

mulation – grew even stronger and increased the demand for railway nationalization, which resulted in the Railroad Nationalization Law of 31 March 1906. Armed with this law, the government was able to buy up the property of 17 major companies and to solidify its control over the national railroad network.

## Notes

1. A samurai revolt broke out in Kagoshima in February 1877. Saigo Takamori had left public office and returned to Kagoshima. He eventually yielded to samurai who were disgruntled with the Okubo government policy and led them in revolt. Thirty thousand troops set out on a northward march to Tokyo. The government mobilized 52,000 troops to quell the rebellion and the entire southern part of Kyushu was a battlefield until September. Saigo's rebellion was eventually quashed, the government spent ¥41.57 million in prosecuting the war and issued inconvertible currency to cover its expenses. This issuance caused inflation that brought extreme pressure on fiscal resources.
2. Railroad administration was transferred from the cabinet to the Home Ministry.

## Railroads

*Katsumasa Harada*

### Expanding Railway Networks and Transportation Capability

From the end of the 1880s to the beginning of the 1910s is the period in which Japan firmed up its policy of domination in Asia. That policy was also closely related to the establishment of a domestic capitalistic system. In the period of the Sino-Japanese War of 1894–1895 and the Russo-Japanese War of 1904–1905, the Japanese capitalist economy was rapidly transformed from light industry, centred on spinning, to heavy industry, centred on steel production. At the same time, the railroads were handling their military and economic requirements and rapidly accelerating in development.

Table 1 looks at the factors in railroad development from 1892 to 1907. The table shows that, in the 15-year period, operating mileage increased 2.5 times and passenger volume increased 5 times. Particularly noteworthy is the 10-fold increase in freight volume. The growth in freight-carrying symbolizes the progress in railroads at the time.

The paragraphs below give a general description of expansion of the railroad network, progress in developing independent technology and specifications, competition between government and privately operated railroads, and the nationalization of railroads.

As mentioned above, the main routes that started operating when the Railroad Construction Law was enacted in 1892 were the one that spanned

**Table 1.** Railroad development (1892-1907)

	1892	1897	1902	1907
Kilometres operated	984	1,163	2,072	7,153
	2,124	3,680	4,843	717
Number of stations	117	139	256	1,153
	213	567	927	217
Number of engines	133	258	431	1,924
	185	636	974	111
Number of passenger coaches	637	878	1,296	4,989
	739	2,029	3,537	677
Number of freight cars	1,746	2,877	5,292	32,242
	2,819	8,541	15,861	1,367
Number of passengers carried (in thousands)	28,464	84,041	110,052	142,316
Amount of freight (in tons)	2,717	7,780	16,210	25,913

Source: *Tetsudō Kyoku nempō* (Railway Bureau annual).

Honshu from Aomori, through Tokyo to Itozaki, and the one that went across Kyushu from Moji to Kumamoto. In Hokkaido, the line that started operating at that time was the Hokkaido Tanko (coalmine) Railway that ran between Temiya and Horonai. The route between Iwamizawa and Muroran was completed immediately before the law was enacted. In addition to the above railroads, Japan Railway's route between Ueno and Maebashi and, connected to it, the government-operated railroad between Takasaki and Naoetsu formed a route cutting across Honshu's mid-section. The route between Maibara and Tsuruga formed a connection to the Hokuriku region that was considered a future link to the line running along the Japan Sea coast.

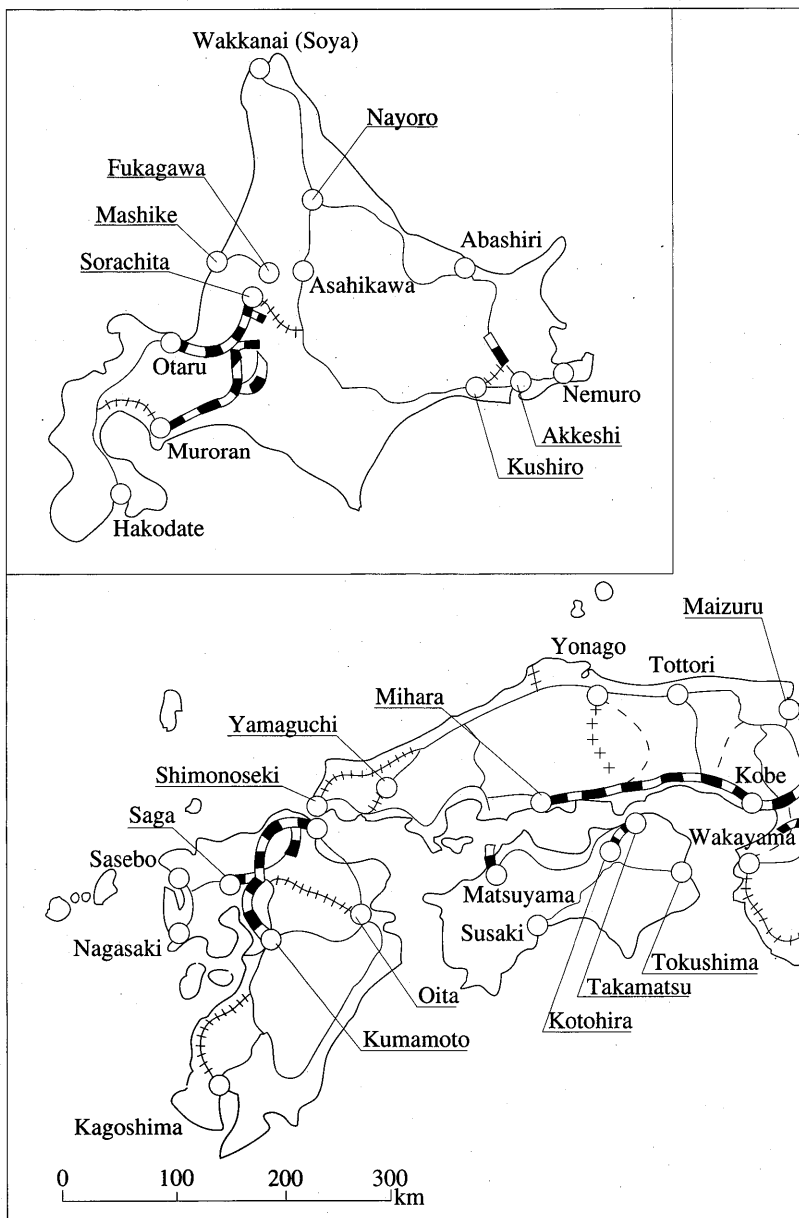
Other lines included the rail links that were fanning out from the major urban areas, such as Tokyo and Osaka, and the coal carrier network being constructed in the mining region of northern Kyushu. Although these were all local lines, they had the potential to be expanded into major trunk lines.

As mentioned above, the conception behind the Railroad Construction Law was the legal systematization of scheduled lines into a major trunk network that would connect geographical points the government believed must be connected. However, not all the network was operating at the time the Russo-Japanese War was concluded. There were still parts of the first-stage scheduled lines, ones on which construction was to start immediately, that were not yet finished. The budget for first-period scheduled lines was ¥60 million during the 12 years from 1892 to 1904, but the target was not achieved. Scheduled line length, including possible alternative routes that were being considered, came to about 12,800 km, first-period scheduled lines alone reached a total of 2,000 to 3,000 km.

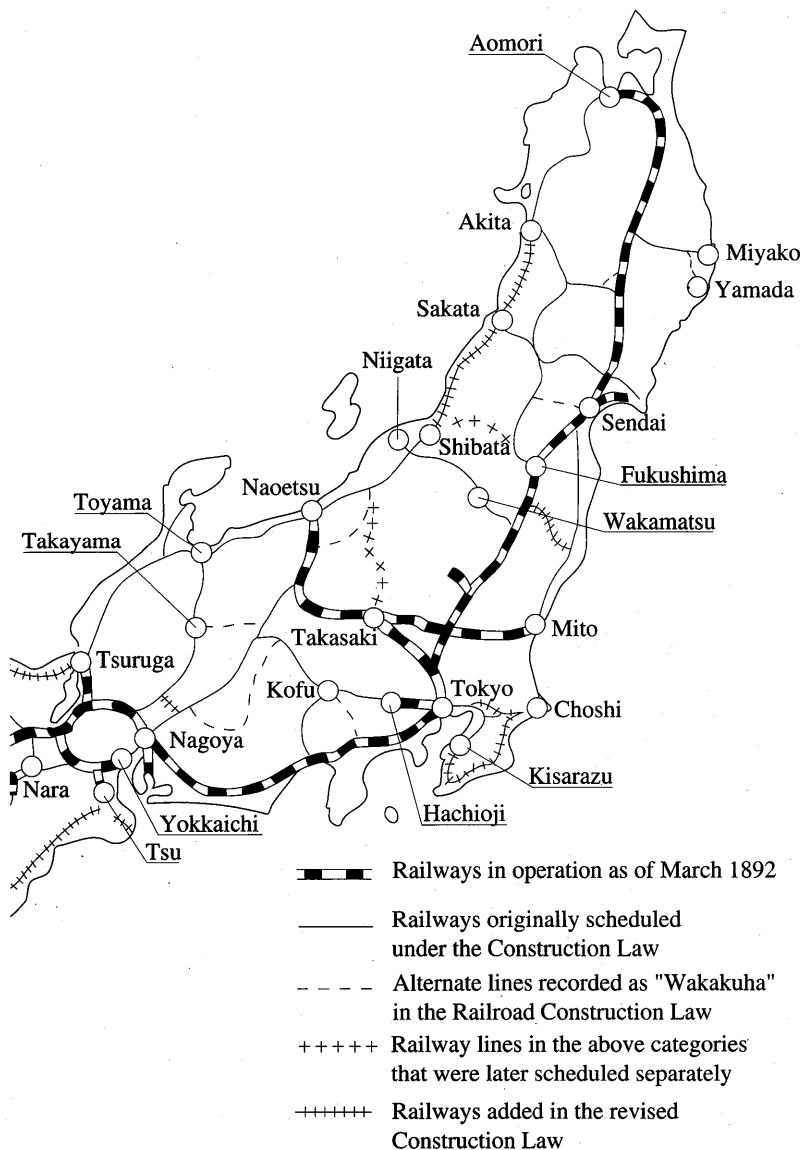
Even though not all first-period scheduled lines started operation, the fact that about 5,000 km of railroad did begin operating during this period shows that the private railroads had greatly expanded the network of lines other than those scheduled under the law. This is because the growth of capitalism required the formation of railroad systems other than the trunk network the government recognized as necessary. The Japan Railway Company's coastal line (now the Joban Line) was one of the scheduled lines but not one of the first-period scheduled lines. Japan Railway constructed this railroad and had it in full operation by 1898 to ship coal from mines along the route to Tokyo and other regions. The railroad played a major role in transporting coal.

Kyushu Railway absorbed and amalgamated private railroads in the mining regions of northern Kyushu and connected the coal-carrying lines to the trunk network to make the transport system more efficient. This was another of the railroad networks that did not include scheduled lines.

As we see in these examples, a trend appeared during this period for industries in every sector to demand railroad systems, and the rail networks between large cities and their environs grew gradually denser. The formation of railroad networks is a phenomenon intimately connected with capitalist development.



**Fig. 1.** Railroad lines scheduled under the Railroad Construction Law of 1892  
Source: Harada Katsumasa and Aoki Eiichi, *Nihon no tetsudō* (Japanese railways), p. 45.



*Note:* Schedules for construction of railways in Hokkaido were specified in the Hokkaido Railroad Construction Law of 1896.

## Creating an Independent, Standardized Technology

By the latter half of the 1880s, the use of railroad technology was leading to the development of Japan's own systems for earthwork, bridge, and tunnel construction. This was attributable to a strong base in traditional technologies; the technical levels of castle construction, river reclamation, coastal landfill, creation of new rice fields, and the digging of tunnels for gold- and silver-mines had become quite high during the Edo period. In the 1880 construction of Osakayama Tunnel, miners from the Ikuno mine dug the tunnel with no machines. The construction of roadbed, land-clearing, building of dykes and landfill were done by engineers and workers who were former employees of the shogunal Sakujikata (agency in charge of civil engineering projects), and their organization was preserved exactly as it had been 20 years before. W.F. Potter and other foreign engineers working for the government praised highly the active use and high technical levels of traditional civil engineering.<sup>1</sup>

In contrast to this traditional technology, young engineers had been learning, since the closing days of the shogunate, European and US surveying techniques and using these new techniques in planning and design to determine the scope of construction. The operating techniques brought by the foreign engineers occasionally conflicted with traditional technology, but techniques like surveying were incorporated quite early on and led to technical independence in planning and design. That made simpler the later creation of independent techniques in construction planning and operation.

Civil engineering from the 1890s on took advantage of technical levels that had been attained and even surpassed them to construct mountain railroads that required digging long tunnels. In graded areas switchback stops, horseshoe curves, and loops of the kind used in Swiss and German mountain railroads were built. The railroad builders adopted one method after another in a repeated process of absorption and incorporation.

The first area of independence in operating techniques was in running locomotives. After that the task was to acquire independence in train scheduling. Beginning in 1871, all train schedules were produced by foreign engineers. Japanese knew nothing of how to graph time and distance on  $x$  and  $y$  axes and did not understand the train-schedule diagrams that foreign technicians compiled. Since foreign technicians showed Japanese only the schedules derived from the diagram, Japanese could only shake their heads at timetables for single-track sections that allowed a train in one direction to avoid colliding with a train coming in the opposite direction. There is a story that the method of using diagrams to plan train schedules was learned by a Japanese worker who accidentally came across the "secret" kept in the drawer of a desk owned by one Walter F. Page, a British engineer who would not teach the diagrams to Japanese. Whether that story is true or not, we do know that it was around the beginning of the 1890s that a method for train scheduling began to be used in which diagrams were com-

piled with distance on the vertical axis and time on the horizontal axis, so that when the train's running points were drawn and then connected in line with the train's performance and route situation, an operating diagram could be completed that required no further modification. These diagrams allowed scheduling of all trains.

In the area of vehicle technology, the government-operated railroad works in Kobe built a model locomotive in 1893, having a 1B1 wheel arrangement equipped with compound low- and high-pressure cylinders. In 1901, after the Sino-Japanese War, the government-owned steel mill in Kita-Kyushu began the full-fledged building of locomotives.

Through developing independent technology, standards were determined for railroad construction, the shape of tunnel cross-sections, and the number of load tons and bridge abutments. Japan uses a 1,067-mm narrow gauge, a major hindrance to increased transportation power but the basic standard used in its rail system. The use of the American Society of Civil Engineering's (ASCE) standard 60-pound rail (i.e. 60 pounds per yard) in the government-operated railroads was the first use of international standards.

The first request for a change from narrow to standard gauge was in "Tetsudoron" (On railroads), an 1887 pamphlet from army general staff headquarters arguing for a trans-Honshu trunk line for military transport. The railroad would be double-track standard gauge (1,435-mm, the international standard gauge). Arguments on behalf of standard gauge went on until 1900, when the army, with its plans for the Russo-Japanese War well under way, advocated increased transportation power through the continued use of narrow gauge. That put the arguments for standard gauge on the back burner until the railways were nationalized.

### Competition between Government and Private Railroads

With the completion of the railroad network, competition arose between government- and privately-owned railroads on interurban routes. In the 1900s, two lines operating between Nagoya and Osaka were begun: the government railroad (Tokaido Line)<sup>2</sup> that went via Gifu, Maibara, and Kyoto and the private Kansai Railway that went via Kameyama and Nara. Although going through different areas, the departure point and destination for most passengers were Osaka and Nagoya, and the two railroads turned their efforts toward getting these customers. In 1902, they competed for customers through discounts on round-trip fares, eventually discounting so much that the round-trip fare became cheaper than the one-way.

The two sides arbitrated to end the battle, but a price war flared up again in October 1903. Part of Kansai Railway's strategy to get more customers this time was to offer box lunches. Japan had just started its war with Russia, and the main argument to end the competition between the railroads was a patriotic one, that the time was improper for competition of that

kind. But the war for customers could not be restrained. Not until April 1904, that is, when a member of the Nagoya Chamber of Commerce conducted negotiations, did it end.

A competitive war of this type, occurring on two different occasions, is evidence that the railroad companies, including the government-operated one, were profit-oriented. The Railway Bureau was the agency under the Ministry of Communications that supervised government-operated railroads at the time. There was also the Railroad Operations Bureau, another organization in the Communications Ministry, which was directly charged with construction and operations. It was in this latter agency that modern management policies began to be used first and where young bureaucrats studied the methods of corporate railroad management used in the United States and Europe and where the railroad was regarded as a land transportation institution, provider of customer services, and the problem was how to improve the company's profit picture. San'yō Railway had adopted these new management methods quite early on, and private railroads were gradually beginning to use them at the time of the Russo-Japanese War.

### Nationalizing the Railroads

The settlement of the Russo-Japanese War gave Japan control over Korea and the southern section of China's north-east region (Manchuria) and a bridgehead in its intention to dominate the rest of the Asian continent. The government then embarked on the basic policy it called "postwar management": advancing domestic capitalism and acquiring rights and interests on the Asian continent.

There were now strong demands that the government link domestic, Manchurian, and Korean railroads into one transportation system. During the Russo-Japanese War, military trains travelled 2.6 million km and carried 1.3 million people (including servicemen during mobilization and demobilization), 200,000 horses, and 3.2 million tons of freight. Civilian trains were also pressed into this service. From this experience, it was argued, Japan would have to strengthen its system of military transport for any future large-scale war. That debate led to plans for the nationalization of the railroads.

Private interests had already requested that the railroads be nationalized during the financial panic of 1890. And, as previously discussed, the government had tried to solve the question of nationalization once and for all when the Railroad Construction Law was enacted. Afterwards, any downturn in the economy and inability of private companies to pay their way brought calls for nationalization. This shows that private capital was quite dependent on the national government to operate the railroads. However, the move for nationalization that occurred in 1905 did not arise out of forces from the private sector. The request for nationalization was based on the necessities of the "postwar management" policy.



**Table 2.** Length of operating railroads (in kilometres)

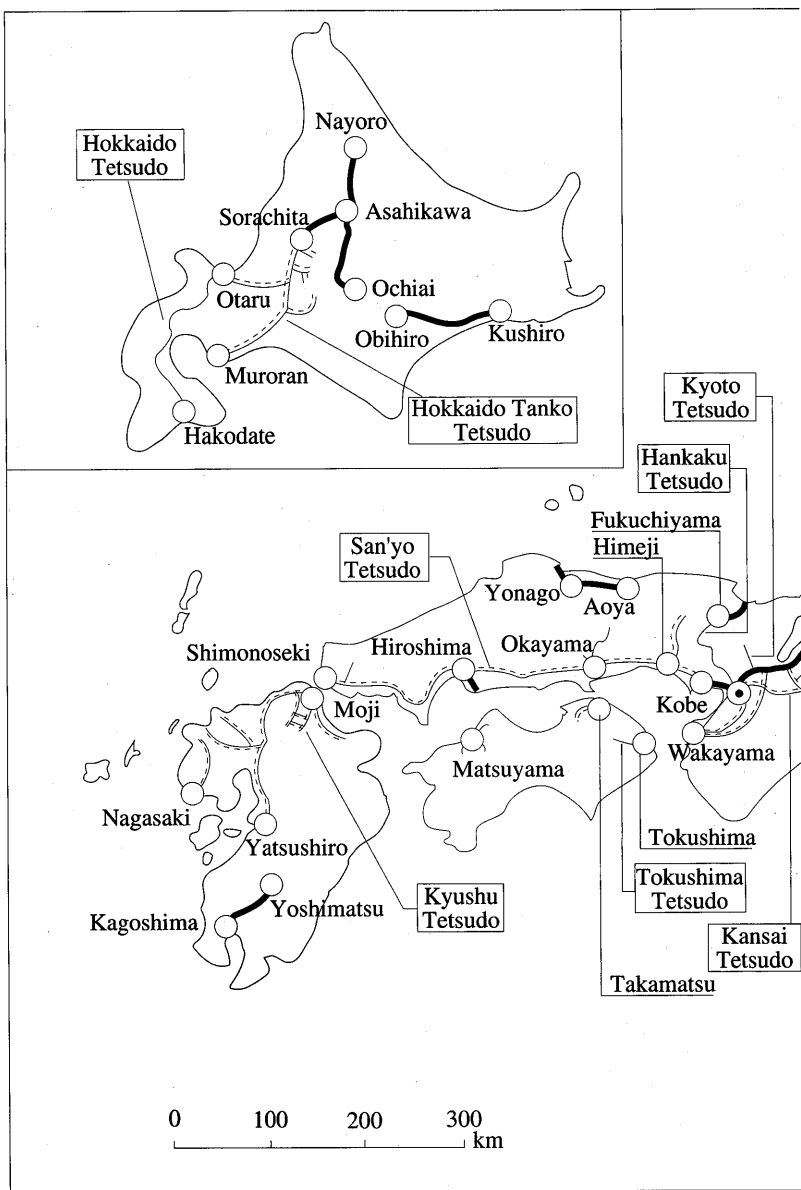
Ending fiscal year	National railroads	Private railroads	Total
1872	29.0		29.0
1882	274.9	(1883) 101.4	
1892	983.5	2,124.4	3,107.9
1902	2,071.5	4,843.1	6,914.6
1907	7,153.2	717.3	7,870.5
1912	8,395.9	3,029.2	11,425.1
1922	11,274.6	5,965.3	17,239.9
1932	15,372.1	9,678.7	25,050.8
1942	18,581.4	8,919.8	27,501.2
1947	19,752.3	7,571.4	27,323.7
1952	19,902.6	7,572.7	27,475.3
1962	20,516.3	7,387.2	27,903.5
1972	20,924.2	5,877.6	26,801.8
1982	21,326.5	5,630.1	27,016.6
1983	21,319.2	5,591.3	26,910.5

Source: Harada Katsumasa, *Tetsudō no kataru Nihon no kindai* (The railroads and Japanese modernization, rev. and expanded ed., p. 55, table 3 (more recent data have been added).

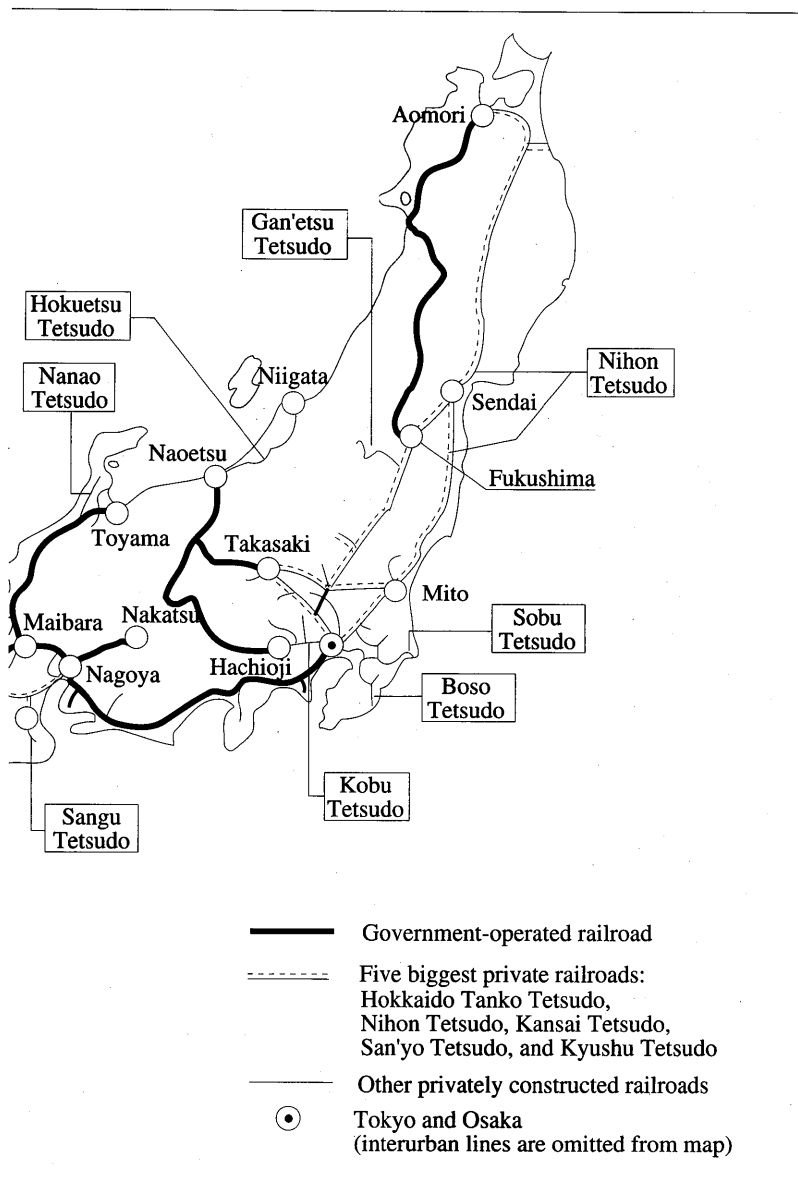
Planning by the Railway Bureau was framed into a bill proposal at the end of 1905. The format was completed and passed through deliberative committees and then presented to the Diet. The private railroads were quite strongly opposed to the bill because it would hamper the advantages they were receiving from the post-Russo-Japanese-War investment boom. However, the government and its political party were forcing the bill through the House of Representatives. The House of Peers agreed to it, and the Railroad Nationalization Law was passed in March 1906.

Seventeen companies and a total of 4,500 km of track were nationalized. That included 25,069 pieces of rolling-stock: 1,118 engines, 3,067 passenger coaches, and 20,884 freight cars. Nationalization brought 48,409 employees and ¥456,195,000 in bonds to the government railway. The entire trunk route through Aomori, Tokyo, Kobe, Shimonoseki, Moji, Kumamoto, and Nagasaki was now under government control; the government-operated railway, Kansetsu Railway, was renamed Kokuyū Railway.

The government said nationalization would have three effects: more convenient transportation, reduced fares, and consolidated equipment. Improvements in transportation efficiency and standardization of facilities were equivalent to reducing fares. The newly established national railways was literally state railroad property, and as such it was expected to play a major role in the two previously mentioned state goals: the building of a strong armed forces and a capitalist economy.



**Fig. 2.** The railroad network immediately before nationalization (September 1906)  
 Source: Harada Katsumasa and Aoki Eiichi, *Nihon no tetsudō* (Japanese railways), p. 51.



*Note:* The names in boxes are those of nationalized private railroads (Nishinari Railway in Osaka would be included in this group).

## Notes

1. W.F. Potter, "Railway Work in Japan," Institution of Civil Engineers Session, 1878-1879, part 2, sect. 1, "Minutes of Proceedings" (vol. 56).
2. Through the official provision of names for railroad routes in April 1895, the Tokaido Railway became the Tokaido Line.

## Roads

*Hirofumi Yamamoto*

### Increase in Railroad Freight Handlers

As previously mentioned, the beginning of operations for the Japan Railway Company in 1883 between Ueno and Kumagaya and their subsequent satisfactory development increased the interest in private railroads. The decade from the mid-1880s to the mid-1890s was what might be called one of railroad fever. A rush in company development planning and licence application began. One railroad after another was built and began operating. Shortages of capital delayed the construction of the government railroad between Tokyo and Kyoto, but by procuring funds through bond issues and changing the route, in July 1889 the entire line between Shimbashi and Kobe was able to be completed. After a strong push by the army, construction on the Yokosuka Line started quickly in the autumn of 1887. The project was completed in June 1889, and transportation of general freight and passengers began between Shimbashi, Ofuna, and Yokosuka. Thus, Japan's railroad age began in the early 1890s.

The advent of the railroad age greatly affected road transportation. The railroad's overwhelming transportation power drove road transportation to the sidelines, but it also created a new demand for road transport to pick up and distribute freight in the station vicinity. The existing routes for distribution were reorganized with the railroads as their central axis. This formed a new transport system consisting of long-distance railroad transportation and supplemental road transport.

The formation of the new transport system rapidly increased the number of operators handling the collection and delivery of railroad freight at each station. As has been mentioned, from the early Edo period there were transport subcontractors in every area who used bearers and horses at each post-station to carry goods for the goods' owners. These subcontractors transported goods that their owners had previously been responsible for transporting and, using porters and horses at the post-stations, delivered the goods to their destination. Over several hundred years, this system had secured a strong foothold in society, and it was continued in this form on into the railroad age. To these subcontractors, there was no essential difference between the age of railroads and the age of post-station horses and porters. This is why, when the first railroad began operating between Shim-