freight train services by the largest post-war scale to increase capacity (extra 340 services or 31,300 train-km per day). On 25 April 1969, high-speed Freight Liners were introduced. This contributed greatly to the dramatic growth of containerized transport, which finally reached 10 million tons on 23 March 1972. This growth was attributable to the unprecedented rapid economic growth and to the bullish policy boosting transport capacity.

The expansion in mass production by manufacturing industries including electrical appliances, machinery, textiles and pharmaceuticals stimulated the LTL market leading to a rapid increase in transportation demand. Scheduled truck transportation grew rapidly from 1966 to 1973 and had already established a market lead by the late 1960s. At about the same time, the country's first expressways were completed, and larger-capacity better-performance trucks appeared (resulting in more efficient transport). This also helped increase transport demand and introduced the second rapid growth phase of truck transport. The Tokyo-Nagoya and Nagoya-Kobe expressways were completed in 1969 making high-speed transport between Tokyo and Osaka possible (time cut from 4 to 6 hours). As a countermeasure, JNR introduced high-speed Freight Liners to implement containerized transportation. Then, in 1970, JNR introduced the privately-owned container system allowing trucking companies to use railway services with their own 10-ton containers. This was intended to recover business from trucks and it was welcomed as a happy marriage between the railway and the truck, paving a new path toward coordinated (cross-modal) transport.

However, while containerized transport grew rapidly, the carload transport and the inter-region express freight train service which was formed in shippers sidings became less popular around 1970, meaning car-load transportation was slowly being taken over by coastal shipping and trucking. The JNR audit report for fiscal 1972 listed three reasons for the unpopular JNR freight transport: (1) failure to adapt to changes in industrial structure or location, (2) failure to modernize transport, and (3) lack of eagerness to meet shippers' demand for reformed logistics. The situation was aggravated by several incidents. One was the reduced number of train operations resulting from poor industrial relations. More than 90 days of freight train operations were suspended in 1972 at the loss of 10 million tons of cargo. Another cause was the huge increase in train fares introduced to improve JNR's financial condition. The container fare was increased by 23.5% in October 1974. Train fares were increased 58.6% in November 1976. These two factors caused grave damage to the railway freight transport business. The situation was made even worse because the country was suffering from recession after the first oil crisis. The happy marriage did not last long.

4. Aggressive management policy after 1965 (2)

In addition to the containerization policy, JNR had another policy to introduce industry-specific freight trains and dedicated train services. After 1965, JNR developed freight cars designed exclusively for specific industries, such as cement, automobiles, steel, oil, liquid chemicals, or powder/particle products. At the same time, JNR opened yards in several locations. Coal cars, refrigerated cars, ventilated cars, cars for carrying fragile china, etc., had been in use for many years before, but after 1965, JNR introduced hopper cars for carrying grains and feeds, and new freight cars for carrying limestone, automobiles, etc. It was a policy designed to enhance the prominent advantage of the railway - mass transportation. This policy was very successful. The demand for the new service increased sharply reflecting the rapid growth of the economy after 1965. Transport demand for limestone, rice, steel, chemical fertilizers, oil, automobiles, paper, etc., soared. Railway transport of automobiles, in particular, increased nearly 18-fold from 1965 to the 1970s. Demand for paper and oil also increased 60% over the same period. At the top of the list in 1972 were coal (1,236 million ton-km), timber (2,177 mtk), rice (2,391 mtk), steel and steel products (2,150 mtk), chemical fertilizers (2,876 mtk), oil (2,624 mtk), cement (2,626 mtk), automobiles (1,110 mtk), paper (3,290 mtk), and limestone (846 mtk).

Warehousing companies, port railway companies, and commodity terminal companies were established in quick succession after 1965. Port railway companies were already in existence but the number was very small. The Keiyo, and the Kanagawa port railway companies were established early in the 1960s. Some of the relatively early companies included the Nagoya (1965), Kashima (1969), and Niigata (1969) port railway companies. Four others were established in 1970 in Mizushima, Akita, Hachinohe, and Sendai. These companies served the new needs of factories built in the port areas in the early 1960s. These factories created a big demand for transport of raw material and other commodities.

A number of commodity terminal companies were established at about the same time. They included the Tokyo Liquid Chemical Products Center (1967), Tokyo Foods Terminal (1965), Hokkaido Agricultural Products Terminal (1965), Kansai Chemical Products Transportation (1965), Japan Oil Terminal (1966), Iidamachi Paper Distribution Center (1966), and Cement Terminal (1972). But the volume of cargo served by these terminals began falling in the early 1970s centering on only four commodities (coal, cement, limestone, and oil). Coal transportation decreased later, and the remaining three commodities became the primary items of railway transport. The falling popularity was

Table 2 Changes in railway freight transport (1960 - 1991)

Year	Tonnage (1,000)	Index	Ton-km (million ton-km)	Index
60	186,953	100	52,992	100
65	191,061	102	55,788	105
70	193,106	103	62,043	117
75	141,691	76	46,577	87
80	117,896	63	36,688	69
85	65,497	35	21,411	40
86	59,072	32	19,974	37
87	55,294	30	20,026	38
88	55,695	30	23,031	43
89	55,782	30	24,675	47
90	58,400	31	26,728	50
91	57,390	31	26,698	50

Notes: 1. Revenue ton/ton-km
2. JNR to 1986, Japan Freight Railway Co. after 1987

JNR Audit Report 1969 - 1979; Railway in Numbers 1993

the result of low reliability due to labour strikes, and fare hikes. Only a small part of demand (coal, timber, fresh fish, etc.) started decreasing in the early 1960s. However, railway transport was divorced by gravel, steel, chemical fertilizers, chemicals, automobiles, etc., in the 1970s, followed by oil, limestone, and cement in the 1980s. Demand fell after the peak years of 1978 (18.8 million tons) for oil, and 1976 (1.6 million tons) for limestone. However, coal, limestone, and cement still remained the primary items for railway transport.

5. Decline of railway freight transport

The two management policies mentioned above were positive policies taken in the process of transition from the railway's monopoly of land transport to the era of competition with the trucking industry.

Table 2 shows the changes in the transport volume (tonnage and ton-km) over approximately 30 years from 1960. The increase from 1965 to 1970 represents the start of containerized transport. Despite the increase, freight transport fell during the 1970s in both tonnage and ton-km, because, although point-to-point direct transport of oil and limestone increased, other car-load transport declined during the period.

In a typical railway transport system, separate cars start from several local stations and are collected in a marshalling yard where they are formed into a train. The train is routed on a trunk line until it reaches the destination yard where the cars are each delivered separately to their own destinations. When the railway dominated land transport, demand was high and the cars reached the marshalling yard quickly and there were frequent departures. As soon as some demand shifted to trucking, marshalling took longer. This caused frequent delays which, in turn, caused further decline in demand. The situation was very bad. If the delay in the arrival time was to be minimized, the number of cars per train had to be reduced. The increase in containerized transport of industry-specific commodities after 1965 accompanied a decline in operation efficiency (operation ratio) of freight cars, and in the number of cars per train. There were as many as 169,000 freight cars by the time the Freight Liner service started in 1969, but their operation ratio fell drastically to only 17.9%. The average number of cars per train fell from 34.7 in 1960 to 32.0 in 1965, and to 27.7 in 1969. Those trains were called "light trains". As competition grew between railways and trucking, a distinct separation grew between freight for railway transport and freight for truck transport. As a result, the need for yards decreased. One cannot neglect the fact that the heavy emphasis on containerization and industry-specific commodity transportation by railways only spurred the decline of the yards. As a result of emphasis on direct and high-speed train operation, the ratio of yard-based transportation fell to 48% by early 1970. In other words, yard-based transportation grew less efficient year-after-year creating the opinion that the poor finances of freight transport would never be improved unless yards were abolished.

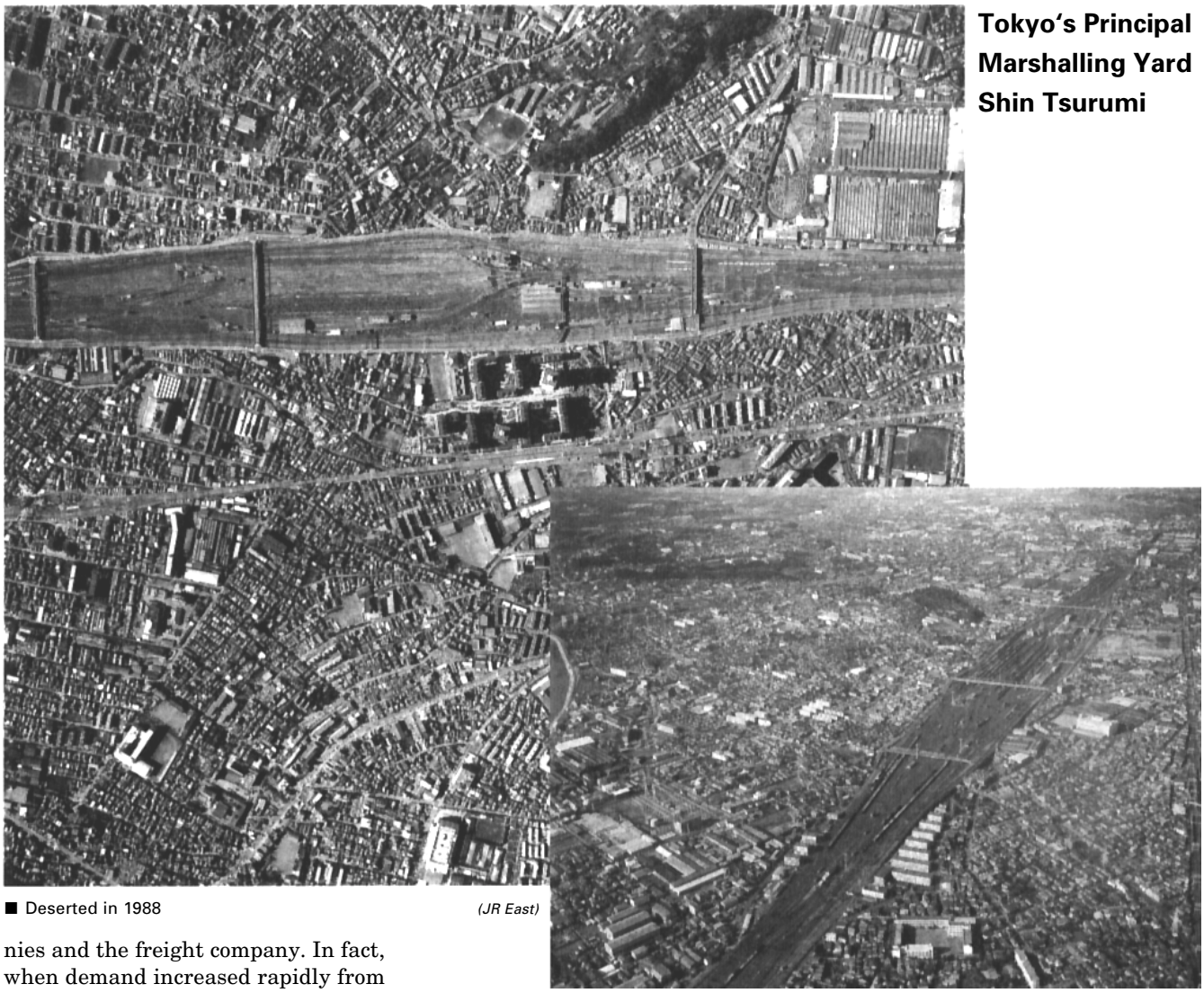
When it was time to revise train schedules in October 1978, new plans were introduced to reduce the number of yards to 196 (47 trunk yards, 47 sub-trunk yards, and 129 supplementary yards). Then, in the schedule revision of February 1984, all the marshalling yards were abolished despite opposing views that some should be maintained. They were abolished because freight transportation had become extremely unprofitable.

The last schedule revision by JNR in November 1986 was based on the post-privatization plans, which set the number of freight stations at approximately 300 (14% of number in 1971), the number of freight cars at approximately 20,000 (14%), and the number of personnel at approximately 10,000. Transport targets were set at 63 million tons (33%) and 21,900 million ton-km (36%). Today, CL freight accounts for 44 million tons and is still declining. However, containerized freight has increased to 20 million tons.

6. Future of railway freight transport

Since the privatization of JNR, passenger transport is handled by six separate companies, and freight is handled by only one company. The freight business is based on contracts with the passenger transport companies leasing tracks. This suggests a potential conflict in the way tracks are shared by the passenger compa-

Tokyo's Principal Marshalling Yard Shin Tsurumi



■ Deserted in 1988 *(JR East)*

■ Still Active in 1983 *(JR East)*

nies and the freight company. In fact, when demand increased rapidly from 1987 to 1991, the freight company had a hard time trying to increase its number of train operations.

Containerized transport on railways can compete favourably with trucks between cities up to 800 km apart. It wins the cost competition and possibly the time competition between Tokyo and Sapporo (Hokkaido) and between Tokyo and Fukuoka (Kyushu). In this regard, the routes between large cities and cities in Hokkaido or Kyushu are good markets for railway freight transport. Trains are used widely in inland transport of oil, cement, and other bulk commodities. However, these markets represent only a very small fraction of freight transport as a whole. An increase in transportation in the near future cannot be expected unless other markets are explored.

One good sign that may lead to recovery is the growing opinion that Japan's freight transport relies too heavily on trucking. Over reliance on trucking is not desirable in terms of road congestion, environmental pollution, and energy efficiency. In addition, a labour shortage is causing a shortage in the number of long-distance truck drivers. The environmental issue is becoming more-and-more sensitive. There are opinions advocating the need to revive railway freight transport for these reasons. However, no scenarios have been proposed to turn these opinions into reality. ■

Kiyoshi Okada

Professor Okada graduated from Waseda University in 1955. He joined Seijo University in 1961 where he teaches Transport Economics. He is an authority on transport policy and advises the Japanese Ministry of Transport, and the Environment Agency.