

Construction of Local Railways

Eiichi Aoki

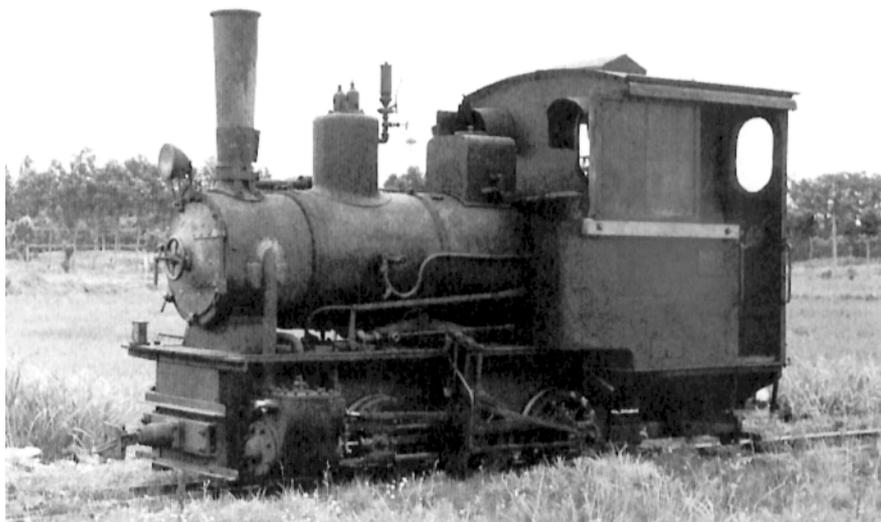
Development of Light Railway Policy

As a result of the nationalization of railways in 1906-1807, 17 leading private railway companies were purchased by the government, and only 20 private steam railway companies continued operating. Generally, these companies operated short lines, and only four had a network of more than 50 km. In addition, there were other railways operating electric, horse-drawn and man-powered trains, running mainly on tramways.

Construction of railways was believed to contribute to regional development and activation of agrarian economies, and many local communities were enthusiastic about introducing railways in their districts. Already in 1907, railway entrepreneurs like Keijiro Amenomiya were making positive investments in introducing steam locomotives for horse drawn or human-powered tramway running on roads, and eight steam tramways of 762 mm (2' 6") gauge under his control, were merged into the Dainihon Tramway Co., Ltd. in 1908.

However, the government considered it undesirable that tramways with limited train operation and safety appliances, spread across Japan as popular branch lines. Light railways, having an intermediate technical standard between tramways and ordinary railways, were thought to be more desirable, for this purpose.

In those days, Japan's railway



■ Kubiki Railway (Niigata) No. 2 Engine built by Koppel in 1911. This 9-ton 762-mm gauge locomotive was widely used by Japanese light railways (author)

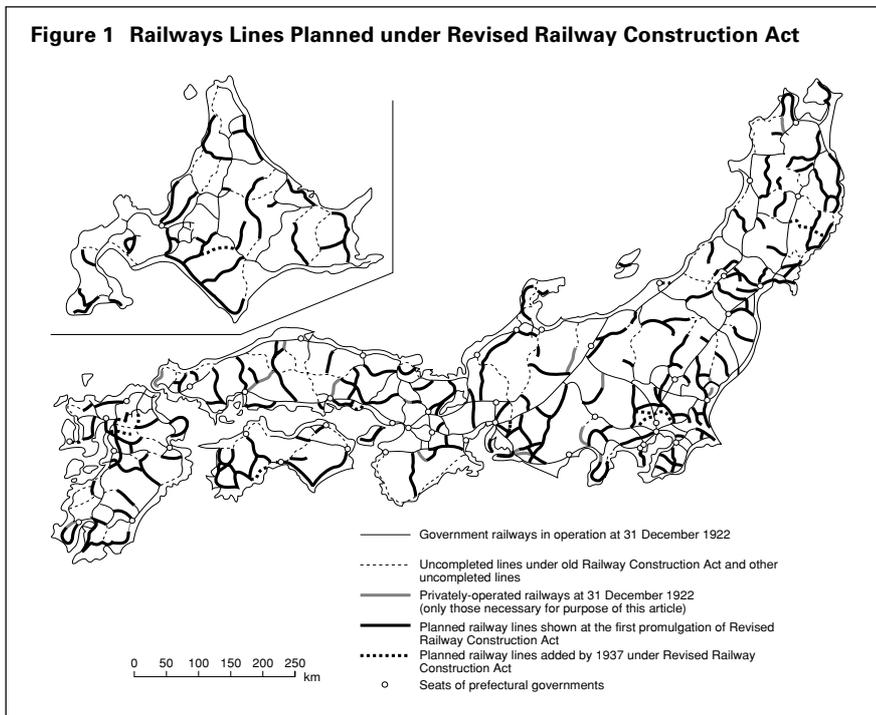
policy was promoted under the leadership of Shimpei Goto, the first president of the Railway Board. As is clear from the fact that he was a proponent of a broad-gauge plan, Goto made efforts to radically improve the functions of trunk lines. He also had in mind the popularization of light railways to be constructed by private investments and their role as branch lines for the Government Railways. For this purpose, he followed a policy of extending subsidies to support light railways with poor profitability. However, the railway policy most important to Goto was improving the functions of railway trunk lines so he avoided investing national financial assets all-round in construction of lo-

cal railways. It is thought that he regarded it as important to create an environment to facilitate private investments in small-scale local railways. For this purpose, he followed a policy of limiting outlay from the government account to subsidies only.

The Light Railway Act (enforced on 3 August 1910) and the Light Railway Subsidiary Act (enforced 1 January 1912) were formulated under this railway policy.

As intended by the government, the Light Railway Act led to many autonomous railway construction plans by local communities across the country. In a period from August 1910 when the Light Railway Act was enforced to March 1911 when fiscal 1910

Figure 1 Railways Lines Planned under Revised Railway Construction Act



ended, 23 new companies were licensed to operate light railways. In addition, 17 railway companies opened under the Private Railway Act, and nine other private railway companies under planning or constructing changed their legal status to light railway by the end of the fiscal year. Furthermore, one operating tramway was designated as a light railway. Table 1 gives the trends in total kilometers of light railways up to 1926. The kilometers of licensed railway lines at the end of each fiscal year, increased rapidly from fiscal 1911-1913, 3 years after the enforcement of the Light Railway Act, declined sharply from 1914 to 1917 and climbed again from around fiscal 1918. Furthermore, the number of railway companies starting service, grew from fiscal 1913 to 1915, stabilized and then grew again after fiscal 1921. Light railways boomed in the 3 years after the Light Railway Act.

Many of the new light railways used the 762 mm (2' 6") gauge in addition to the 1067 mm (3' 6") gauge of the Government Railways. This was because this was the narrowest gauge to which the Light Railway Subsidiary Act applied. These railways were mainly for passenger transportation, and the operators did not need to at-

tach importance to direct connection of freight cars to the Government Railways.

Actual Conditions of Light Railways

The average construction cost of light railways per km was about ¥21,000 (1913 values) for the 762-mm gauge and about ¥34,000 for the 1067-mm (3' 6") gauge. So, it was possible to construct a short line of about 20 km at a cost of less than ¥500,000.

Nevertheless, most light-railway companies suffered from shortages of construction funds. Consequently, they avoided construction of tunnels and bridges, and connections with Government Railways were at the nearest station. Moreover, there were many railway lines not directly connecting to main local cities with shopping and business centers. Such connections by light railways proved to be a fatal drawback when bus networks connected directly to central local cities developed in later years.

There were stations with no railway men, while signal and other security facilities were minimized. They used light rails of 20-25 pounds/yard (10-12.5 kg/m), weighing less than half the weight of rails used by the Govern-

ment Railways in those days.

Many light railways were invested in by inhabitants in local communities along the lines. Many stockholders held just 1 or 2 shares, because communities were more or less forced to buy shares allotted according to their own assets. Thus, for most shareholders, their money was not invested in the proper sense of the word "investment", but was a contributions shared by villagers. In agrarian areas, landlords owned relatively large



■ Toshio Kinoshita (1874-1923)

(Transportation Museum, Tokyo)

Born into a sake-brewing family in Kono-mura Kyoto Prefecture, he graduated from the Civil Engineering Department of Tokyo Imperial University, and read law and economics in the post-graduate course. Employed by the National Railway Operation Bureau in 1899, he visited Europe and the United States for study the next year. He stayed in the United States, Germany and Britain for study from September 1904 to October 1907. In the United States, he studied the theories of transportation, railway operation and management under Professor Emory R. Johnson at the University of Pennsylvania. After his return home, he held responsible posts in the transportation business of the Government Railways, serving as Chief (1908-1914) of the Management Section, Transportation Department, Railway Board and as Chief of the Transportation Dept. of the board. He introduced a major change in the management policy of the Government Railways and realized services for the benefit of users. He was instrumental in introducing express trains and a discount system for group tourists, inviting foreign tourists to Japan and publication of tourist guides in English, opening the Tokyo Station Hotel and establishing the Tourist Bureau (predecessor of Japan Travel Bureau) which all embodied his ideas.

The Social and Economic Effects of Railways in Japan (1923), compiled at Kinoshita's initiative, is highly evaluated as a record of concrete research on the social and economic effects of railways. The Future of Government Railways (1923), a collection of his articles published posthumously, contains articles about railways in competition with automobiles and shows his farsightedness.

Table 1 Licenses, Terminations of Licenses, and Opening of Services of Light Railways and Local Railways

| FY | Licenses | Changes in designations* | Terminations of licenses | Nationalization | Opening of service ** |
|------|----------|--------------------------|--------------------------|-----------------|-----------------------|
| 1910 | 633.0 | 769.2 | — | — | (374.0) |
| 1911 | 1,762.0 | 289.1 | 24.4 | — | 143.2 (7.3) |
| 1912 | 1,629.6 | 182.4 | 86.6 | — | 255.3 |
| 1913 | 1,468.0 | 36.4 | 385.5 | — | 521.4 |
| 1914 | 456.0 | 10.1 | 439.0 | — | 487.6 |
| 1915 | 136.0 | — | 910.9 | — | 469.6 |
| 1916 | 326.6 | 40.7 | 478.9 | — | 143.9 (37.1) |
| 1917 | 283.3 | 407.6 | 415.9 | — | 91.1 (321.9) |
| 1918 | 495.2 | — | 509.9 | — | 230.2 |
| 1919 | 1,009.5 | — | 194.1 | — | 129.4 |
| 1920 | 785.2 | — | 85.6 | 130.4 | 108.4 |
| 1921 | 594.3 | — | 59.6 | — | 250.6 |
| 1922 | 1,350.1 | — | 105.9 | 35.0 | 372.8 |
| 1923 | 954.6 | — | 112.3 | — | 487.4 |
| 1924 | 597.5 | — | 730.6 | — | 332.8 |
| 1925 | 421.2 | — | 260.3 | 23.8 | 330.9 |
| 1926 | 933.4 | — | 230.3 | 11.9 | 480.2 |

Mile-chain representations are converted to kilometers (mile = 1609 m, chain = 20 m).
 (Sources: The Railway Statistical Yearbook (1910-1926))
 * Private railways redesignated their legal status as light railways
 ** Bracketed figures denote those private railways in operation which were redesignated as light railways.
 In April 1919, Private Railways Act (all railways based on this act disappeared by 1918) and Light Railways Act were merged into Local Railways Act.

numbers of shares and led planning, construction and management of light railways.

Despite government subsidies, light railways were in financial difficulty. Construction costs tended to be underestimated for light railways which depended largely on capital from poor agrarian communities. As a result, many light railways had to borrow large sums of money in the course of construction and found it hard to pay interest on the loans. In many cases, light railways were barely able to make both ends meet and only earned small profits. But they were saddled with large interest payments far exceeding earnings, so government subsidies were spent on paying interest. No dividends were paid to shareholders, or were paid only to those holding preferred stock. Thus, the capital invested by local communities in light railways bore almost no profits to or-

dinary investors, and the asset value was very low. In those days, it was a heavy burden on local communities to construct a light railway.

Against this background, construction plans for light railways declined steeply after 1914. However, after 1911, the Government Railways began to construct local lines specified as light railway standard, that were not regulated by the Railway Construction Act. If local inhabitants could succeed in persuading the government via members of the Imperial Diet from their localities and other influential persons, to construct a railway, they were able to benefit from the convenience of a railway without the difficulties of fund-raising and railway management. Construction of local railway lines gradually began to depend on the government, a natural and desirable development for local communities.

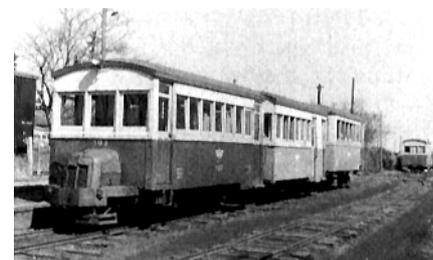
Significance and Development of Revised Railway Construction Act

A new Railway Construction Act was formulated in April 1922. The old Railway Construction Act formulated in 1892 was aimed at constructing a network of railway trunk lines, but the new Railway Construction Act was intended to expand networks of local branch lines. To distinguish it from the old Construction Laying Act, it is commonly called the Revised Railway Construction Act. This act stipulated plans for construction of railway lines with a total length of 10,158 km as shown in Fig. 1.

The Revised Railway Construction Act spelled out the policy of large-scale construction of local railways by the Government Railways, unlike the Light Railway Act which embodied the basic government policy that local railway networks should be constructed with private capital. At the same time, this new policy inherited and further developed the Government Railways' policy on light railways which had been constructed every year since 1911 outside the framework of the old Railway Construction Act.

The Revised Railway Construction Act did not specify the order of priority of new lines or the start or completion dates of construction. As a result, decisions on construction of new lines were influenced by the balance of forces of political parties and factional groupings in the Imperial Diet. In those days, newspapers described this state of affairs as "Every Voter wants to draw railways to his own fields," parodying the proverb, "Every farmer wants to draw water to his own fields."

The fact that importance was attached to construction of new local rail-



■ Railcar of Kujukuri Railway powered by Ford Gasoline Engine (author)



■ Government Railways Standard Gasoline Railcar built in 1932-1934 (author)

way lines within a limited budget meant that funds for improving existing trunk lines were eroded, and this policy was called the “policy of subordinating improvement of trunk lines to new line local construction.” Seiyukai, one of the two major political parties in the Imperial Diet, had advocated this policy for a long time. Seiyukai argued that it was the duty of the Government Railways to construct new lines, even if non-profitable, for the sake of the development of local economies. On the other hand, Kenseikai, later Minseito, a party opposed to Seiyukai stressed the policy of improving existing lines called the “policy of subordinating new local line construction to improvement of trunk lines.” Thus, Japan’s railway policy swayed between these two policies with each change of government. However, many Minseito Diet members were elected from local agrarian communities and could not afford to be indifferent to the construction of local branch lines. Consequently, many local branch lines were constructed even while Minseito was in power.

In Japan, the 1920s saw the beginning of automobile transportation. In those days, Japanese roads were in a poor condition, but bus networks still expanded rapidly throughout the country. Early Japanese buses had poor performance with a carrying capacity of less than 20 persons and an output of about 20 hp. Nevertheless, short local private railway lines were defeated in competition with bus lines and went out of business one after another. Yoshio Kinoshita, a far-sighted bureaucrat of the Ministry of Railways, in his posthumous work “The Future of Government Railways” (published in 1923) explained the actual conditions of automobile transportation and competition between railway and automobile transportation and the deteriorating condi-

tions of railway management. On this basis, he insisted that railways and automobiles should provide services in areas where they could give full play to their advantages and that construction of short local branch lines in areas where automobile transportation could be best utilized, should be stopped. However, proponents of such an advanced theory were a minority, and both politicians and the public upheld the principle that railways should be the main means of local transportation.

Operation of bus lines by the Government Railways, originally proposed by Kinoshita, became reality in 1930, and the network gradually expanded.

The Government Railways continued its policy of supplying (at relatively low prices) its old small steam locomotives and two-axle passenger carriages to meet the demand for locomotives and carriages of light railways, which rapidly grew in the 1910s. But these locomotives and passenger cars only partially met the demand from 1067-mm gauge light railway operators. In those days, the Government Railways had established a production system for large steam locomotives for its trunk lines, but the production capacity was not sufficient to meet demand from light railways which, therefore, imported them.

German and American small locomotives were imported in large numbers. Large numbers were made by Orenstein & Koppel A.G. of Germany, and Baldwin Locomotive Works of the United States. When WWI broke out, Japan could not easily import locomotives, and Amenomiya Works (which developed from Dainihon Tramway, Tokyo) and Nippon Sharyo (Nagoya) became the main domestic suppliers. Imports from Britain were very limited in those days.

Demand for passenger and freight cars for light railways was met completely by domestic manufacturers. In

addition to Amenomiya and Nippon Sharyo, there were many small local manufacturers.

Some light railways adopted internal combustion-engine locomotives. Chikugo Tramway in northern Kyushu first used an internal combustion engine locomotive for operation of commercial trains in 1905 with a locomotive powered by a single-cylinder hot-bulb engine (about 10 hp) designed for a fishing boat. The hot-bulb engine was manufactured by Fukuoka Iron Works in Osaka, and large numbers of engines of this kind were supplied to railways in northern Kyushu. However, because of their low output, they were not used widely in other areas.

Yoshima Railway in Fukushima Prefecture commercially operated gasoline-engined rail-cars for the first time in 1921. Later, more-and-more small railways used gasoline-engined rail-cars for passenger trains. At first, such rail-cars were used for 610-mm (2' 0") and 762-mm (2' 6") gauge railways, but after the mid-1920s, they were used for 1067-mm gauge railways. These gasoline engines were mostly imported from the United States.

The Government Railways used its first gasoline-engined rail-cars in 1929, but it was a failure because of low output and poor performance. However, highly-reliable gasoline engines of 100-150 hp were manufactured domestically in 1933 and afterwards, and rail-cars powered by them were mass-produced for local lines and short trunk lines throughout the Government Railway Network.

However, as imports of gasoline were gradually restricted in the late 1930s, the number of gasoline-engined rail-cars in operation declined sharply, putting a temporary end to internal combustion engine locomotives and rail-cars in Japan. ■



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After graduating from the Faculty of Science at Chiba University in 1957, Mr. Aoki received a doctorate in science from the Tokyo University of Education (now called Tsukuba University). After serving at Tsuru City University and Tokyo Gakugei University as an assistant professor, he became a professor at Tokyo Gakugei University in 1978. He specializes in transportation geography and is also a leading Japanese scholar of the history of railways and marine transportation. Mr. Aoki is former president of the Japan Railway History Society. His publications include *World History of Sea Power* and *Japanese Railway—Its Rise and Development*.