

formed transportation, giving priority to railroads and placing the country firmly into the railroad age.

## Notes

1. Response made on 20 October 1867 to an eight-article inquiry on the transfer of political duties from Tokugawa Yoshinobu (the last shogun) soon after he submitted his resignation to the court (*Zoku Tokugawa jikki*, 28 October 1867, and *Fukkoki*, 19–26 October 1867).
2. Yamamoto Hirofumi, *Ishinki no kaidō to yusō* (Roads and transport in the Restoration period) (Hosei University Press, 1972); idem, “Boshinki ni okeru gunji yusō” (Military transport during the Boshin Civil War), in *Nihon kinsei kōsū shi kenkyū* (Research on transportation in early modern Japan) (Yoshikawa Kobunkan, 1979).
3. Masuda Hiromi, *Shokusan kōgyō seisaku to Nobiru chikkō* (Industrial development policy and the construction of Nobiru Port) (United Nations University, 1979). Teratani Takeaki, *Nihon kōwan shiron josetsu* (Introduction to the history of Japanese ports) (Jicho Sha, 1977).
4. See note 3 above and Masuda Hiromi, “Shokusan kōgyō seisaku to kasen shū’un” (Industrial development policy and river transport), in *Shakai Keizai Shigaku*, vol. 48, no. 5.

## Railroads

*Katsumasa Harada*

### The Decision to Construct Railroads

Japan’s government planned and constructed the country’s railroads and adopted a system by which it would operate them as well.<sup>1</sup> The government had to do the job because the national base for private industrial capital was too weak then to provide the motive force of industrialization. The conditions called for manufacturing to be the main force in private capital industrialization; those in charge did not regard the time as ripe for private business to take the lead in railroad construction. Moreover, it would have been impossible for Japan to start out with a programme of private construction and operation similar to that in Great Britain. Several plans for private construction of railroads had been made by foreigners immediately before the fall of the shogunate, and there were also the plans of Godai Tomoatsu and his associates for a railroad between Kobe and Osaka. Although none made any demand for domestic industrial capital, the type of right-of-way that the former demanded would have made the railroad similar to those in the West’s colonies in Asia and Africa.

Established through imperial restoration, the Meiji government had economic and political motives, including the strengthening of its own authority, for constructing railroads. That is clearly shown in the routes selected for construction, ones that would connect economic and population centres.

The first railroads were to be between Tokyo and Kyoto, and subsequent routes would link Tokyo with Yokohama, Kyoto and Osaka with Kobe, and the Maibara and Nagahama (Shiga) areas with Tsuruga (Fukui).

The government's first consideration in building a railroad was its political effect. Constructing a 500-kilometre railroad between Tokyo, the new capital, and Kyoto, the old, meant building it along either the Nakasendo or the Tokaido, the nation's two major traffic arteries since the beginning of the Edo period. But in either case, an iron-rail connection between the old and new political centres would strengthen central authority.

Considerations of political and social effect were decisive in government decisions on railroad construction. Plans were made for routes that would connect the open ports with the economic and political centres: routes between Tokyo and Yokohama and between Kyoto, Osaka, and Kobe. One of the social effects of constructing railroads where population and traffic were highly concentrated and where, therefore, cultural level was highest would be to demonstrate how powerful the government was.

One of the peculiar characteristics of Japanese railroads is that they adhered to political requirements rather than to the needs of private capital. It would be helpful in this connection to look at the chronology of events leading up to railroad construction.

In March 1869, Richard Henry Brunton, a Scottish engineer employed in Japan to construct coastal lighthouses, discussed with officials of the Foreign Office (Gaikokukan, the antecedent to the Gaimusho, the Ministry of Foreign Affairs) the possibility of building railroads and advised that the economic effects of such construction would be indeed large. Sir Harry Parkes, the British minister, had frequent informal meetings with Foreign Office leaders to explain the great potential of railroads and the need to build them. Okuma Shigenobu was in charge of diplomatic negotiations at the time and he became more and more convinced that Sir Harry's advice must be heeded. After being transferred to the Finance Ministry as a vice-minister, Okuma became a central figure in domestic reform and discussed the matter of railroads with Ito Hirobumi, a Finance Ministry director. Vehement factional feuding within the government meant that discussions of this nature had to be informal, so the two men joined forces to make railroads a reality by arranging informal talks between Parkes and government leaders. Through these talks, cabinet ministers were eventually persuaded to push for railroad construction.

The government formally decided on 12 December 1869 to begin preparing to construct railroads. For financial reasons, the decision stated that the first routes would be between Tokyo and Yokohama and between Osaka and Kobe. Parkes had introduced a fellow Briton, Horatio Nelson Lay, to the government, and it was decided that Lay would supply the Japanese government with funds for construction and aid in providing engineers and construction materials.

On 17 April 1870, the order was given to begin surveying the route between Tokyo and Yokohama. Construction soon began with Edmund

Morell as chief engineer. The materials Lay had procured and the engineers began to arrive from England. However, Lay's floating of a bond issue on the London market was contrary to the government's desire that the money be raised privately. And, although 12 per cent was the expected interest, the government received only 9; Lay was getting a 3 per cent margin of profit. Okuma and his allies not only stood to lose confidence from the rest of the people in government, there was also a dangerous possibility that the railroad construction plan would be cancelled.

Opposition within the government to railroad construction was strong. The leading faction consisted of people to whom military policy was more important than transportation. Its chief exponents were the leaders of the Ministry of Military Affairs (later split into ministries of the army and navy), particularly the man known as the founder of the army, Saigo Takamori. Their idea of providing a strong foundation for the new government was through the building of a mighty military force. To them, pouring large amounts of funds into constructing railroads was clearly a waste of money. To an extent, their view was realistic, but there were also those in the ministry who contended that if a railroad were built, the armed forces of Great Britain and France, stationed in Yokohama, would seize it and attack Tokyo.

Other preposterous arguments that Okuma and Ito confronted were those grounded in traditional exclusionism, held by, among others, conservative Military Affairs and Danjodai (predecessor to the Ministry of Justice) bureaucrats, that machine civilization from vile foreign countries should not be permitted into the land of the gods. Other opposition was based on superstitious fancy: that because *tetsu* (iron), the first Chinese character in *tetsudo* (railroad), can also be read to mean "lose money" (*kane o ushinau*), the laying of metal rails would cause Japan to mint and print large volumes of money that would be lost in the venture. The dead seriousness of those who held these views, no matter how readily apparent their weirdness, was often manifested in threats to the lives of Okuma and Ito.

In response to Lay's actions and the public outcry they caused, the government cancelled his commission. In his place, it appointed the Yokohama branch of the British Oriental Bank as agent, which got the government through the crisis and allowed the operation to continue.

The Ministry of Public Works was established on 28 December 1870 and given jurisdiction over railroad construction. Morell's advice to the government was an important factor in establishing this ministry. He had contended that Japan should immediately set up its own industrial technology, that the government should set up an agency to oversee the modernization of industry, and that the agency should have jurisdiction over railroads. Since Japan was importing all the materials for the railroad, construction costs were enormous. Morell pointed out that Japan could supply its own wooden railroad ties and that bridges could be made of domestic wood rather than imported steel. In all of his discussions with the government, he tried to look at things from the Japanese perspective and to give instruc-

tions in line with that view. He also advised Japanese leaders that continually hiring foreign engineers would incur personnel costs that would eventually sap the treasury. The best approach would be to train native engineers. His suggestions led to the setting up of a school to train engineers, the Kogakuryo, in the Ministry of Public Works.

### Beginning Railroad Operations and the Road to Independent Technology

The Kawasaki-Yokohama segment of the planned railroad was completed and test runs begun in September 1871. Ten engines and several passenger and cargo coaches arrived in Yokohama for assembly. In October, Morell died from tuberculosis at the young age of 30. But by that time, based on his advice and instructions, Japanese themselves were able to implement immediate railroad construction projects, map out general construction policy, and determine the most important factors in railroad management. Initial construction projects were completed by diligent construction workers and assiduous Japanese engineers, who mastered what they were taught in a short period, and conscientious foreign engineers similar to Morell.

Morell is responsible for the 1,067 mm narrow gauge that most Japanese railroads use. Japanese then had no idea of the significance of gauge in building railroads. When Morell asked what gauge Japan was going to use, no one could answer because nobody knew what he was talking about. Morell told them about the disputes over gauge in Great Britain and the situations in Ceylon and New Zealand, where the 1,067 mm narrow gauge was in use. He suggested that Japan adopt this gauge rather than the international standard of 1,435 mm, and it was from that suggestion that the decision was made.

The ceremony to open the railroad between Tokyo and Yokohama was held on 14 October 1872, passenger service beginning formally the next day. Interim passenger service had been operating between Shinagawa and Yokohama since June of that year. The demand for services was extremely high, the first schedules calling for two round trips a day, but in only a few days that had to be boosted to six round trips a day to handle the 70–90 per cent average passenger capacity.

The establishment of the direct link between Tokyo and Yokohama increased transport demand even more. But the Tokyo terminal's location was an inconvenience to city residents. It was built at Shimbashi, to the south of the city centre because land costs there were lower and the Ministry of Military Affairs wanted it there for strategic reasons: Shimbashi was thought to be a good location because it was close to the foreign settlement; thus, the range of movement for foreigners would be restricted, which meant fewer non-Japanese in Japanese areas. The appearance of foreigners in the centre of the city could cause trouble, even bloodshed, from the exclusionists. The government's fear of such trouble was one reason it built the station in Shimbashi.

Fares were very high and divided into three classes. First class between Tokyo and Yokohama was roughly equivalent to today's express fare between Tokyo and Osaka, while second class was twice as much as third class and first class three times as much as third class. Second class was the equivalent of the cost for a palanquin ride between Tokyo and Yokohama, and third class was about the same as steamship fare for the equivalent distance. In those days anything other than walking was expensive.

Despite the high cost, the train had many passengers. For one thing, it took only 52 minutes between Shimbashi and Yokohama, so the traveller could now make a one-day trip there and back. Walking the 30 kilometres would take most people 10 to 12 hours, and they would have to stay overnight before returning the next day. So with the costs for food and lodging calculated in, the railroad may still have been cheaper. Another reason for the train's great popularity was that, during the daytime, it left once every hour, which gave greater range in choosing a travel schedule.

Many people were aware of the railroad's economic effects early on, but inadequate capital prevented much private promotion of railroad construction until the latter half of the 1880s.

The government began constructing a railroad between Kobe and Osaka at the same time as the one between Tokyo and Yokohama. The Kobe-Osaka line was eventually opened on 11 May 1874, and the extension to Kyoto on 5 February 1877. Lack of funds kept the railroad from being extended any farther. Of the £1 million in public bonds that Lay placed on the market in 1869, only £300,000 (¥1,464,000) went for railroads. This was not enough to complete both the Tokyo-Yokohama and Kobe-Osaka construction, and the government had to supply an additional ¥3,600,000. The railroad building costs were enormous and government finances were not equal to completing the entire trunk between Tokyo and Osaka.

As part of its "increase production and promote industry" policy, the government built and operated testing stations for farming, animal husbandry, spinning, silk manufacture, mining, glass, cement-making, machinery, shipbuilding, and steel production that were models for transplanting modern industry. But the funds invested were so enormous that the treasury strained under the burden, leaving the government no margin in financial reserves with which it could move ahead in railroad construction.

Inoue Masaru was chief director of the Bureau of Railways in the Ministry of Public Works, and as such was charged with constructing and operating railroads. He did a great deal to push railroad construction. Inoue was born in Choshu, one of the leading domains that toppled the Tokugawa shogunate. During the years of shogunal decline, he, Ito Hirobumi, and three other Choshu natives stole out of Japan and made their way to England, where Inoue studied mining and civil engineering at University College, London. He returned in 1868. Inoue was one of the very few Japanese technically qualified in railroad construction. After Morell died, Inoue used those abilities and an independent turn of mind to take over some of the leadership that had been in the hands of foreign engineers and com-

plete the project. He began demonstrating this initiative during the construction of the Osaka-Kobe and Kyoto-Osaka routes. Inoue showed his ability to direct matters when he pointed out that the European switchback system originally planned at Osaka Station would cost too much because it required longer track and would make train operations more complex. He ordered the line to be completed in a way that would make train runs in a straight-line fashion.

In 1876 and early 1877, Inoue strongly appealed for extending the route eastward from Kyoto, permission for which was given in the following year, with construction starting on the route from Kyoto to Otsu. Building the Kyoto-Otsu segment meant crossing the mountains to the east of Kyoto and that meant building tunnels and grades for the first time. In 1877, Inoue opened the Kogisei Yoseisho (Technical Training Centre) in Osaka. To this centre came candidates selected from the ranks of general railroad workers thought to have the potential to become first-class engineers. The centre's graduates supervised construction on the line between Kyoto and Otsu, directing Japanese engineers and labourers, without the help of foreign advisors, to build dykes, cut roads, dig tunnels, and build bridges.

Although the government had at one time employed more than 100 foreign advisors, almost all had been released by the end of the 1870s. The few that remained were supervisors for rolling-stock maintenance, designers of bridges and tunnels, or consultants on general operations. Terminating these positions that featured wages 10 times that of Japanese employees in the same jobs not only saved labour costs but was important in fostering technological independence. Overseas engineers were also released because Japanese had learned almost everything they could from them in railroad construction and operations. The ability of the first Japanese to take the throttle of a locomotive in 1879 demonstrated that independence in operating technology was almost total by the end of the 1870s. The country still had to rely on foreign sources for locomotives and coaches, because Japan had not gone through the heavy industrialization in steel and machine production needed to build such equipment. The first built-in-Japan steam locomotive was rolled out of the factory in 1893, and the first complete made-in-Japan locomotive headed down the rails in 1912.

By the beginning of the 1880s, almost everyone was fully aware of the superiority of railroads as a mode of transportation and the important effects they have on transportation. Gaining independence in construction and operating technologies would lay the foundation on which railroading would soon become the nation's major mode of transport.

## Note

1. It is generally believed that the principle behind the government's policy of constructing and operating railroads during the early years was nationalization. However, it has recently been pointed out that some Meiji government officials

advocated private construction and operation. See Hoshino Takao, "Meiji shonen no shitetsu seisaku: 'Tetsudō kokuyūshugi setsu' 'kansen kansetsushugi setsu' no saikentō" (The policies on private railroads in early Meiji – Re-examining the theories of state ownership of railroads and of government operation of trunk lines), *Musashi Daigaku Ronshu*, vol. 27, nos. 3–5 (1979).

## Roads

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### The Appearance of Vehicular Transportation

National unification and growing foreign trade caused traditional transportation systems to collapse, transport demand to increase, and road transportation, around 1875, to begin marked progress. This progress is shown in sharp relief in the increase in vehicular transport. As previously mentioned, the traditional feudal system prohibited vehicular road transport. However, transport of goods by freight wagon was permitted for the first time in 1863, and in 1870 the new government modified the rules to allow passenger transport by rickshaw.

After the ports were opened in 1854, foreign ministries used their own horse-drawn carriages for travel in the port vicinity. But not until 1869 was permission first given allowing Japanese to operate horse-drawn passenger-carrying services on the route between Tokyo and Yokohama. However, this connection between the capital and a major open port was an exception, and it was not until 1872, with the beginning of the railroads, that this passenger service was permitted generally. When that happened, it led not only to the appearance of horse-drawn cabs and coaches within the cities but also to horse-drawn coaches running between stations along the high-ways.

Bids were submitted in 1872 to operate horse-drawn coaches on six routes: Tokyo-Takasaki, Tokyo-Hachioji, Tokyo-Utsunomiya, Sakai-Fukushima, Osaka-Kyoto, and Hakodate-Sapporo. All bidders were private operators except those asking for the route between Hakodate and Sapporo. Common to all is that a major city, Tokyo, Osaka, or Sapporo, was one of the terminals; these were routes with the highest transportation demand. The opposite terminals, Takasaki, Utsunomiya, Fukushima, and Hachioji, were in regions producing silk for export. So part of the high transportation demand came from the need to transport silk to Tokyo. The goods were rail-shipped to Yokohama and then overseas. This does show, however, that horse-drawn transport, from its inception, was different from railroad transport in being privately controlled and sought to supply the market's demand for transportation. Raw silk was light, it commanded high transport fares, and was sensitive to changes in price. It was a cargo most highly suited to the new mode of transportation. In addition to general cargo, the horse-drawn coach companies contracted to transport government mail in March 1871. Those carrying the mail travelled under govern-