

# Chapter 2

## The Government Railways and the Procurement of Railway Sleepers in Prewar Japan

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**Abstract** In the Japanese industrialization process, it was essential for industries to procure stable supplies of timber because of its vital role as a raw material, as a source of energy, and for use in construction. The purpose of this article is therefore to examine the issue of timber procurement through a case study of the supply of timber for use as rail sleepers by the Japanese Government Railways (JGR) in the prewar period. JGR's need for wooden sleepers increased as its network expanded, and in 1909 it switched from competitive tendering to sole-source contracts in order to secure stable supplies at prices within the annual budget. In 1930 JGR changed to invited tendering in order to secure low prices at a time of budget restrictions, but in 1933 economic conditions improved and it returned to sole-source contracts. Thus JGR adapted its supply methods to meet changes in both its budget and in the timber market. However, despite efforts to utilize a wider range of trees and preservative treatments, it experienced increasing difficulties in finding supplies from the late 1930s.

**Keywords** Wood • Timber • Sleeper • Railway • Environment

### 1 Introduction

In the Japanese industrialization process, wood was widely used by modern and traditional industries as well as in the residential sector as an energy source, a raw material and a construction material. In the seventeenth century, or the early Tokugawa period, logging was conducted and wood was used mainly for

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constructing castle towns and for developing arable land in response to population increases. Beginning in the nineteenth century, however, industrial development changed the supply and demand structure for wood. This was especially apparent in the modern period when wood demand accelerated with advancing industrialization; not only did the demand for firewood by traditional industries increase, but demand for wooden materials also emerged in modern industries. In such conditions, it was a challenge for industries to secure stable supplies of wood over the long term.

In research on the history of wood, a number of previous studies examined specifically the history of forestry, unions, and village communities. The body of literature increases enormously if we include prefectural and municipal history. These studies mainly consider the history at a regional level and examine the process of wood production, which includes afforestation, logging, processing, the use of water transportation techniques, and use of forests by actors like forestry managers, unions, and regional entities. Thus, past research on the history of wood involved little analysis of the distribution and consumption of wood. In other words, despite the fact that wood played an important role in the industrialization process, research on the history of wood use in Japan has only briefly discussed its role in the industrialization process.

In the field of economic history, wood has been examined as an energy source (firewood and charcoal), and energy consumption trends in the residential sector and the traditional industries have been analyzed from the standpoint of the development and the selection of technologies (Makino 1996; Taniguchi 1998). In the modern and subsequent periods, demand for firewood and charcoal was large because these resources were continuously used in the residential sector and by traditional industries. However, wood played another important role in the industrialization process. Wood was used as construction and raw materials in modern industries such as the railway, coal mining, and paper industries. Although the share of such timber use in total wood consumption was not necessarily large, demand for timber grew rapidly. Indeed, the generation and expansion of timber demand in modern industries significantly changed the supply and demand structure of the Japanese wood market. In order to better understand the role of timber in the industrialization process, therefore, it is necessary to analyze the market for timber that was used in construction and as a raw material. To this end, it is also useful to examine changes in the market for firewood and charcoal and in energy use. Moreover, past research on economic history focused mainly on procurement and use of raw materials and barely examined construction materials, despite the fact that they are essential factors that define the activities of industries. A previous paper by the author shed light on the procurement and use of timber in the coal-mining industry (Yamaguchi 2008, 2009), but comprehensive analysis of the procurement and use of construction materials has yet to be undertaken.

Against this background, this paper considers wooden sleepers in the railway industry as an example of the use of timber as an industrial construction material. Like the mining industry, the railway industry was a central target for government support under the industrial promotion policy of the Meiji government, and approximately 50 % of the Ministry of Industry's total expenditure for industrial promotion

from December 1870 (when the Ministry was established) through December 1885 (when it was abolished) was channeled to the railway industry (Kobayashi 1977). In the modern and subsequent periods, the railway industry played an important role in Japan's industrialization, particularly as a growth engine driving the rise of enterprises during the 1880s and also as the main transportation industry supporting the expansion of domestic markets. Earlier research on the railway industry has mainly focused on railway policy, financing, railway technology, functions of the railway as a transportation system, and effects on regional economies (Oikawa 1992; Nakamura 1998; Matsushita 2004). In regard to railway materials, there is only one study on vehicles by Sawai Minoru (Sawai 1998). Based mainly on statistics and investigation documents from the Japanese Government Railways (JGR),<sup>1</sup> documents in the Railway Museum, and relevant documents from the sleeper dealer Hasegawa Shōten (Hasegawa Timber Co.), this paper sheds light on the use of timber as an industrial construction material by examining the procurement and use of sleepers by JGR.

## 2 The Position of Sleepers in Timber Consumption

### 2.1 Consumption of Wood

Wood is mainly used as a fuel, either firewood or charcoal, and as a material for building construction, mine pillars, rail sleepers, electric poles, pulpwood, and military installations. In the early modern and subsequent periods, firewood and charcoal were used in traditional industries such the salt, ceramic, and silk reeling industries. In the 1880s and 1890s, the share of fuel in total wood consumption was more than 80 % (36 million cubic meters). In the early twentieth century, energy sources of various industries shifted from firewood and charcoal to coal, electricity, and petroleum; however, fuelwood consumption was consistently above 28 million cubic meters because households and traditional industries continued to use firewood and charcoal. The consumption of timber was around 6 million cubic meters in the 1880s, and it started rising along with industrial development during the economic boom which followed the deflationary fiscal policy by Finance Minister, Matsukata Masayoshi in the early 1880s. Subsequently, consumption reached 11 million cubic meters at the beginning of the twentieth century and 17 million cubic meters in the period of the economic boom during World War I. The consumption of timber trended upward after 1920 except in the periods of postwar recession (1920–22) and depression (1928–32), and exceeded 28 million cubic meters starting in the second half of the 1930s due to a rapid rise in the demand

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<sup>1</sup>The government agency in charge of operating the national railways continually changed. This paper uses the generic term “Japanese Government Railways” in referring to the national railway agencies.

for military materials. As these figures show, the structure of the demand for timber changed significantly with the rise in industrial development in the modern period.

With regard to the consumption of timber in different sectors, the construction sector had the largest share which was around 50 % until the 1900s. However, starting in the 1910s, the share fell to between 20 % and 40 % as timber consumption increased in other industries. The second largest share was held by the mining sector, at 1–5 % in the 1880s and 1890s and consistently at around 10 % early in the twentieth century. The consumption of pulpwood used as a raw material for paper rose in the twentieth century as more demand for paper was generated by an increased volume of newspapers and magazines issued and by the start of the system of government-designated textbooks; its share was 3–6 % after the second half of the 1910s. Also, with development of the transportation infrastructure being promoted, timber consumption in public projects such as the construction and the repair of roads and ports increased, and its share was 2–6 % from the early 1880s to 1940 (Umemura et al. 1966).

The share of sleepers in timber consumption was 1–2 % consistently from the end of the 1880s onwards. This share was small compared to the kinds of timber consumption mentioned above; however, this does not necessarily mean that the procurement of timber for railroad sleepers was easy. This is because tree varieties as well as the size and shape of timber which is used for different purposes vary. Based on the amount of trees felled for timber during 1905 through 1921 for different tree varieties, it is estimated that the share of pine and cedar in the timber market in Japan was 50–70 %, and that the share of chestnut timber, which was in high demand for sleepers in Honshū, was merely 2–3 %. In addition, tree varieties that are suitable for sleepers, such as chestnut, hiba, and hinoki (Japanese cypress), were also used for construction materials, furniture, firewood, and charcoal. Therefore, timber for sleepers was in a competitive relationship with timber used for such purposes. Also, since high-quality, large-diameter logs that are not bent or cracked are needed for sleepers, the market availability of timber for sleepers was limited. Timber for sleepers mainly comes from domestic sources. According to statistics from the Ministry of Agriculture and Commerce for 1905–1914, the sleeper-timber-producing regions are Hokkaidō (approximately 40–60 %, including exports), the Tōhoku region, including Aomori, Iwate, and Fukushima (approximately 20 %), the Chūbu region, including Aichi, Nagano, and Gifu (approximately 4 %), the Kinki region, including Kyōto and Hyōgo (approximately 4 %), the Chūgoku region, including Hiroshima and Shimane (approximately 8 %), and the Kyūshū region, including Ōita and Kagoshima (approximately 2 %) (Nōshōmushō 1907–1921) (Fig. 2.1).<sup>2</sup>

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<sup>2</sup>Sleepers from Hokkaidō (*fraxinus spaethiana*, *kalopanax septemlobus*, *katsura*, *quercus serrata*, etc.) were different from sleepers from the main island of Japan (chestnut, hiba, hinoki, etc.), in terms of tree varieties used.

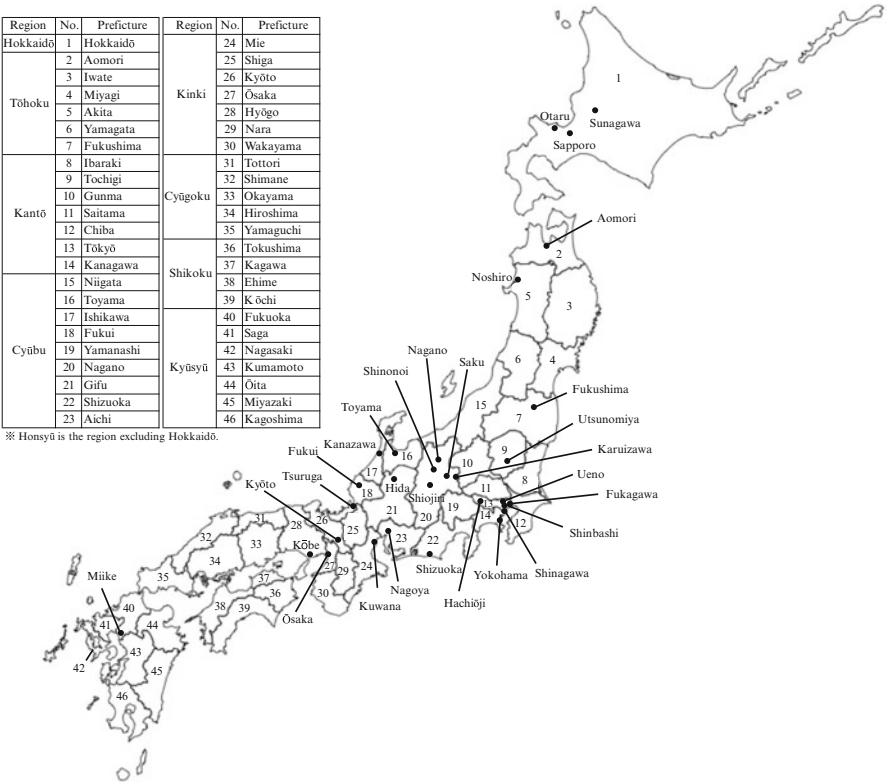
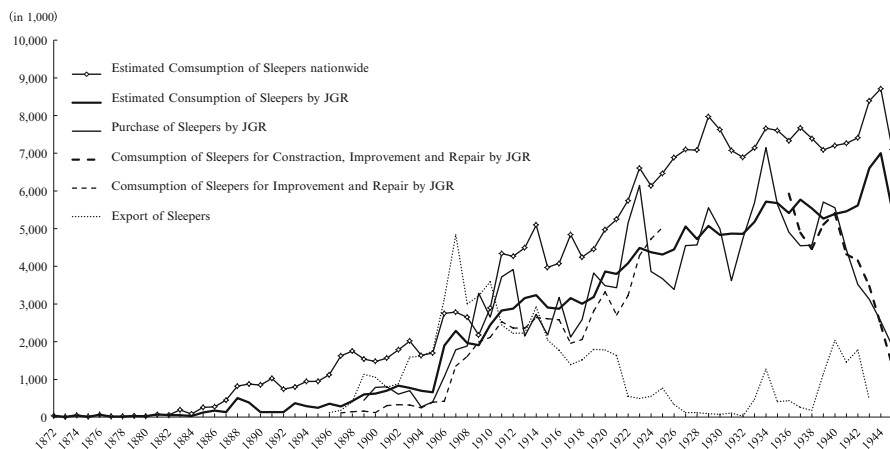


Fig. 2.1 Map. Prefectures and major place names

2.2 Estimated Consumption of Sleepers

The consumption of sleepers nationwide and by JGR in particular, increased in the prewar period. Demand for sleepers increased year by year with the extension of railways not only because sleepers were used in the construction of new railway lines or additional tracks, but also because sleepers needed to be replaced due to decay or damage. The volume of sleepers consumed nationwide and by JGR shown in Fig. 2.2 is calculated by multiplying the distance (single-track equivalent, i.e., the sum length of the sidetracks in a multiple-track line added to the length of the main track) by the number of sleepers used per kilometer in new construction and improvement/repair. The number of sleepers used per kilometer varies depending on the time period, the type of the site (e.g., level ground, bridge, tight curve, and steep slope), and the specifications used by railway companies, but this number is assumed to be 1,250–1,500 in new construction and 130–150 in improvement/repair, based on the documents available. As shown in Fig. 2.2, sleeper consumption rapidly increased after 1906 and 1907 (when railway operation was nationalized),



Sources: Nihon Tōkei Kyōkai (2006), pp.506-508; Naikaku Tōkeikyoku (1896-1937); Ōkurashō (1902-1943); Nihon Kokuyū Tetsudō (1971), p.645; Tetsudōsagyōkyoku (1898-1905); Tetsudōchō (1906 and 1907); Tetsudōin (1908-1920); Tetsudōin (1916-1919); Tetsudōshō (1920-1941); Yoshitsugu (1951), p.340; Nihon Makuragi Kyōkai (1959), p.2.

Note: The amount of sleepers consumed is calculated by multiplying the distance of railways by the number of sleepers used per kilometer in new construction and improvement/repair. The number of sleepers used per kilometer is assumed to be 1,250 (1872-1880), 1,380 (1881-1910), 1,500 (1911-1945) in new construction, and 130 (1872-1880), 140 (1881-1910), 170 (1911-1945) in improvements/repairs.

**Fig. 2.2** The amount of sleepers consumed nationwide and by JGR, 1872–1945

tended to flatten during World War I, started to rise again in the 1920s, and tended to flatten again thereafter (from the early 1930s onwards in the case of JGR).

After the railway between Shinbashi and Yokohama opened in 1872, major cities and ports were connected by railways, and a nationwide arterial network was mostly completed in the first half of the 1900s. After the Russo-Japanese War of 1904–05, mention began to be made that improvement in the international balance of payments and growth in exports to the Chinese market would require lower railway fares and the development of an integrated system of transportation to Korea and Manchuria. At the same time, a movement toward railway nationalization, which was led by the military advocating the importance of wartime military transportation, gained strength. As a result, 17 private railway companies were nationalized in 1906 and 1907. The proportion of JGR's operating kilometers to operating kilometers nationwide increased from 29 % (2,413 km) at the end of 1905–82 % (7,152 km) at the end of 1907, and JGR's share in the sleeper market rose to more than 80 %. In the 1920s, electric railways and subways in cities like Tokyo and Ōsaka as well as regional railways were rapidly developed. Consequently, the proportion of JGR's operating kilometers dropped to 67 % by 1940. However, in terms of total distance, which takes into account the length of multiple-track lines, JGR's proportion still exceeded 70 % in 1940. Moreover, in terms of freight (kilometers per ton) and passengers (kilometers per passenger) which affect the wear rate of sleepers, JGR's share was 91–99 % and 82–94 %, respectively. This puts JGR's share in the tie market at a minimum of 70 % after railway nationalization.

### 3 The Period Before Railway Nationalization of 1906

#### 3.1 Procurement of Sleepers Through the Sale of Government Forests

In building a railway between Shinbashi and Yokohama, the government created the Railway Office (*Tetsudōgakarī*) in the Ministry of Public Affairs and Finance (Minbu-Ōkurashō).<sup>3</sup> The construction work was conducted under the instruction of British chief engineer Edmund Morel. Most of the materials used in the construction were imported from Britain, and expensive steel sleepers were imported. Thus, railway construction expenditure was large not only for the materials purchased from foreign countries but also for the foreign advisers hired by the Japanese government (Nakamura 1998). Following the recommendations from Morel that Japanese wooden sleepers were cheaper than steel sleepers and were more suitable to the environment of Japan, the government decided to limit the purchase of steel sleepers as well as to use domestic timber for subsequent railway construction (Nihon Kokuyū Tetsudō 1969).

In August 1872, the Administrative Rules of *Tetsudōryō* were enacted, and *Tetsudōryō* of the Ministry of Industry (*Kōbushō*) was required to obtain timber, earth, and rocks needed for railway construction in a flexible manner through consultation with relevant authorities. In accordance with the rules, *Tetsudōryō* procured timber for sleepers, girders, train vehicles, and train stations, as well as for foundation work for embankments and bridges, through the Ministry of Finance (Ōkurashō) which then had jurisdiction over the government forests. These forests formerly belonged to the Tokugawa Shogunate, feudal clans, temples, and shrines, but became the property of the Meiji government due to the return of the lands and people from the feudal lords to the emperor in 1869 (*Hanseki Hōkan*), the abolition of the feudal system, and the establishment of prefectures in 1871 (*Haihan Chiken*). For example, in the first railway construction between Shinbashi and Yokohama, *Tetsudōryō* procured the necessary timber from timber being stored at Fukagawa-Sarue which was under the Ministry of Finance's jurisdiction. In the construction of the railway between Kyōto and Kōbe, the Great Council of State (*Dajōkan*) notified Ōsaka, Kyōto, and neighboring prefectures that it would sell to merchants, through a tendering process, the trees (with the land) in the government forests in areas that could be logged, and that it would purchase processed products from these trees. Thus, the Ministry of Industry's *Tetsudōryō* procured timber from Aichi, Wakayama, Mie, Kagawa, and Yamaguchi through the Finance Minister. However, it was difficult to secure high-quality, large-diameter logs. Also, investigations for and the procedure related to securing timber took substantial time. Therefore, Masaru Inoue, the head of *Tetsudōryō*, requested through the Minister of Industry

<sup>3</sup>In what follows, *Tetsudōryō*, *Tetsudōkyoku*, *Tetsudōchō*, and *Tetsudōsagyōkyoku* are all names of the bureau in charge of railway operation at a given time.

the direct sale of government forests to the Ministry of Home Affairs (*Naimushō*), and the jurisdiction over the government forests was transferred from the Ministry of Finance to the Ministry of Home Affairs in January 1874. This change made it possible for officials from the Ministry of Engineering and Industry to purchase timber through direct contact with prefectural governments (Nihon Kokuyū Tetsudō 1969). In the construction of the railway between Ueno and Morioka (opened in 1891), six people from Kitakunohegun, Iwate, and one person from Sannohegun, Aomori, submitted a joint petition to the Ministry of Industry and Engineering's *Tetsudoryō* for a purchase of 300,000 chestnut sleepers (priced at 112,500 yen) (Karumichō 1975). Although this seems to be a case of a direct purchase by timber dealers, in the 1870s and the 1880s sleepers were mainly procured through the sale of government-owned forests in various prefectures.

### 3.2 Procurement of Sleepers Through Competitive Tendering

The Public Accounting Act promulgated in February 1889 stipulated that government procurement be conducted in principle through competitive tendering. The accounting regulations enacted in May of the same year required that those who were eligible to participate in competitive tendering and to sign a contract must have engaged in the relevant business for two or more years, and that a payment of 5 % or more of the quoted price (if participating in the tendering process) and 10 % or more of the security deposit (if signing a contract) must be made in cash or public bonds. Information on the tendering contest, such as the time and place and the amount of security deposit required, was posted or announced in newspapers or government bulletins. Based on the Public Accounting Act and the accounting regulations, the Home Ministry's *Tetsudōchō* enacted regulations on the purchase and sales conducted by the agency in October 1890 and started to procure sleepers through competitive tendering. Complying with the regulations, the Home Ministry's *Tetsudōchō*, for instance, announced in the government gazette for February 4, 1891 that those who wished to participate in a tendering process for hinoki, hiba, and chestnut sleepers (30,000 sleepers for each kind) should mail their tender form to the agency by February 25 of the same year. Responding to the announcement, the participants mailed their tender form containing their quote (unit price and total amount) by the specified date (Dajōkan Monjokyoku 1891).

Let us now look at the sleeper dealers who participated in competitive tendering and the content of the contracts. Table 2.1 shows petitions for cancellation of delivery contracts for sleepers submitted from 1893 through 1902 to the Ministry of Communications' (*Teishinshō*) *Tetsudōkyoku* (the Ministry of Communications' *Tetsudōsagyōkyoku* from August 1897). As the table shows, sleeper dealers came from Hokkaidō and the Tōhoku, Chūbu, Kinki, and Chūgoku regions, but not from Kyūshū or Shikoku. The listed contracts are considered to have been for procuring sleepers used in the construction of the railways between Fukushima and Aomori and between Tsuruga and Toyama, which was intensified from 1896,



**Table 2.1** Petitions for cancellation of delivery contracts for sleepers submitted to the Ministry of Communications' Tetsudōkyōku (Tetudōsagyōkyoku), 1893–1902

No.	Sleeper dealer	Address	Date of contact	Deadline for completion delivery	Tree varieties	Price of sleepers contracted (in yen)	Number of sleepers contracted	Number of sleepers delivered	Sleeper producing regions	Sleeper delivery destination	Petitions for cancellation of delivery contracts	
											Date of submission	Reason
1	Hanshichi Gotō	Hokkaidō	22 Aug. 1899			6,400	20,000	10,000			1 Dec. 1899	
	Daigorō Sekikawa (Hanshichi Gotō's agent)	Hokkaidō		Dec. 1899	Class 2		5,000	2,500		Noshiro	1 Dec. 1899	Transport difficulties in bad weather
1'	Hanshichi Gotō	Hokkaidō		31 June 1898			20,000					
	Yohachi Hirata (Hanshichi Gotō's agent)	Tokyo						4,172			1 Feb. 1898	Transport difficulties in bad weather
2	Hokkaidō Timber Co.	Hokkaidō	8 Mar. 1899		Class 2		6,000				24 Aug. 1899	A fire
			12 Jan. 1900	30 Sep. 1900	Class 2		23,000	7,182			13 Dec. 1900	A shortage of ships
3	Sōtarō Shirato (Satarō Tsushima's agent)	Aomori	19 Oct. 1895				10,000	0			10 Dec. 1895	A breach of contract by a subcontractor a problem of raising money

(continued)

Table 2.1 (continued)

No.	Sleeper dealer	Address	Date of contact	Deadline for completion delivery	Tree varieties	Price of sleepers contracted (in yen)	Number of sleepers contracted	Number of sleepers delivered	Sleeper producing regions	Sleeper delivery destination	Petitions for cancellation of delivery contracts	
											Date of submission	Reason
4	Kanjūrō Nishimura	Aomori	3 Mar. 1896	Apr. 1896 May 1896			10,000	2,000			19 May 1896* 28 Apr. 1896	A shortage of freight cars due to military transports
5	Yasusuke Kikuta	Fukushima	9 June 1897	30 Sep. 1897	Class 1 (for switches)		1,280		Fukushima	Fukushima Station	28 Dec. 1898	A flood and transport difficulties because road was destroyed.
6	Toyokichi Numa-hata	Aomori	7 July 1899	30 Sep. 1899	Class 1	1,947	5,500		Iwate	Aomori	17 Dec. 1899	A shortage of freight cars, and a flood
7	Sakuzaeon Echigo	Akita	14 Oct. 1899		Class 1 (for switches)		2,682	973			22 Sep. 1900	Personal reasons
8	Takesuke Kakizaki	Akira	26 Jan. 1900		Class 1 (for switches)		1,713				28 Dec. 1900	Miscalculation of a unit sleeper price at competitive tendering process, and transport difficulties due to heavy snow

							30 Dec. 1900	Class 1		5,000		Akita		27 Apr. 1900	Sinking of ship, and shortage of timber for sleepers
9	Unokichi Uga	Fukushima	24 Oct. 1900					Class 1 (for bridges)	3,900	2,000	572			29 Mar. 1901	A shortage of timber for sleepers
10	Miyota Horochi	Iwate	23 May 1899	30 Sep. 1899					1,750	5,000		Iwate	Fukushima	22 Feb. 1900	An epidemic of dysentery
11	Tahichi Nozawa	Kanagawa	10 Oct. 1894							10,000	589			4 June 1895	
12	Tsunejiro Misawa (Kikujiro Misawa's agent)	Saitama	June 1894	Dec. 1894 → Sep. 1895					778	10,000	6,695		Tsuruga	20 Sep. 1895	A shortage of ships due to military transports
13	Kirizaburo Yokoi (Kyōji Hasegawa's agent)	Tokyo	1 June 1900					Class 1	5,800	10,000	1,165			18 Dec. 1900	Personal reasons
14	Kidokoro	Tokyo	7 Nov. 1900					Class 1		5,000				23 Mar. 1901	Difficulties in carrying logs
15	Kakuzō Ishiwatari	Tokyo	Oct. 1896	30 Nov. 1896						402				29 Nov. 1896	A cancellation of a contract by a supplier; sleepers of crude quality

(continued)

Table 2.1 (continued)

No.	Sleeper dealer	Address	Date of contact	Deadline for completion delivery	Tree varieties	Price of sleepers contracted (in yen)	Number of sleepers contracted	Number of sleepers delivered	Sleeper producing regions	Sleeper delivery destination	Petitions for cancellation of delivery contracts	
											Date of submission	Reason
16	Kamekichi Ichikawa	Tokyo	26 Nov. 1896		Class 1		5,000				9 May 1897	Natural disasters
			26 Nov. 1896		Class 2		5,000				31 Mar. 1897	Natural disasters
17	Yoshimasa Suzuki	Kanagawa	16 Dec. 1896	31 Mar. 1897	Class 2		7,700					
	Kamakichi Ichikawa (Yoshimasa Suzuki's agent)	Tokyo									25 Mar. 1897	Natural disasters
18	Yoshirō Yamaguchi	Tochigi	7 Feb. 1899			2,100	5,000				14 May 1900	
			22 May 1899	Aug. 1899	Class 1	2,250	5,000	4,689			6 Aug. 1900	An epidemic disease and a flood disaster
19	Tadajirō Nakamura	Yamanashi	20, 22 Jan. 1897		Class 2		20,000	3,378			31 Aug. 1897	Transport difficulties by road destroyed due to heavy rain

20	Kōshirō Nagasawa	Yamanashi	15 Oct. 1900	31 Dec. 1900	Class 1		15,000	Ibaraki		18 Mar. 1901	A reduction of water volume in the river
			15 Nov. 1900				20,000			15 May 1901	A reduction of water volume in the river
21	Takajirō Arai	Gunma		31 Jan. 1900	Class 1 (for switches)		686			9 May 1900	Heavy snow
22	Susumu Kōda	Nagano	15 June 1896	Nov. 1896		5,400	10,000		Shinbashi and Karuzawa Stations	26 Nov. 1896	A shortage of freight cars
23	Tsunezō Shimada	Nagano	12 Dec. 1899	31 Mar. 1900	Class 1		5,000			21 May 1900	Logging and transport difficulties due to heavy snow
24	Kinosaku Fujiwara	Nagano	21 Dec. 1900	10 Dec. 1900	Class 1 (for switches)					14 Mar. 1901	Personal reasons
25	Chōjirō Nishiwaki	Gifu	1 June 1900	31 Aug. 1900			20,000			1 Sep. 1900	Supplier's disease
26	Kumema Ōkura	Tokyo	20 Mar. 1901							5 July 1901	(Partial cancellation)
	Shōsaku Kanamori (Kumema Ōkura's agent)	Nagano		May 1901	Class 1 (for switches)					10 June 1901	Sleepers of crude quality

(continued)

Table 2.1 (continued)

No.	Sleeper dealer	Address	Date of contact	Deadline for completion delivery	Tree varieties	Price of sleepers contracted (in yen)	Number of sleepers contracted	Number of sleepers delivered	Sleeper producing regions	Sleeper delivery destination	Petitions for cancellation of delivery contracts	
											Date of submission	Reason
27	Takeshirō Kameyama	Aichi	9 Aug. 1893	May 1894			5,000	More than half			20 June 1894	Personal reasons
28	Tōbē Okada		25 Jan. 1901				20,000					
	Isaburō Nishiura (Tōbē Okada's agent)	Aichi									8 June 1902	A shortage of timber for sleepers
29	Kintarō Umino (Bunkichi Idei's agent)	Shizuoka	3 Feb. 1897	24 June 1897			15,000				30 June 1897	Difficulties in logging
30	Kenkichi Ueno	Toyama	12 Nov. 1896		Class 1		5,000	1,500			30 Apr. 1897	The subcontractor didn't transport sleepers under the pretense of wind and waves in the sea
31	Kanejirō Kobayashi	Niigata	May 1896				1,300			Karuizawa		

	Shosaku Tanaka (Kanejirō Kobayashi's agent)	Niigata	28 Mar. 1899	30 Sep. 1899	Class 1		5,000				21 Sep. 1899	Personal reasons
32	Sadakichi Kasai	Toyama	12 Feb. 1897				20,000		Akita	Fukui		
	Shinji Shirasawa (Sadakichi Kasai's agent)										30 Apr. 1897	Breach of contract by the sub-contractor
33	Buhō Ishida	Ishikawa	30 July 1897	30 Oct. 1897			5,000		Shiga		30 Oct. 1897	Difficulties in sawing due to a run of wet weather, and epidemic of dysentery
34	Hidekazu Katsumi	Ishikawa	6 Nov. 1899	25 Dec. 1899 → 29 Jan. 1900	Class 1 (for bridges)		1,141		Toyama, Ishikawa, Aichi, Fukui	Takaoka, Kanazawa, Tsuruga, and Kata-machi Stations		Logging and transport difficulties due to heavy snow
	Ichijirō Oda (Hidekazu Katsumi's agent)	Ishikawa									18 Feb. 1900*	

(continued)

Table 2.1 (continued)

No.	Sleepers dealer	Address	Date of contact	Deadline for completion delivery	Tree varieties	Price of sleepers contracted (in yen)	Number of sleepers contracted	Number of sleepers delivered	Sleepers producing regions	Sleepers delivery destination	Petitions for cancellation of delivery contracts	
											Date of submission	Reason
34'	Hidekazu Katsumi	Ishikawa	6 Nov. 1899	25 Dec. 1899	Class 1 (for bridges)	2,603	1,162					Logging and transport difficulties due to heavy snow, and wrong size of sleepers
	Sōemon Osa (Hidekazu Katsumi's agent)	Ishikawa									15 Feb. 1900	
35	Masayasu Aoki	Ishikawa	7 June 1899	26 July 1899	Class 1 (for bridges)		504				13 Aug. 1899	A fire
36	Hidejirō Tsuda (Yoshiharu Nagae's agent)	Ōsaka	23 July 1900			6,400	10,000	3,907			14 Mar. 1901	Transport and logging difficulties in bad weather and heavy snow
	Hidejirō Tsuda (Sentarō Kozasa's agent)		25 Aug. 1900				20,000				14 Mar. 1901	



37	Kichibē Takagi	Hyōgo	6 Nov. 1900	31 Mar. 1901	Class 1	2,295	3,000				20 May 1901	Logging and transport difficulties due to heavy snow
38	Kazuyoshi Okada	Hiroshima	13 Feb. 1899		Class (only chest-nut)		5,000			Ōsaka	31 Mar. 1899	Sleepers of crude quality
			20 Feb. 1899		Class (only chest-nut)	2,285	5,000				30 Apr. 1899	Sleepers of crude quality
39	Kichitarō Abe	Tottori	4 Mar. 1901		Class 1		6,984				1 Mar. 1902	Natural disasters
40	Kōzō Minami	Tottori	5 Oct. 1900		Class 1	7,450	10,000					
							10,000		Shimane		9 Mar. 1901	Mistakes in conclusion of contract

Source: Teishinshō (1893–1902)

Note: (1) \* a petition for postponement of the deadline for delivery completion. (2) Class 1 timber: chestnut, hiba and hinoki. Class 2 timber: timber from Hokkaidō

and the construction of the railways between Hachiōji and Nagoya and between Shinonoi and Shiojiri, which began in that year. Tendering contests were held at accounting offices in Shizuoka, Kōbe, Nagano, and other regions that were under the jurisdiction of the Accounting Division of the Ministry of Communications' *Tetsudōkyoku* ([Dajōkan Monjokyoku 1903](#)). To complete the delivery process, *Tetsudōkyoku* had the winning dealer bring sleepers to a specified location at the site of a railway station by a given deadline and then conducted a product quality inspection. Although there are some exceptions, the number of sleepers contracted was 5,000–20,000 (5,000 per lot) per dealer. A calculation of the number of dealers who delivered sleepers based on the number of sleepers purchased by *Tetsudōsagyōkyoku* in 1899 and 1900 reveals that there were at least 22, and at most 89, such dealers in 1899 and at least 39, and at most 157, dealers in 1900. Since the number of the dealers who petitioned for contract cancellation is 10 (14 instances) for 1899 and 12 (15 instances) for 1900 as shown in Table 2.1, it is estimated that *Tetsudōsagyōkyoku* signed contracts with 60–100 sleeper dealers, and that about 10 % of them submitted petitions for contract cancellation. The proportion of the amount paid for the sleepers procured through competitive tendering to the total amount spent for all sleepers is 97 % (216,411 yen) for 1899 and 99 % (586,433 yen) for 1900 (*Tetsudōsagyōkyoku* 1900).

### ***3.3 Limitations Placed on the Participants in the Tendering Process***

Under the competitive tendering system, the contract winners were determined based only on the tendering price, and the penalty for non-execution of the contract was only the confiscation of the security deposit, which gave rise to problems such as the participation of financially and technologically weak producers in tendering contests and the delivery of poor quality sleepers. Although the reasons for contract cancellation listed in Table 2.1 include natural disasters, the number of sleepers that had been planned for delivery in 1899 but were not actually delivered was 67,000, or about 15 % of the number of sleepers purchased by the Ministry of Communications' *Tetsudōsagyōkyoku* that year (447,000). In response, with the issuance of Ordinance of the Ministry of Communications No. 19, the Ministry put limitations on the participants in the tendering process based on the amount of their direct national tax. More specifically, participants with a tendering price of less than 5,000 yen per lot (5,000 or more but less than 10,000; 10,000 or more but less than 20,000; 20,000 or more but less than 50,000; and 50,000 or more) must be taxpayers paying a national direct tax of 10 yen (20, 50, 80, and 100, respectively) or more annually. Also, one employee in the case of a general partnership company or one partner with unlimited liability in the case of a limited partnership company must satisfy the above condition. In the case of a stock company, it must have the same qualification as a limited partnership company, or the money received for issued stocks must be twice as much or more than the

quoted price (Naikaku Kanpōkyoku 1900). With such limitations, the Ministry of Communications determined the quantity of sleepers delivered based on the suppliers' asset size and lowered the risk of contract non-execution in efforts to secure sleepers accordingly to the specifications, tree varieties, and quantities listed on the contracts.

An invited tendering system was created in June 1900 with the issuance of Imperial Ordinance No. 280. This enabled the Ministry of Communications' *Tetsudōsagyōkyoku* to directly select the participants for the tendering process. As a result, things like coal, cement, girders, and materials for train vehicles were purchased through the invited tendering system (Teishinshō 1904, 1905). The competitive tendering system continued to be used for sleepers however. One reason may be that producers were unlikely to meet delivery deadlines even if they had started producing sleepers immediately after signing their contract; production of sleepers required more than half a year for logging, transportation, sawing, and drying. However, the delivery deadline was set to be 3–5 months after the contract was signed. Further, despite the fact that logging and transportation in some regions was difficult due to seasonal reasons such as accumulated snow, sleeper dealers could not know the quantity to be contracted or the delivery location and delivery deadline until immediately before the tendering contest, which made planned production impossible. Another reason why competitive tendering for sleepers continued is that since the transportation costs were high for a distant delivery location, the geographical extent of sleeper-producing regions for a given delivery location was, to some degree, limited. For these reasons, the Ministry of Communications' *Tetsudōsagyōkyoku* would likely have experienced difficulties securing the necessary quantities without opening up the tendering system to many sleeper dealers, although eliminating those who paid less than 10 yen for their direct national tax.

In sum, with the competitive tendering process or the invited tendering process, it was difficult to secure the necessary quantities of sleepers while keeping their quality high.

## 4 Post-nationalization Period Until the Start of World War I

### 4.1 Procurement of Sleepers Through Sole-Source Contracts

New regulations were enacted in June 1906 (and implemented the following year) on the Imperial Railway and the accounting of funds for materials; accordingly, the procurement process for railway materials shifted from competitive tendering to sole-source contracts. As seen in Table 2.2, the share of sole-source contracts in the amount spent for purchasing materials (domestic orders only) increased from 22 % in 1906 to 58 % in 1907 and then to 74 % in 1909. The Railway Authority (*Tetsudōin* 1908–1920) came to use sole-source contracts, starting with sleepers purchased for 1909 (*Teikoku Tetsudō Taikan Hensankyoku* 1984). It also took the following measures to secure the necessary quantities of sleepers.

**Table 2.2** The amount spent by JGR in purchasing materials, 1900–1909

Domestic orders									
Year	Competitive tendering (%)	Invited tendering (%)	Sole-source contract (%)	Others (%)	Sub-total (%)	Foreign orders	Total (in 1,000 yen)		
1900	7,362 (88.9)	99 (1.2)	822 (9.9)	0 (0.0)	8,283 (100)	3,798	12,081		
1901	3,636 (59.6)	570 (9.3)	549 (9.0)	1,344 (22.0)	6,099 (100)	1,767	7,866		
1902	3,402 (59.6)	1,695 (29.7)	611 (10.7)	0 (0.0)	5,708 (100)	3,019	8,727		
1903	2,753 (35.0)	3,682 (46.8)	1,429 (18.2)	8 (0.1)	7,872 (100)	1,834	9,706		
1904	1,073 (41.3)	739 (28.4)	707 (27.2)	82 (3.2)	2,601 (100)	2,263	4,864		
1905	1,668 (24.4)	3,749 (54.7)	1,420 (20.7)	11 (0.2)	6,848 (100)	645	7,493		
1906	4,363 (41.5)	3,863 (36.7)	2,270 (21.6)	29 (0.3)	10,524 (100)	2,124	12,648		
1907	9,558 (34.8)	1,849 (6.7)	15,980 (58.2)	63 (0.2)	27,449 (100)	7,931	35,380		
1908	5,012 (25.3)	3,846 (19.4)	10,898 (55.1)	31 (0.2)	19,788 (100)	2,073	21,860		
1909	2,891 (13.2)	1,116 (5.1)	16,316 (74.4)	1,622 (7.4)	21,944 (100)	2,120	24,064		

Sources: Tetsudōsagyōkyoku (1900–1905); Tetsudōchō (1906 and 1907); Tetsudōin (1908 and 1909)

Note: Others include contracts with the Yawata Steel Works and the Printing Bureau

The Railway Authority decided to limit the scale of material purchases in different regions (at railway management bureaus and regional offices) and to make lump-sum purchases in Tokyo (at the headquarters). It totally banned regional purchase of coal and sleepers, for which the amount spent was particularly large. In addition, the Railway Authority conducted investigations related to purchasing special materials, such as sleepers and coal, and to preparing purchase plans. Although details of the investigations related to sleeper purchases are unknown, after the contracts in a given year had been completed, the Railway Authority sent staff to sleeper-producing regions to collect information on unit prices and production quantities for the following year and conducted detailed investigations and research. Then, based on these investigations, the Authority judged whether the production costs (calculated precisely based on the price of timber, production costs, transportation costs, and profit) listed in the quote form were high or low, calculated the quantity to be contracted for—which would ensure the securing of the necessary quantities within budget—and gave instructions to the designated sleeper dealers. The quantity desired by a dealer was not listed on the quote form. By informing dealers of its desired contract quantity after receipt of the quote forms, the Railway Authority probably intended to imply that the contract quantity would be reduced if a sleeper dealer's quote was relatively high, and in this way would prevent them from raising the prices quoted. After informing the sleeper dealers of its desired contract quantity, the Railway Authority decided on the contract unit price through price negotiations and prepared a final purchase plan. The contract price determined in this way was not changed over a one-year contract period unless there was a significant change in the market price (see Fig. 2.3) (Nihon Kokuyū Tetsudō 1971; Nihon Makuragi Kyōkai 1959).

The Railway Authority selected sleeper dealers who owned mountains and forests and had sufficient funds and credit as transaction counterparts, and decided

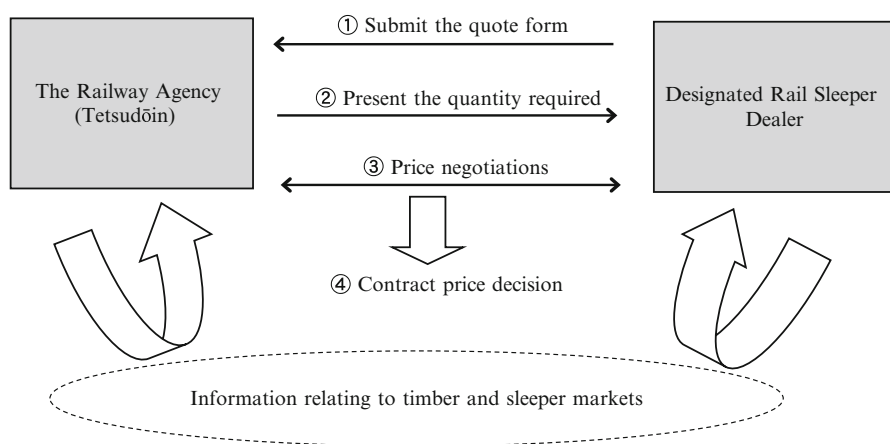


Fig. 2.3 The process of concluding contracts for the purchase of sleepers

to make direct contracts with them (Yamada 1911). The criteria used to select designated sleeper dealers are unknown, but, for example, Sōbei Suzuki of Zaisō and Tadashichi Hasegawa of Hasegawa Shōten served as executives at many timber companies and chambers of commerce and were powerful timber dealers in Nagoya with sizable assets. Sannosuke Kobayashi, whose assets and volume of timber transactions were probably small relative to Suzuki's and Hasegawa's, opened a sleeper dealing business in Ichikawachō, Kanzakigun, Hyōgo prefecture in 1908, then moved to Gifu prefecture in 1916 and started producing and selling sleepers mainly in that prefecture, and eventually became one of the Ministry of Railways' (Tetsudōshō 1920–1943) designated sleeper dealers in 1921 (*Gifu Shinbun*, 3 December 1995).

The Railway Authority not only made contracts with such designated sleeper dealers and did not easily allow new entry by other dealers, but also rarely made contracts with sleeper dealers who had previously caused a contract cancellation due to contract non-execution. Yoshimoto Shōten (established in 1887; Yoshimoto Limited Partnership Co. established in March 1910 with a capital of 5,000 yen) was a timber dealer headquartered in Saku, Nagano. In addition to producing wood charcoal, it also produced sleepers as side work and started to deliver sleepers to the Nagano Transportation Office of the Ministry of Communications' *Tetsudōsagyōkyoku* in 1905. Starting in the mid-1910s, Yoshimoto Limited Partnership Co. expanded its sleeper sales to several private railway operators including Nagano railways, Ina railways, and Tōbu railways, and the number of sleepers delivered well exceeded 100,000 per year. However, the delivery of sleepers from the company to the Ministry of Railways stopped in 1921 for an unknown reason. The company subsequently petitioned the Ministry of Railways repeatedly for the right to supply sleepers, but permission was not granted (Yui 1961). Such actions by the Railway Authority or the Ministry of Railways guaranteed that, in exchange for proper contract execution, designated sleeper dealers would receive contracts the following year. Therefore, the designated sleeper dealers could secure stable sales. In addition, they received the payment for sleepers delivered within one week of invoicing. Also, in other timber markets they could take advantage of the fact that they had transactions with the Railway Authority or the Ministry of Railways, which enhanced their reputation (Tomiyaama 1934; Yoshitsugu 1951). These provided the designated sleeper dealers with incentives for supplying sleepers to the national railway operator.

The Railway Authority had sleeper dealers including Kyōji Hasegawa (Tokyo), Torazō Fuji (Ōsaka), Kinzaburō Nagata (Nagoya), and Yasujirō Kodate (Aomori) establish the Ōminato Timber Co. in Aomori in August 1912 in order to secure sleepers for bridges and switches, for which mostly only hiba and hinoki timber could be used in Honshū.<sup>4</sup> With a starting capital of 500,000 yen (125,000 yen

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<sup>4</sup>According to a survey of the income and business taxes of September and October 1913, the number of timber dealers involved in the establishment of Ōminato Timber Co. was relatively large (Kōjunsha ed. 1914).

already paid in), the company set up its headquarters in Ōminato, Aomori and an office in Fukagawa, Tokyo and started to produce sleepers, with preferential purchases of hiba timber from national forests in Aomori. In the 1900s, government-run timber factories in Aomori and Nagano produced sleepers, using timber from national forests, but there was an increasing movement toward their abolishment in the first half of the 1910s because they took business away from private companies or did not perform well. Under these circumstances, the Railway Authority gave up on the management of sleeper factories, which was under negotiation with the Ministry of Agriculture and Commerce (Nōshōmushō 1910), and instead commissioned private-sector actors to establish sleeper-producing companies (Matsunami 1924; Hasegawa Mokuzai Kōgyō Kabushiki Kaisha 1967). It seems that the Nagoya Railway Sleeper Limited Partnership Co., which was established in May 1913 with a capital of 120,000 yen, served the same function as the Ōminato Timber Co. and produced sleepers for bridges and switches, purchasing hinoki timber from the Kiso Imperial Forest (*Goryōrin*). The investors in the Nagoya Railway Sleeper Limited Partnership Co. were Sōbei Suzuki, Kinzaburō Nagata, Tadashichi Hasegawa, Kōjuro Hattori, Kentarō Hayase, and the Hamakiya Limited Partnership Co., all powerful timber dealers in Nagoya (Nagoya Shōgyō Kaigisho 1914; Nihon Kōtsū Kyōkai 1952).

Thus, the Railway Authority selected sleeper dealers with sufficient funds and credit and made contracts with them at prices that were judged to ensure the securing of sleepers. With this system the Railway Authority could secure the necessary quantities of sleepers within budget, avoid regional shortages of sleepers caused by differences between the existing quantity of timber and demand for it, and ensure the quality of sleepers.

## 4.2 *Activities of the Designated Sleeper Dealers*

What kinds of activities were conducted by the designated sleeper dealers in connection with the procurement of sleepers by the Railway Authority? This subsection examines the activities of Hasegawa Shōten which supplied sleepers to JGR. The Hasegawa family lived in Shimo-Asōmura, Kamogun, Gifu prefecture from the 1680s. The head of the family served as the village headman, and the family conducted a log boom project and a logging project in the Meiji period. The Hasegawa family collected logs floating downstream from Hida and Gujō with a log boom at Shimo-Asō, formed them into rafts, and transported them to Nagoya, Kuwana, and Inuyama. Since Nagoya, a major destination for timber, was an important market, the family set up a branch store in Kuwana in 1876 as a distribution centre for timber and another branch store in Nagoya in 1881. The family also set up its Tokyo office in 1881 (upgraded to branch status in 1886) and its Ōsaka branch in 1892, expanding its sales network to both these cities. Among the three branches in Nagoya, Tokyo, and Ōsaka, the Nagoya branch supplied timber

not only to the Navy and the Railway Authority, but also to companies engaged in civil engineering construction, spinning, and harbour construction. The Nagoya branch apparently performed better than the Tokyo branch and the Ōsaka branch (Hasegawa Mokuzai Kōgyō Kabushiki Kaisha 1967; Hasemoku 1988).<sup>5</sup> According to a survey conducted in September and October of 1910, the business tax paid by Tadashichi Hasegawa (head of the Nagoya branch), Kyōji Hasegawa (head of the Tokyo branch), and Katsusuke Hasegawa (head of the Ōsaka branch), was 892 yen, 312 yen, and 339 yen, respectively (Kōjunsha ed. 1911).

Since the inception of the Nagoya branch, its head, Tadashichi Hasegawa, actively purchased mountains and forests in nine prefectures including Gifu, Nagano, Aichi, Shizuoka and Mie, and set up offices for logging and transportation. In light of this, the Hasegawa family created a central command center within the Nagoya branch in 1895. The central command center managed the family assets and business operation, supervised the operation of the branches, and unified administrative work related to logging projects and shipping. Through the headquarters and the Nagoya branch, the command centre conducted logging and transportation projects, timber sales, and investments in forests and mountains. However, sales were stagnant relative to timber production before World War I. In October 1913, the command centre was shut down and all branches began to operate autonomously (Hasemoku 1988).

Let us now examine in detail the business activities of the Hasegawa Tokyo branch. Against a backdrop of increased demand in Tokyo for building materials and materials for civil engineering construction to develop transportation infrastructure, the Tokyo branch engaged in the consignment sale of timber and, at the same time, focused on direct sales of timber produced by its family business. However, for several years after its establishment in 1887, the Tokyo branch could not join the associations organized by the wholesale sellers and buyers of timber, and its business was so bleak that it was about to face bankruptcy. In response, the Hasegawa headquarters decided to separate the accounting system of the Tokyo branch from that of the headquarters and made the branch operate independently after providing it with a capital fund of 10,000 yen in 1892. It was then that the Sino-Japanese War broke out, which led to an economic boom and increased demand for building materials. This enabled the Tokyo branch to turn around its declining business. As seen in Table 2.3, which shows the operational performance of the Tokyo branch, it earned profits of 1,075 yen and 3,923 yen in 1894 and 1895, respectively. However, during the post-Sino-Japanese War economic stagnation, demand for timber fell. Also, since the headquarters had increased its loan to the Tokyo branch by 10,000 yen after the account was settled for 1897, the interest on the capital from the headquarters increased. These factors led to the Tokyo branch posting a loss in 1898. Therefore, in order to stabilize its business, the branch expanded its timber supply to government agencies, taking advantage of the fact that it had supplied timber to the Imperial Household Ministry (*Kunaishō*) (Hasegawa

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<sup>5</sup>The Kuwana branch was closed in 1890.



**Table 2.3** Profit and loss statement of the Hasegawa Tokyo branch, 1894–1916

Year	Revenues			Costs and expenses							Gross profit (C = A-B)	Interest on capital from headquarters (D)	Net income (C-D) (in yen)
	Sales of goods	Sales commission fee	Interest income	Other income	Total (A)	Cost of goods sold	Selling, general and administrative expenses	Interest expenses	Rent expenses/taxes	Other expenses	Total (B)		
1894													1,075
1895	36,638	4,247	501	496	41,882	31,818	3,973	278		1,224	37,292	667	3,923
1896	65,019	6,867	2,165	308	74,359	56,106	5,345	665		1,674	63,790	600	9,969
1897	47,326	1,017	1,497	7,677	57,517	40,674	5,577	260		1,647	48,158	1,204	8,156
1898	38,835	491	1,336	1,086	41,748	36,057	3,728	453		158	40,395	1,352	▲ 108
1899		1,992	1,372	2,389			7,211	1,002		2,121		1,464	3,631
1900	94,692	2,450	429	2,104	99,674	76,569	10,780	2,805		520	90,676	1,670	7,328
1901	108,863	1,860	1,069	935	112,726	87,892	14,319	3,463	814	0	106,487	480	5,750
1902	79,739	2,652	952	5,023	88,366	71,820	4,417	2,499	851	0	79,586	870	6,281
1903	106,673	4,057		3,872	114,602	98,020	5,116	3,277	1,123	422	107,959	6,644	6,644
1904	134,945	1,017		4,909	140,871	120,761	8,676	813	1,585	0	131,835	9,036	9,036
1905	245,236	6,518		3,350	255,104	222,509	13,709	429	1,922	748	239,316	15,788	15,788
1906	244,494	7,373		12,688	264,555	228,573	19,419	1,823	2,684	5	252,504	12,051	12,051
1907	210,503	861		3,433	214,797	188,282	17,482	0	2,864	0	208,629	6,168	6,168
1908	261,046	3,304		1,288	265,639	237,166	16,356	4,713	1,396	0	259,630	6,008	6,008
1909	168,497	1,385		0	169,882	144,747	16,755	1,947	1,518	1,931	166,899	2,984	2,984
1910	131,656	160		4,180	135,996	112,952	12,881	3,298	286	1	129,418	6,578	6,578

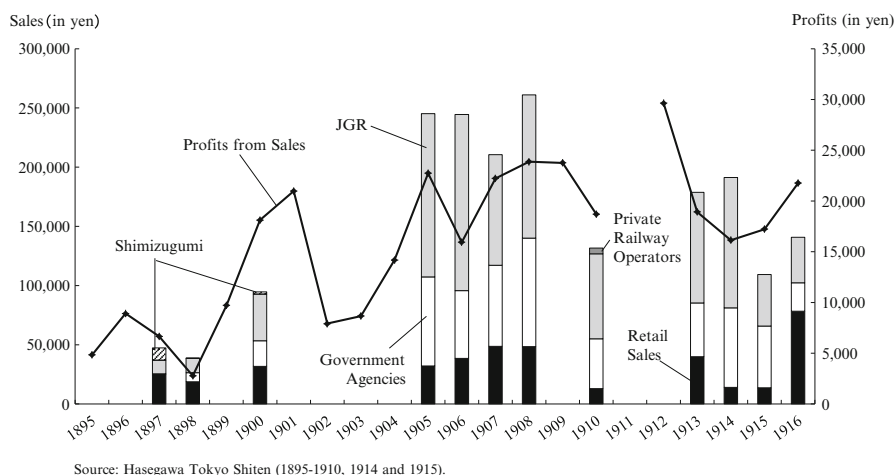
(continued)

Table 2.3 (continued)

Year	Revenues		Costs and expenses							Gross profit (C = A-B)	Interest on capital from headquarters (D)	Net income (C-D) (in yen)	
	Sales of goods	Sales commission fee	Interest income	Other income	Total (A)	Cost of goods sold	Selling, general and administrative expenses	Rent expenses /taxes expenses	Other expenses				Total (B)
1911													
1912	176,649	0		1,826	178,475	147,025	17,061	4,477	940	1,474	170,977	7,498	7,498
1913	178,674	2,989		3,520	185,182	159,772	14,450	3,488	851	0	178,561	6,621	6,621
1914	191,262	5,354		5,647	202,263	175,124	15,019	2,237	794	4,518	197,692	4,571	4,571
1915	109,352	1,798		2,594	113,745	92,139	15,618	1,805	799	0	110,361	3,384	3,384
1916	140,806	765		2,917	144,488	119,059	13,179	4,467	779	0	137,483	7,005	7,005

Source: Hasegawa Tokyo Shiten (1895–1910, 1914 and 1915)

Notes: The accounting period is from January to December. ▲ means minus



**Fig. 2.4** Sales and profits of products of the Hasegawa Tokyo branch, 1895–1916

Mokuzai Kōgyō Kabushiki Kaisha 1967). The profit of the Tokyo branch mainly consisted of the profit from product sales (subtracting the cost of goods sold from the sales of goods) and sales commission fees. From 1900, of the entire profits, the share of profit from product sales was largest, at 60–90 %.

Figure 2.4 shows product sales of the Tokyo branch from 1895 to 1916. The branch engaged in timber supply to government agencies (JGR, Navy Shipyard, The Ministry of the Imperial Household, the Water Supply Department of Tokyo City, and the agency overseeing civil engineering works), timber sales to Shimizugumi (Shimizu Construction Co.) and private railway operators, and retail sales. Sales to government agencies were the largest; these accounted for 25 % of all sales in 1897 and 51 % of all sales in 1898. These sales reached 80–90 % of all sales from 1905 to 1915. In particular, the share of sales to JGR in the entire product sales was around 50 % from 1905 to 1914, except for the years for which data are not available, and exceeded 60 % in 1906. Besides timber supply to government agencies, retail sales were important. The share of retail sales in the product sales varied significantly from 7 to 50 %, but the fluctuation coincided with that of the profit from product sales.<sup>6</sup> For the Hasegawa Tokyo branch, timber supply to JGR was likely to cause a loss when there was a post-contract increase in the price of trees, logs, and labour, but was important during a recessionary period when demand for general-purpose timber declined. At the same time, in retail sales, it

<sup>6</sup>As an exception, in 1905, although the retail sales declined from the previous year, the net profit rose by more than 3,500 yen. This can be attributed to the fact that during the Russo-Japanese War, when the timber price was increasing due to rapidly increased demand for materials for military purposes, the Tokyo branch sold timber, which it had purchased before the war and had stored, to the Navy and Army.

was difficult to achieve distribution network expansion or sales increases during economic stagnation, but it was feasible during periods of economic boom when timber demand rose. In other words, for the Tokyo branch, the sleeper market was a sector where the branch could definitely secure a certain level of profits each year, and the retail market was a sector which was affected by economic fluctuations, but which gave the branch an opportunity to earn large profits during economic booms. The Hasegawa Tokyo branch is an example of a designated sleeper dealer having multiple sales channels. The same situation was also observed for Zaisō in Nagoya and Kodate Timber Co. in Aomori.

## 5 Increased Demand for Timber During World War I

As discussed in the previous section, the Railway Authority procured sleepers through designated sleeper dealers. However, during the economic boom resulting from World War I, it became difficult to secure stable supplies of sleepers. After the Japanese economy recovered from the recession in the second half of 1914, a wartime boom resulted from increased exports to Asia and the United States. Industrial activity was invigorated in various sectors, increasing the demand for timber. As a result, the price of general-purpose timber soared, and the average unit price for regular sleepers paid by the Railway Authority rose from 0.62 yen in 1915 to 1.04 yen in 1917, then to 1.79 yen in 1919. In early 1917, the Railway Authority could sign contracts at almost the same price as the previous year, with traditional direct procurement from the designated sleeper dealers; however, as wages increased from the middle of the year, many dealers asked for delayed delivery or contract cancellation, which hindered the progress of projects. Therefore, as an incentive payment, 20 % of the contract price was granted for half of the contract quantity (i.e., 0.1–0.2 yen per sleeper) so that the Railway Authority could then procure the necessary quantity (Tetsudōin 1916–1919). Such a problem can be attributed to the fact that the designated sleeper dealers were not specialized in the production and sale of sleepers for the Railway Authority, and that as demand for timber increased, they sold timber in other timber product markets, where they expected to earn greater profits, thereby reducing the quantity of sleepers supplied to the Railway Authority or cancelling contracts.

For example, in Hokkaidō, where there was active exporting of sleepers, the price of sleepers for exports (about 8 ft) was high compared to the price of sleepers supplied for railways in Hokkaidō or Honshū. Therefore, timber dealers preferred to produce and supply 8-ft sleepers intended for railways in Korea and Manchuria, resulting in chronic shortages of sleepers for local railways. Particularly in 1916 and 1917, it was enormously difficult for the railway operator in Hokkaidō to procure sleepers. In response, the Railway Authority significantly increased the budget for sleeper procurement and forcibly secured delivery of the necessary quantity for 1918 (approximately 500,000 sleepers) to the railway management bureau in Sapporo

(*Kōbe Yūshin Nippō*, 16 October 1918). As a result, the purchase price per sleeper paid by the railway management bureau increased—from 0.40 to 0.45 yen in 1916, from 0.45 to 0.55 yen in 1917, and from 0.65 to 0.70 yen in 1918. However, as the price of a sleeper for export (at Otaru port) rose from 1.25 yen in 1918 to 1.90 yen in 1919 and to 2.25 yen in 1920, the price difference between sleepers supplied to the railway management bureau in Sapporo and sleepers for exports grew to about threefold, and there were many dealers who had signed a contract and had paid their security deposit to the Railway Authority but later cancelled the contract and paid the specified penalty (*Hokkai Times*, 28 December 1918). Especially for a timber dealer like Mitsui & Co. (Mitsui Bussan) that produced and sold timber on a large scale in both the domestic and overseas market, the supply of sleepers to the Railway Authority must have seemed small. Mitsui & Co. produced 2 million cubic meters of timber in Hokkaidō at the end of 1919, and 3.25 million of it was for sleepers intended mainly for exports to China and Korea. In Honshū, there was a case where 10,000 sleepers were produced from the mountains of Iwate prefecture and supplied to the Railway Authority in 1919; however, according to a report by the head of the Miike branch in a conference with Mitsui's branch chiefs, supplying sleepers to the Railway Authority was only a nominal business for Mitsui, yet it was advantageous because they received a certain amount of fees per tie without taking any risks (Mitsui Bunko 2004; Ringyō Hattatsushi Kenkyūkai 1958).

In the case of the Hasegawa Tokyo branch, 93,385 yen's worth of sleepers were supplied to the Railway Authority in 1913 and 110,075 yen in 1914, but the amount fell to 38,412 in 1916. In contrast, retail sales increased from 39,897 yen and 13,957 yen in 1913 and 1914, respectively, to 78,374 yen in 1916. Similarly, profits from product sales rose from 18,902 yen and 16,138 yen in 1913 and 1914 to 21,747 yen in 1916 (see Fig. 2.4). If a dealer canceled a contract with the Railway Authority, it was possible that transactions with the agency in the following years would not be guaranteed, and that sales channels could not be secured especially during a recessionary period when demand for timber declined. Therefore, it seems that the Hasegawa Tokyo branch, for which the share of sales to the Railway Authority in total sales was relatively large, reduced the quantity of sleepers supplied to the agency without cancelling contracts on the one hand, while at the same time taking advantage of its reputation as a supplier to the agency to pursue greater profits in other timber markets.

Facing difficulties securing sleepers because of the designated sleeper dealers' business savvy, the Railway Authority procured sleepers to be used in its Okayama railway district, for example, from Okayama, Tottori, Shimane, and Ehime prefectures, as well as relatively distant Nagano prefecture, in order to avoid regional sleeper shortages. The Authority brought in 200,000 sleepers in 1918, and 250,000 sleepers in 1919 from Hokkaidō to make up for shortages in Honshū. In contrast, the Tokyo railway management bureau could secure only 330,000 sleepers in 1920, as opposed to its annual demand for 600,000 sleepers (*Hokkai Times*, December 28, 1918; Dai-Nihon Sanrinkai 1920).

## 6 Shortages of Timber Suitable for Sleepers in the 1920s

Demand for timber fell in the 1920s due to the postwar economic recession. Although demand for timber rose rapidly during the period of World War I, after the war the government lowered tariffs on timber. The government also removed most of the tariffs on imported timber after the Great Kantō Earthquake in September 1923, seeing the need for timber in the reconstruction of the earthquake-stricken areas. As a result, the amount of imported timber jumped from 34,000 cubic meters in 1920 to 3.3 million cubic meters (of which 2.7 million cubic meters came from the United States) in 1924. At the same time, timber which was harvested through large-scale logging due to insect damage, was transported from Sakhalin. Japan's timber market therefore experienced excess supply, which led to a fall in the price of timber (Ōkurashō 1920–1925). During recessionary periods when demand for general-purpose timber declined, existing designated sleeper dealers supplied sleepers as contracted, so many timber dealers wanted to become designated sleeper dealers for the Ministry of Railways in order to secure sales channels. But in the 1920s the Ministry of Railways still had to tackle the problem of securing sleepers. This is because it was plagued by shortages of timber suitable for sleepers (appropriate tree varieties with a large diameter) due to the greater demand for sleepers resulting from increased railway construction and improvement work. Concerns about sleeper shortages had been expressed since railway nationalization, and chestnut timber was expected to be in short supply around the mid-1910s at the latest (*Yokohama Bōeki Shinpō*, 9 October 1909; Nōshōmushō 1910).

The sleepers used by the Ministry of Railways were divided into Class 1 timber (chestnut, hiba, hinoki, and Japanese chinquapin) and Class 2 timber (tree varieties used in Hokkaidō without preservation treatment, mainly timber from Hokkaidō). Facing shortages of suitable timber, the Ministry designated other tree varieties usable for sleepers as Class 3 timber. It also expanded the coverage of Class 3 timber, and the number of tree varieties designated increased from 9 and 17 in 1900 and 1910, respectively, to more than 40 by the second half of the 1930s (Suzuki 1938). However, while Class 1 timber lasted 8–12 years, Class 3 timber, such as pine and beech, lasted 3–5 years. As the replacement frequency was high for sleepers of Class 3 timber, the Ministry of Railways had to apply preservation treatment (inject creosote oil, etc.) to Class 3 timber. Some timber imported from the United States and Sakhalin was added to the list of the designated tree varieties, but tree varieties suitable for sleepers were very limited. Oregon pine, which was the typical variety imported from the United States, was used with creosote oil injected.

Research on the preservation techniques for timber started being actively conducted after railway nationalization in 1906, and the Operation Research Committee was set up after Shinpei Gotō took office as president of the Railway Authority in December 1908. The Committee's Eleventh Sub-committee was mainly responsible for research on sleepers and conducted comparative experiments on different preservatives, injection quantities, and injection methods. Also, in 1913, in order to conduct research on tree varieties suitable for preservation treatment, the Railway Authority set up a timber research laboratory, which was equipped with a room

for testing preservatives, conducting analysis, and culturing bacteria, and began developing preservation techniques. The Railway Authority moved systems and equipment from the Sunagawa timber preservation treatment factory (established in 1909) of the Hokkaidō management bureau and the Utsunomiya preservation treatment factory (established by the Nippon Railway Co. in 1900 and transferred to the Railway Authority at the time of railway nationalization) to Fukagawa, Tokyo and started preservation treatment for sleepers at the new location in December 1919. The Railway Authority (the Ministry of Railways) applied preservation treatment to 310,000 regular sleepers and 2,400 sleepers used for bridges and switches in 1920, and produced 400,000 treated sleepers annually from 1926 through 1929. In the early 1910s, there were only two private-sector preservation treatment factories, which were owned by Nihon Wood Preserving Co. and Tōyō Wood Preserving Co., but the number of such factories increased to 12 by the mid-1920s. Partly due to this increase, the Railway Authority specified preservation treatment factories as the delivery site for sleepers supplied by dealers and had the sleepers processed there (Mokuzai Hozonshi Hensan Iinkai 1985; *Tetsudō Jihō*, 19 November 1921; Nihon Kōtsū Kyōkai 1952).

The unit price of treated sleepers produced and procured by the Ministry of Railways in this way was higher than that of Class 1 sleepers by 0.3–0.5 yen in the second half of the 1920s. Also, the useful life of treated sleepers was longer than that of Class 1 sleepers by only 2–3 years. Furthermore, due to a dearth of large-diameter trees and widespread use of small-diameter logs, the number of sleepers made of boxed timber, which tended to cause cracks and thus rotting, increased. This further decreased the cost performance of treated sleepers. The share of treated sleepers in all sleepers procured by the Ministry of Railways was around 30 % from the end of the 1920s through 1930. Therefore, the Ministry still needed the designated sleeper dealers to supply as many desirable sleepers as possible (Kamimura 1935; *Tetsudō Jihō*, 18 January 1930).<sup>7</sup>

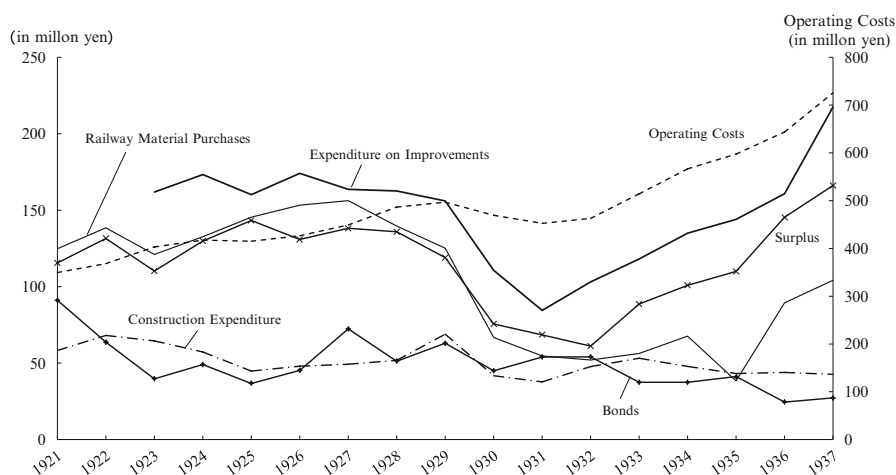
## 7 Greater Shortages of Sleepers in the 1930s

### 7.1 *Reduced Material Purchase Expenditure due to Austere Fiscal Policy*

In addition to the problem of securing appropriate materials, the Ministry of Railways faced budget problems at the end of the 1920s. Each year, the Ministry prepared the following year's budget for three accounts—capital, revenue, and supplies—based on forecasts of the following year's operating income. The revenue items in the capital account were profits carried forward, bonds, and borrowings,

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<sup>7</sup>It seems that the use of steel sleepers was difficult as the domestic supply of rails was finally achieved in the mid-1920s (Tomiyama 1934).



Sources: Tetsudōshō (1941), pp.22-30; Nihon Kokuyū Tetsudō (1971), pp.511-514.

**Fig. 2.5** Trends in the operations of the Ministry of Railways, 1921–1937

and main expenditure items were construction expenditure, which was needed for construction work for new railway lines, and improvement expenditure, which was necessary for work for additional tracks or gradient improvement. The revenue items in the revenue account were transportation income and miscellaneous income, and the expenditure items were operating costs and subsidy costs. The difference between the revenue side and the expenditure side surplus was carried forward as revenue in the capital account and was mainly used for improvement expenditure. As shown in Fig. 2.5, among these items (all of which are of the category *kō*, one of the budgetary categories used under the then Public Accounting Act), construction expenditure declined from 58 million yen in 1921 to 45 million yen in 1924, but started to increase in the following year and reached 69 million yen in 1929. Improvement expenditure gradually increased from 125 million yen in 1921 to 156 million yen in 1928 and consistently exceeded construction expenditure in the 1920s. Operating costs increased from 349 million yen in 1921 to 497 million yen in 1929, and the total revenue in the revenue account was between 466 million yen and 623 million yen over the same period. Therefore, profit was between 111 million yen and 140 million yen. As a result, there was a funding shortage of 2.15 million to 54 million yen to cover improvement expenditure, which depended on surplus as the main funding source. Active railway construction and improvement became impossible under such funding deficiencies following the implementation of an austere fiscal policy in 1930. Expenditures for construction and improvement for 1930 significantly dropped to 41.71 million yen and 66.73 million yen respectively, and operating costs for the same year also fell by 27 million yen from the previous year (Nihon Kokuyū Tetsudō 1971).

Since the Ministry of Railways was not allowed to transfer funds between items of the category *kō*, it needed to respond to the budgetary shortfall for



material purchases by either using stored products or reducing contract prices. The Ministry used 32 million yen from the funds for supplies as operating funds, made lump-sum purchases of materials, and stored them. This is because if materials had been purchased separately using funds for materials included in the relevant items (construction expenditure, improvement expenditure, and operating costs) in accordance with a single year's budget, it would not only have caused problems for projects in the following year due to shortages of materials, but also would have hindered efficient use of the materials. The Ministry supplemented expenses for materials used in projects by using funds from the relevant items (construction expenditure, improvement expenditure, and operating costs) and managed flows from these items under the supplies account. Even though it could store materials, the Ministry could not store materials worth 100–170 million yen per year for long periods of time because it had to keep the balance for the stored materials and the factory account (for timber preservation treatment and the manufacturing of uniforms etc.) to 32 million yen or below (Hirayama and Fujikawa 1936). Also, it could sign multiple-year contracts up to 5 years into the future, but sleepers were not suitable for long-term storage due to potential cracking and rotting. It was also possible to change expenses for material purchases with the transfer of funds between budgetary items of the category *moku* or below, which was allowed to some degree; however, the highest priority was placed on coal purchases.<sup>8</sup> Therefore, it seems that the budget for purchasing other materials including sleepers was cut significantly. In sum, the only measure that the Ministry of Railways could take to deal with the lack of budget for material purchases was a reduction in contract prices.

## 7.2 Implementation of an Invited Tendering System

The Ministry of Railways implemented an invited tendering system for a limited period, from 1930 through 1932 (purchases for 1931 through 1933). This appears to be a measure the Ministry took to overcome the two aforementioned problems, namely, the shortage of timber suitable for sleepers and the tight budget. In other words, by implementing an invited tendering system, the Ministry tried not only to reduce contract prices and secure the necessary quantity of sleepers within the reduced budget, but also to secure sleepers with desirable quality through re-selection of designated sleeper dealers. In the invited tendering held in November 1930, the Ministry signed purchase contracts for a total of 3.03 million sleepers with 330 sleeper dealers out of the 360 dealers who were qualified to the tendering. Although details of the tendering are unknown, Yoshimoto Limited Partnership Co., which had been unable to get a contract since 1921, was among the 330 sleeper

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<sup>8</sup>The share of railway sleeper purchases in the entire expenditures on materials was 6.3 % in 1929 and 5.3 % in 1931. In contrast, the share of coal increased from 26.4 % in 1929 to 37.8 % in 1931.

dealers which signed a contract. The company was finally permitted to supply 30,000 sleepers, but at the lowest price. The company purchased mountains, forests, and trees in Iwate, Fukushima, Nagano, and Gunma prefectures and produced sleepers in the second half of the 1920s; the transaction volume reached about 400,000 sleepers by 1931 (Tetsudō Jihō, 15 November 1930; Yui 1961). It seems that the Ministry of Railways tried not only to reduce contract prices, but also to add major sleeper dealers, which had grown as large as or larger than the existing designated sleeper dealers, as new members of the designated sleeper dealers.

Following implementation of the invited tendering system, the contract price of a sleeper fell from 2.06 yen in 1924 to 1.48 yen in 1930 and then to 0.88 yen in 1932. Similarly, the expenditure on sleeper purchases declined from 9 million yen in 1924 to 7.9 million yen in 1930, then to 4.85 million yen in 1932. This enabled the Ministry of Railways to handle the budget problem (Tetsudōshō 1920–1930). The Ministry could not, however, effectively deal with shortages of timber suitable for sleepers through the re-selection of sleeper dealers and, in addition, faced a further decline in the quality of sleepers. In the recessionary period, sleeper dealers took contracts at low prices in order to secure their sales channels. But if they could not meet orders with their stock of sleepers, they could do nothing but deliver cracked or bent sleepers. A number of sleeper dealers incurred losses and there were many contract violations in 1932 (Nihon Makuragi Kyōkai 1965). The shortage of timber suitable for sleepers might have been mitigated or eliminated by increasing the number of designated sleeper dealers; however, it probably was not easy to further increase the number of designated dealers (which had already been more than 300) and conduct contract negotiations repeatedly. Also, the decreased quantity of sleepers contracted per dealer in the 1930s, when the Ministry of Railways' demand for sleepers was satiated, decreased the dealers' incentive to supply the Ministry with sleepers.

### ***7.3 Increased Demand for Timber, and Measures to Secure Sleepers***

From 1933 onwards, as industrial activities were invigorated under the so-called Takahashi fiscal policy, the demand for timber increased, and after the Sino-Japanese War broke out in 1937 the demand for timber for military purposes soared. The price for general-purpose timber started to rise, and since profits in the Ministry of Railways' budgetary account returned to normal, the Ministry reverted to the traditional transaction process and tried to secure sleepers of guaranteed quality. The shortage of timber suitable for sleepers was still not mitigated at all.<sup>9</sup> Therefore, putting emphasis on improving rot-resistant timber, the Ministry of Railways

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<sup>9</sup>The share of chestnut and hinoki wood in the sleepers purchased by the Ministry of Railways in 1937 was only 3.7 % and 4.2 %, respectively (Manshū Chōsabu 1939).

devised new ways to dry sleepers and decided on a plan to inject more effective amounts of preservatives into sleepers in order to drastically reduce the quantity of sleepers procured to a minimum level and to cope with the devastated mountains and forests (*Tetsudō Jihō*, 1 August 1936). At the Accounting Department's timber preservation treatment factory, which moved in 1930 from Fukagawa to reclaimed land at Shibaura close to Shinagawa Station, the Ministry of Railways not only conducted experiments and research on timber preservation, but also produced more than 10 % of the treated sleepers and supplied them mainly to the railway management bureau in Tokyo (Nihon Kokuyū Tetsudō 1972).

According a survey conducted by the Ministry of Railways in January 1936, 45 % of the sleepers installed nationwide (27 million sleepers) were treated sleepers. Especially in the jurisdiction of the Tokyo railway management bureau, the percentage of installed treated sleepers reached as high as 93 % (Suzuki 1938; *Tetsudō Jihō*, 29 August 1936). However, despite the use of treated sleepers, the Ministry of Railways could not reduce its demand for sleepers. This is because the Ministry increased the use of pine timber, which had the shortest useful life (6.4 years) among the tree varieties used for treated sleepers. Moreover, supplying pine timber to the Ministry was advantageous to the dealers. For example, Kodate Timber Co. purchased pine timber, which was relatively easily available, as 'supplementary timber', because of a reduced amount of hiba trees logged in Aomori, and because of their rising prices which resulted from increased competition among buyers (*Tetsudō Jihō*, 3 October 1936; Kodate Mokuzai Kabushiki Kaisha 1933–1938). The share of pine sleepers in all treated sleepers purchased by the Ministry of Railways increased from 9 % (140,000 sleepers) in 1927 to 38 % (740,000 sleepers) in 1936 and then to 60 % (1.91 million sleepers) in 1939 (Nihon Makuragi Kyōkai 1959). Also, a decline in the number of large-diameter logs led to a reduction in the useful life of sleepers regardless of tree variety used. This exacerbated the problem of sleeper degradation further. From the second half of the 1930s, as the domestic timber market tightened, the Ministry of Railways continued to search for solutions to the problems of procuring sufficient supplies.

## 8 Conclusion

JGR responded to changes in supply and demand in the markets for timber and sleepers and to fluctuations in the budget for material purchases, and shifted the mechanism for procuring sleepers from competitive tendering to sole-source contracts, then to invited tendering before returning to sole-source contracts. Among these methods, the competitive tendering system enabled JGR to purchase sleepers at the lowest prices. However, since it was difficult to secure the necessary quantity of sleepers with this system, JGR shifted the procurement method to sole-source contracts. With sole-source contracts, JGR attempted not only to have the designated sleeper dealers, who had sufficient funds and credit, deliver sleepers with certainty by giving them various incentives, but also to secure the necessary quantity of

sleepers within budget by concentrating the procurement process in response to the expansion of areas from which timber was procured. Put differently, JGR chose a procurement mechanism that prioritized securing the necessary quantity of sleepers as long as procurement was accomplished within budget, even though the purchase price was high relative to the price offered in the general timber market.

The designated sleeper dealers, however, were not specialized in producing and selling sleepers for JGR, and therefore responded sensitively to trends in demand in other timber markets. During economic booms when the price of general-purpose timber rose, the designated sleeper dealers sold timber in other timber markets where they could earn greater profits, rather than supply JGR with sleepers. In contrast, during the boom times JGR could not secure the necessary quantity of sleepers, being unable to overspend its budget. Procuring sleepers with sole-source contracts made it difficult to reduce contract prices due to curbed competition, and JGR faced difficulties securing the necessary quantity of sleepers once a budget deficit emerged. The response to this problem during a recessionary period was to implement the invited tendering system. However, since it would become difficult to secure the necessary quantity of sleepers once the economy started to grow, JGR shifted the procurement method back to sole-source contrasts after solving its budgetary problem.

Overall, it can be said that the changes to JGR's procurement of sleepers were made in order to secure necessary quantities of sleepers while facing budget constraints. However, despite such a flexible response, JGR could not secure sufficient sleepers in the long run. Although it took short-term measures against changes in demand for timber or in its budget that were caused by macroeconomic fluctuations, JGR could not take long-term measures that would take into account not only static budget constraints each year, but also future procurements of sleepers. The first reason why JGR could not secure stable supplies of sleepers in the long run was its procurement method, and the second reason, which is also important, was a collapse of the balance between supply and demand. Although timber is a renewable resource, the speed of tree regeneration cannot be artificially controlled. If demand for timber increased due to industrial development, supply shortages occurred, which could in turn constrain the development process. Analysis of the procurement and use of timber in the process of industrialization is an examination of measures taken by industry in order to deal with the limits of the natural environment and can potentially explain the relationship between industrial development and the natural environment, an issue that remains to be studied in economic history. This article sheds light on only a part of the field, but shows that the railway industry was not free from constraints imposed by the natural environment.

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