Introduction

The objective of this paper is to provide a balanced, faithful overview of railway construction in Japan during the 90 years from 1870 to 1960. The problem we need to be aware of is the often antagonistic, mutually contradictive nature of elements such as engineering support from Great Britain and the transfer of the technology, the raising of capital by the government and by the private sector investment in extending and improving main lines and investment in extending branch lines, the growth and regulation of private railways, and to look at how decisions on these issues were made and implemented. During the 90 years in question the pace of industrialisation in Japan was very rapid, and this period also included the devastating blow of the Second World War. The main theme of railway construction after 1960 would be the construction of Shinkansen lines, but I will leave that for another paper.

This paper is a considerably－amended version of the introductory chapter of a book by the author entitled The History of Thirty Years of Public Corporation Railway Construction in Japan.

1 The Meiji Government and Construction of Railways

Establishing of Government Policy and Commencement of Construction

During the latter years of the Shogunate, knowledge of railways was already flowing into Japan via the Dutch "factory" in Nagasaki. The accuracy of that knowledge was said to be such that it surprised Commander Perry who forced the opening up of Japan's ports. In 1853, models of steam engines from Russia and America had been brought into the country, which taught the Japanese much of what they had been unable to learn from the documents in Dutch they had studied. Two years later, in 1855, a samurai from Sage Han was able to make a model steam engine himself from his observation of the operation of the model from Russia. It is said that models of steam engines were also made in Satsuma Han and Fukuoka Han, and that there was a strong desire to absorb modern Western technology in many Han, in which, it should be remembered, engineering skills were already at a high level.

As well as models of steam engines coming to Japan, Japanese people were going to America and Europe and actually having the opportunity to travel on trains themselves, wanderers such as "John Manjiro" (Manjiro Nakahama), envoys sent to the West by the Shogunate, and samurai from Choshu Han who travelled secretly to the West. Of these Masaru Inoue (1843－1910) from Choshu Han and Hirobumi Ito's party, together with whom Inoue travelled secretly to Great Britain, not only saw the railways for themselves, Inoue studied railway construction, mining, and mintage at London University, and were later to contribute greatly to the construction of railways in Japan.

In the second half of the 1860s, some ten years after the model steam engines were brought to Japan, there was already movement afoot to construct railways in Japan. Satsuma Han and the Belgian government had jointly formed a railway company, petitions to construct railways

had been submitted by French, American, and British engineers. In December 1867, after the Shogunate had promised to restore Imperial rule, it had granted a licence, in response to a petition submitted by the Secretary of the American Legation, A. L. C. Portman, to construct a railway between Edo and Yokohama. Portman had come to Japan as one of Perry's officers, and it was he who had assembled the model steam engine from America. The Shogunate's policy for railways had been to approve construction with forign capital. This policy, however, incorporated the danger of the railways being used as a lever and Japan becoming a colony of one of the Western powers, as had happened in China. Portman persisted in maintaining that the licence for the construction of the Edo－Yokohama railway was valid, but the government, newly established as a resuit of the Meiji Restoration in 1868, refused to approve this licence.

The outcome of the negotiations with Portman was that the Japanese government settled upon a policy of not granting concessions to lay railways to foreigners, they were to be constructed independently under Japan's sovereignty. In deciding upon this policy the Japanese government felt that they should be in charge of the development of the railways and restrain the intrusion of America and other Western powers. The advice of the British envoy Harry Smith Parkes (1828－1885), who proposed providing British engineering skills, had been extremely influential. Within the new government, Shigenobu Okuma (1838－1922) and Hirobumi Ito (1841－1909), who were well aware of the political and economic role of railways in the task of uniting the nation, and of the social and psychological effect on the people, were the leading lights on railway construction.

In 1870 Edmund Morel (1841－1871) was hired, appointed as the first chief construction engineer, then in 1871 Masuru Inoue was appointed as head of mining and railways, and construction of Japan's first railways was started. The hired foreign workers, more than half of whom were British, were involved in the operation of the railways as well as their constructionk and at the peak there were more than 100 of them. Nearly all of the materials－wrought iron rails (£60 per yard), steam locomotives,

passenger carriages, freight wagons, iron, cement etc. – for the first section of railway to be opened, between Shimbashi and Yokohama, were imported from Britain.

A part of this line, between Shinagawa and Yokohama, was opened on a provisional basis, and then in September 1872 the Shimbashi – Yokohama line was opened offcially. The recently established Meiji Government made the celebrations a national event. The government's financial base was still weak, and the capital for railway construction was raised by a loan floated through the auspices of the Oriental Bank.

Selection of Route for Main Line between Tokyo and Kyoto, and its Construction

When the new government decided, in 1869, the 2nd year of the Meiji period, that railways would be constructed, the lines planned were the main line linking Tokyo and Kyoto, and three branch lines, Tokyo – Yokohama, Kyoto – Kobe, and Lake Biwa – Tsuruga. Today it may be difficult to understand how Tokyo – Yokohama could be regarded as a branch line, but the role of these branch lines was that of terminal lines which would connect ports, water transport with the main line. Because the capital had been moved from Kyoto to Tokyo in the preceding Tokugawa Period, there was an acute sense of the national need for a main line between the two cities, but the government had been putting off the decision on whether it should go along the Tokaido (Pacific Coast) route or the Nakasendo (through the central range of mountains) route, and on how they would go about raising the necessary capital to construct it.

The next line constructed after the Shimbashi – Yokohama line was the Kobe – Kyoto line, for which the Ishiyagawa Tunnel and two other tunnels had to be excavated, and three iron bridges, including the one over the River Buko had to be erected. These were the first real tunnels and the first iron bridges in Japan. Steel rails were used as well as wrought

iron rails. This line was completed in 1877. After this the progress of railway construction was halted because capital was used to fight a civil war, the Seinan War. After this war government bonds were issued to raise capital, and the extension from Kyoto to Otsu was begun.

What is significant is that no directions were received from foreign engineers for the line between Kyoto and Otsu, it was constructed by Japanese engineers under the direction of Masaru Inoue, the head of the Railways Bureau. It is worthy of note that, in what was only the 8th year since foreign engineers had first come to Japan, the transfer of technology was already complete. Along this section of line they excavated the Osakayama Tunnel, the first tunnel Japanese engineers completed on their own. Subsequently the number of foreign engineers involved fell sharply, which helped reduce construction and running costs.

A comparison of the Tokaido and Nakasendo routes, to decide which the Tokyo－Kyoto main line would take, was carried out by Morel's successor as chief construction engineer, Richard Vicars Boyle ; Morel had died in Japan at the height of his powers, at only 30 years of age. Boyle argued that using the Tokaido route, which was already served by coastal shipping, would constitute a duplication of investment, whereas a line along the Nakasendo route would have the added benefits of improving communications between the Pacific and Japan Sea regions and developing the inland regions, and he recommended that the latter route should be taken. The military also supported this route for reasons of national defence ; they believed that a railway line along the Tokaido route would be vulnerable to cannon fire from foreign warships. The government took on board these opinions, and officialy decided that the main line would be along the Nakasendo route. During 1884 and 1885 they issued National Nakasendo Railway Bonds to raise the capital for the project.

Work started at the two ends of the line, Ogaki in the west and Takasaki in the east. The section between Takasaki and Yokokawa, the Naoetsu (Karuizawa－Naoetsu) and Taketoyo lines were constructed. The Naoetsu and Taketoyo lines were constructed to bring construction materials from

ports. The Yokokawa – Karuizawa section went through some very steep terrain, and on the advice of the foreign engineers an Abt system cograil track was laid. 26 tunnels and 18 bridges were built in order to overcome the 66.7 permil gradient. However, as the work proceeded, and accurate surveys were made of the middle section of the line, it became clear that the work would take much longer than had been anticipated and that construction costs would spiral.

At this point Masaru Inoue, the head of the Railways Bureau, Proposed to the government that the construction of the Nakasendo line should be abandoned and that they should switch to the Tokaido route. We are told that the military took a lot of persuading, but that eventually the government approved his proposal, and the construction of the Tokaido main line was started in 1886. The residual capital raised from the Nakasendo Railway Bonds was used to finance this project.

The Tokaido line faced two construction problems, the mountainous region of Hakone, and, because it followed the coast, the wide river mouths across which long bridges would have to be built. The first problem was tackled by having a circuitous route around the mountains via Gotemba, the building of the bridges involved the introduction of new engineering techniques. All in all it progressed satisfactorily, the main section, Yokohama – Atsuta, was completed in just over two yesrs ; it took over a year less than expected. The remaining sections were then completed, and the Shimbashi – Kobe east – west main line, opened in 1889 was 605.7 kilometres in length. The opening of the Tokaido line was to make an enormous contribution to the modernisation of Japan.

Private Construction of Main Lines

Since the inauguration of government – constructed railways there had been several attempts by private companies to obtain permission to construct, operate railways. However, due to a fear of abuses such as private monopolies

or excessive competition which Inoue and others in the Railways Bureau had observed in the West, they had up until now stuck to the principle of publicly constructed, publicly run railways. However, with the continuing limitations on public finances which had led to the delayed start of the construction of the Tokyo－Kyoto line, and the financial crisis the government faced after the Seinan War, the time came when the government decided to surmount this crisis by the sale of government enterprises, and Nihon Tetsudo (railway) became the first private company permitted to construct railways.

Nihon Tetsudo raised capital by aquiring Kinroku Kosai, bonds owned by ex-samurai as a result the Meiji Government abolishing the old system of samurai stipends. This company was founded with the objectives of providing employment for ex-samurai, and to create employment along the railway lines that were to be built. The government's protective measures for this company were very generous. As well as providing grants to cover the payment of a fixed rate of interest (on completed capital payments) during the period of construction, and guaranteeing profits when operation began, they carried out some of the construction work for them, purchased the land required on their behalf, and granted them exemptions from national taxation. Although not quite as extensive as they had been for Nihon Tetsudo, these protective measures were also available for private railway companies which were set up subsequently. In addition, private financing for setting up railway companies was provided through a scheme for repayment of capital in instalments, financing with stock as collateral, and the Bank of Japan's system of secured discounting of bills.

Nihon Tetsudo constructed and ran, at its peak, 1,380 kilometres of railways, which included Ueno－Takasaki (later to become the Tohoku／Takasaki Lines), Omiya－Aomori (later to become the Tohoku Line), Tabata －Iwanuma (later to become the Joban Line), making it he biggest private railways enterprise in the country. The next private company to start operation was Bankai Tetsudo (the forerunner of Nankai Denki Tetsudo), and as both companies had very good results, a railway company boom

ensued. By 1890 about 40 companies had been set up, 22 of which actually operated railways. Some of them constructed branch lines, or parts of them : Sanyo Tetsudo (their railway later became the Sanyo Line), Kyushu Tetsudo (Kagoshima Line, Nagasaki Line etc.), Hokkaido Tanko Tetsudo (Muroran Line etc.), Kansai Tetsudo (Kansai Line), Kobu Tetsudo (Ochanomizu – Hachioji section of Chuo Line). Other railway companies founded were Chikuho Kogyo Tetsudo, Osaka Tetsudo, Sanuki Tetsudo, Kushiro Tetsudo, Sobu Tetsudo, Hoshu Tetsudo, and Kawagoe Tetsudo. Thus Japan's railway network was constructed through the coexistence of public and private railways.

2 Construction of Main Lines

Passing of Railway Construction Law and Estblishing of Railway Conferences

The founding of many railway companies during the railway companies boom, the resulting construction of main lines by some of them, the existence of both national and private railways was effective in speeding up the completion of the network. However, railway construction was affected by economic cycles and by public opinion. In times of recession people demanded that the government should purchase the private railways, while when business conditions were favourable they demanded more privatisation. With the debate over private/public ownership of the railways become increasingly lively, Inoue, the Railways Bureau chief, presented a document about government strategy for the railways, in which he asserted that more should be constructed and that they should be in public ownership. He said that three things needed doing, investigation and surveying of planned lines, section and then commencement of work on new lines, and the purchase of private railways by the government.

Inoue's views on expansion of the railways and public ownership of them were approved by the government, and two bills – a railways government bill and a private railways purchase bill – were presented to the 2nd session of the imperial Diet, and debated widely inside and outside the Diet. They were rejected at the 2nd session, but presented again at the 3rd session, and eventually combined with a third bill presented by a Diet member, the Railway Construction Act was passed in 1892 (Law No. 4 1892).

The 1892 Railway Construction Act established the principle that railway construction should be carried out by the government, and named the 33 planned lines selected. The capital for their construction was to be raised by issuing national bonds. The first group of lines to be completed were the ones which later would become the Chuo, Hokuriku, Shinetsu,

Ou, Sanyo, Nagasaki, Sasebo, Misumi, Sanin, Maizuru, and Wakayama Lines. The Act also stated that if it became necessary to purchase private lines, the price could be agreed through discussions, and the purchase made once the Diet's agreement had been obtained.

The Act also established Railway Conferences, and these conferences were to be closely linked with the construction of new railways right up until the 2nd World War. The participants were to be senior civil servants from the Ministry of Home Affairs, the Railways Bureau, the Ministry for the Army, the Office of the General Staff, the Ministry of Finance, the Ministry for the Navy, the Ministry of Agriculture and Commerce, and the Ministry of Communications. They were to discuss the order in which the lines would be constructed, the amounts to be raised by national bonds, the design of the lines, purchasing of private railways, frequency of services, and fares.

With the passing of the 1892 Act, the principle of nationally constructed, nationally owned, nationally run railways was established.

Extensions to National Lines

Although the 1892 Railway Construction Act established the principle of government construction of railways, it did not stipulate that existing private railways had to be nationalised, nor did it ban the opening of new privately constructed lines, so that after a while railway construction again came to carried out by both the government and private companies. The first round of government construction laid down by the Act began, with work on the Hokuriku Line and the Ou Line in 1893. The construction of the Hokuriku Line carried on from where it left off at Tsuruga. The extension through Fukui, Komatsu, Kanazawa, Takaoka, and Toyama required 12 tunnels. Work on the Ou line started from both ends of the line, at Aomori and Fukushima. There were several difficult mountain sections, in particular the Yatate, Itaya, and Innai mountain passes. The Itaya Pass

required the construction of switchback halts in 4 places, and the 1,628 metre Itaya Tunnel.

The next lines commenced were the Chuo Line, the Sanin Line, and the Kure Line. The Chuo Line was divided into the Eastern Line, starting from Hachioji, where it met the private line run by the Kobu Tetsudo company, and the Western Line, starting from Nagoya. Many tunnels were constructed for the Eastern Line including the longest contemporar one, the 4,600 metre Sasago Tunnel, and the Kobotoke Tunnel. The Shinonoi Line was constructed in conjunction with the Eastern Line. The Chuo Eastern and Western Lines were not joined until after the Russo－Japanese War of 1904－1905. The route for the Sanin Line, planned with the objective of connecting the Sanin and Sanyo regions, was changed several times, but finally a route which went from Fukuchiyama out onto the Japan Sea coast and then along the Sanin coastine was settled upon. The Kure Line was a branch line off the Sanyo Tetsudo Line to the military port of Kure ; it was completed just before the Russo－Japanese War.

The first group of lines selected in the 1892 Railway Construction Act suggest that the view of the military was strongly represented, they were all connected with military installations. The military had learnt the importance of rail transport for munitions during the Seinan War, and the railways were utilised widely during the Sino－Japanese War of 1894－1895. Having said that, however, these lines were not without economic benefits for the provincial companies along them.

Hokkaido had not been included in the first round of lines selected in the 1892 Railway Construction Act, but four years later the Hokkaido Railway Construction Act (May 1896) was passed, providing plans for government railways in the eastern and northern parts of Hokkaido, to add to the Hokkaido Tanko Tetsudo already constructed in the central region. The new government railways opened in Hokkaido centred on Asahikawa and extending to Nayoro in the north, Kamifurano and Ochiai in the east. Also the private Kushiro Tetsudo, which had gone out of business, was purchased by the govermnt, and construction of a railway

going westwards from Kushiro was started.

After the Sino－Japanese War the Japanese economy grew rapidly, and the demand for transportation increased, so it was necessary to start increasing the number of tracks and making improvements on existing lines in order to improve transportation capability. The main improvements were to the Tokaido Line. The number of tracks were increased along the whole of the line, with 4 tracks on the Shimbashi－Shinagawa section. In addition, work was started on the Central Halt in Tokyo (now Tokyo Station) and a 4 track elevated suburban line, improvements were made to the halts on the Shinetsu Line, which were too small for transportation purposes, and more rolling stock was produced for the Tokaido and Shinetsu Lines.

As railway construction progressed it became necessary to have the entire national network organised centrally, and standardisation came to be regarded as more important. From 1893 onwards standards were established for civil engineering, tunnels, steel plated bridges, construction, and halts, and in 1900 the railway construction standards were laid down. Standardisation, self－reliance of civil engineering and construction techniques, manufacturing of locomotives within Japan, and the regulations governing railways all signified that a new stage of development had been reached. Up until this time most of the railways in Honshu had been the British type, while in Hokkaido they had been the American type, and in Kyushu the German type.

The Second Private Railway Construction Boom

The first boom, spurred on by the success of the Nihon Tetsudo and Hankai Tetsudo companies, led to the birth of several private companies operating main lines, but the economic panic of 1890 brought about the breakdown of the mechanism which created new companies and the end of this boom. The second boom came after the Sino－Japanese War. The

1892 Railway Construction Act had named 33 lines to be built by the public sector, but due to the financial limitations that dogged the government only a part of the planned first group were actually started, and many regions had no clear idea of when railways would come to their areas.

Entrepreneurs, landowners, merchants were well aware of the economic benefits that railways brought, and there was considerable lobbying by representatives of regional communities for rapid start/ completion of the projected government railways, or to have lines, halts selected which would benefit their areas. Nor did it stop at political activity, in some cases the campaign cost these people a considerable amount of money. For example, when the Chuo Line construction was suspended because priority was given to raising capital for the Sino－Japanese War, the silk manufacturers of Suwa, Okaya purchased a considerable amount of national bonds for railway construction, and demanded that the construction be continued.

Because the Imperial Diet approved the construction by private companies of some of the 1892 Railway Construction Act's scheduled government railways, campaigns gathered strength for private companies, financed by regional communities, to be set up to construct the "planned" railways which had as vet no schedule for construction, and this resulted in a private railway company boom after the Sino－Japanese War. The 1892 Railway Construction Act had laid down the principle of nationally constructed railways, but because the government approved the construction, by private companies, of lines named in the Act, it had the unexpected effect of improving the prosperity of private railways. Some of the lines constructed by companies founded in this second boom period were main lines or semi-main lines－the Hokuetsu Tetsudo (later to become the Naoetsu－Niigata section of the Shinetsu Line , the Ganetsu Tetsudo (later to become the Banetsusai Line), the Hankaku Tetsudo (later to become the Fukuchiyama Line), and the Kyoto Tetsudo (later to become the Kyoto－Sonobe section of the Sanin Line). Most, however, were local lines to connect local termini to main lines, such as those constructed by the Ome, Narita, Ota, Toyokawa,

Chuetsu, Nanao, Naniwa, Nara, Nanwa, Kiwa, Sangu, Bantan, Tokushima, Karatsu, Imari, and Hakata Bay railway companies. Hence Japan had now entered the stage of construction of branch lines. The private companies which constructed branch lines were less profitable than those which ran main lines or suburban lines, and many of them struggled to raise the necessary capital. As a result some of them reduced their equipment investment by using somewhat inferior equipment, also some of them tried to raise capital with various types of stock issues, such as company bonds and special stock issues.

The private railways were regulated by the Private Railways Ordinance of 1887, but as rapid construction continued and the lines were increasingly used in combination with each other it became necessary to clarify standards and regulations, and the Private Railways Law (1900 Law No. 64) and Railways Operation Law (same year No.65) were passed to achieve this end. In 1905 a Railways Mortgage Law was passed, which made it easier to raise capital in the form of long term loans, by setting up Railway Foundations. The result of allowing the private railway companies to construct railways as well as the government was that private companies constructed twice as rapidly as the public sector, and at the end of 1905 private companies were running 5,200 kilometres of railway lines, more than double the 2, 500 kilometres of national railways.

3 Railway Construction after Nationalisation

Founding of National Railways, Construction and improvements

After the Russo－Japanese War the government decided upon a policy of nationalisation, with the objectives of improving transportation, gradually reducing fares, and standardising of eguipment, all of which was part of their so-called "post-war management" policy. As well as reducing running costs by centralised running of the railways and bringing down distribution costs within the country, they also wanted to prevent foreigners obtaining stock in Japanese private railway companies, and to be able to create collateral for when the government might want to attract foreign investment to Japan. A Railways Nationalisation Act was passed in March 1906, and during the following year 17 main line private railway companies were purchased by the government, the main ones being Hokkaido Tanko Tetsudo, Kobu Tetsudo, Nihon Tetsudo, Sanyo Tetsudo, Kyushu Tetsudo, Kyoto Tetsudo, Hankaku Tetsudo, Hokuetsu Tetsudo, Sobu Tetsudo, Kansai Tetsudo and Sangu Tetsudo.

"Post-war Management" was put forward as a policy which would stimulate rural communities and develop the provinces. The influence of political parties was increasing at this time, and they had a considerable amount of interest in railway construction in the provinces. During this period main lines such the Kagoshima, Chuo, Sanin, and Hokuriku Lines were completed one after the other, so that the main line network was taking shape, but demands for regional railway construction in areas not yet reached increased sharply, and the as yet unconstructed ones named in the 1892 Act, and other light railways were constructed.

The National Railways administration was reorganised under a new "Railways Office" (Tetsudo－in), and its newly appointed first head, Shinpei Goto (1857－1929), proposed conversion to wide gauge track, and asserted that equipment investment was needed on the existing main lines, particularly

the Tokaido Line. He wanted to convert Japan's railway lines from their 1,067 millimetre gauge to the international standard 1,435 millimetre gauge tracks, because this would greatly improve their transportation capability. The Railways Office vigorously carried out surveys, conversion tests and drew up plans, but they were unable to obtain the support of the political party, "Seiyu－kai", and were forced to abandon their plans. This effectivery ended the hopes for conversion to the standard international gauge in Japan, it has remained narrow gauge right up until the present day. Over half a century later, however, the international standard gauge was adopted when the Tokaido Shinkansen Line was constructed.

In order to improve the transportation capability of the railways the Railways Office carried out impovements such as increasing the number of tracks, reducing gradients, electrification, and separation of passenger stations from marshalling yards at major stations. I have already mentioned the work to increase the number of tracks on the Tokaido Line, this was completed for the whole length of the line in 1913. Other lines on which this was done were the Sanyo, Tohoku, Chuo, Kagoshima, and Hakodate Lines. To reduce gradients on the Tokaido Line, the excavation of the Tanna Tunnel on the mountainous Hakone stretch of the Tokaido Line was started. This project faced difficulties not seen in other countries, in the form of a number of underground springs in which the water was at high pressure, but various methods of construction were attempted and its construction contributed significantly to the development of tunnel engineering.

To improve transportation capability on the Shinetsu Line, where the Usui Pass formed a bottleneck, the construction of Joetsu Line was started, and here an exremely long tunnel, the Shimizu Tunnel had to be constructed. Electrification was carried out on the steepest section of the Shinetsu Line's Usui Pass, and also on the Yamanote and Keihin surburban lines in Tokyo. The opening of Tokyo Station, which was a passenger station, and the conversion of the old Shimbashi station to the freight－only Shiodome Station, are examples of separation of freight from passenger

facilities.

Deregulation, Light Railways

With the nationalisation of these railways public ownership became the basic principle for main line and most other railways. However, a few companies (one such being Tobu Tetsudo) were given licences to serve a particular region and allowed to remain in the private sector ; they avoided nationalisation for the time being. The private railways law which had regulated private, including large main line railway companies prior to nationalisation was inappropriate for the regulation of smaller railways. A new law, the Light Railways Law was passed (1910, Law No. 57), and a Light Railways Assistance Law (1911, Law No. 17) was passed with the aim of expanding the light railway network. The regulations under the Light Railways Law represented a considerable relaxation of the laws under the Private Railways Law ; the intention was clearly to extend the railways to various local termini by allowing them to use cheaper equipment. Under the Light Railways Assistance Law, light railway companies whose profits were less than 5% of the construction costs were to receive the difference from the National Railways Account.

These two laws instigated a light railways boom throughout Japan. For example the Musashino Tetsudo, the forerunner of the Seibu Tetsudo, started as a light railway. Nationally owned light railways, such as the Moka line, were also constructed as a result of the Light Railways Law. In 1919 the Light Railways Law, the Light Railways Assistance Law, and the Private Railways Law were all repealed, and two new laws to regulate private railways, the Local Railways Law (1919, Law No. 52) and the Local Railways Assistance Law were passed in their stead.

The Nihon Tetsudo company was the first private railway company according to the narrower definition of railways, but if we take the wider definition the Tokyo Horsendrawn Tramway, founded in 1882, was the

first. Because trams usually run along roads they were at first seen as being a method of improving the functionality of roads, and hence came under the sole supervision of the Roads Bureau, but subsequently they were brought under the joint supervision of the Railways Bureau and the Roads Bureau. Electrical power and new (for trams only – separate from the road) tramlines were introduced, and the trams were used for rapid transportation of large loads, and there were examples of tram lines competing with national railways, such as the Keihin Denki Tetsudo (the forerunner of the Keihin Kyuko Dentetsu) and the Hanshin Denki Tetsudo. The presentday Keio Teito Dentetsu, Keisei Dentetsu, Keihan Denki Tetsudo, and the Nishinihon Tetsudo were all originally built as tramways.

Railway Construction Law Reforms and Construction of New Lines

The result of a half century of continuing railway construction since the start of the Meiji Period was that by just after the end of the First World War there were over 10,000 kilometres of national railways in operation, and most of the planned lines in the 1892 Railway Construction Act had been completed or started. This included, as well as the ones already mentioned, the Uetsu Line, the Takayama Line, the Boso Line, the Kise Line, the Yosan Line, the Dosan Line, and the Tokushima Line. However demands for the construction of lines not included in the 1892 plan increased, and the governing party frequently altered the 1892 Act, adding new lines to the plan, and used budgetary measures for construction of other light railways. The opposition party criticised them fiercely, claiming that these actions were purely to further the interests of the governing party.

The cabinet of Takashi Hara (1856–1921) of the "Seiyu – kai" Party was particularly keen on the construction of new lines. They put forward the policy of "Kenshukaiju", which stated that when it came to priorities for investment, the majority should go to the construction of new lines with improvements to existing lines taking second place, precisely the

reverse of what Shinpei Goto, the head of the Railways Office, wanted, and proposed radical reforms to the 1892 Act. This was an attempt to deflect the criticisms of the opposition party. Their reform bill included an appended chart of 149 planned lines comprising 10,218 kilometres of railway, which included just about every line that could possibly be imagined. This bill was discussed at the Railway conferences under Hara's cabinet, and was presented as the government's bill to the 44th session of the imperial Diet, but the session ended before it could be passed. Shortly afterwards Takashi Hara was assassinated at Tokyo Station. There were arguments for and against the bill, and public opinion was split down the middle. People from the provinces throughout Japan formed the League for Rapid Completion of Railways, and a popular campaign was organised with the objective of getting the bill passed as quickly as possible.

The government introduced the bill again at the 45th session of the Imperial Diet, and after a fierce debate it was passed with some amendments. The new law (passed in 1922, Law No. 37) had the same name, the Railway Construction law, as the 1892 Law, so it came to be called the Reformed Railway Construction Law to distinguish it. The main features of the 1922 law was the chart with its list of nearly all imaginable lines, and the fact that there was no clarification whatsoever of the order of construction of the planned lines and nothing whatsoever about budgetary limitations. This indicated, in the opposition party's view, that the government would be able to construct lines in their own constituencies, and thus gain an electoral advantage, it was simply an attempt to gain more votes. They christened it "Gaden Intetsu", which meant literally "bringing railways to your own fields", a corruption of a well-known phrase "Gaden Insui", which literally means farmers bringing irrigation water only to their own rice fields, in other words exploiting circumstances for their own interests. The 1922 Law was for the construction of branch lines.

What is certain is that at this juncture, the emphasis of investment had shifted to construction of branch lines. From the provincial viewpoint, the hope was that the government would construct national railways,

instead of allowing light railways to be constructed with regional communities bearing the financial burden ; the railways construction campaign had assumed a distinctly political flavour. The 1922 Law was to determine the basic policy on railway construction for a good many years hence, and was later a factor in JNR's rural lines problems. With the passing of the 1922 Law the old 1892 Law and the Hokkaido Railway Construction Law were repealed.

Purchasing of provincial private railways was carried out at the same time as construction of the rural lines. However, while the construction of rural lines proceeded, the automobile, just starting to come to the fore, was making inroads into the railways' share of the short distance transportation market.

4 Construction of Suburban Railways, Wartime and Post－War Construction

Equipment investment for Private Suburban Railways

During the First World War Japanese companies increased in size, and after it the number of middle managers, white collar workers living in the cities increased significantly. The Great Kanto Earthquake of 1923, however, was the signal for the start of a continuing population movement out into the suburbs, and the construction of housing and railways there. Construction of housing and railways tended to be coordinated : it was Ichizo Kobayashi's Mino-Arima Denki Kido (Electric Tramways) Company (the forerunner of Hankyu Dentetsu) which set the pattern for Japan of "diversified" companies which managed both railways and property. In Tokyo the Meguro-Kamata Dentetsu Company (the forerunner of Tokyo Kyuko Dentetsu) was established by Keita Goto (1882－1959), and residential areas modelled on the garden cities of Britain were developed along the railway.

The private suburban railways constructed in big cities originally used steam locomotives, but now investment was made in electrification, increasing the number of tracks, and enlarging the stations. Investment on electrical tramways was put into improvement to the arrangement of the lines, new types of track, and better transformers. New lines constructed were the Odawara Kyuko Tetsudo (forerunner of Odakyu Dentetsu), the Aichi Denki Tetsudo／Meigi Tetsudo (forerunner of Nagoya Tetsudo), the Osaka Denki Kido (Electricl Tramways) ／Sangu Kyuko Dentetsu (forerunner of Kinki Nihon Tetsudo), the Shinkeihan Tetsudo, and the Hanwa Denki Tetsudo.

The amounts of equipment investment and capital raised for electrified railways companies reached previously unheard of levels, their share prices soared, and there enshued an unprecedented electrified railways boom. The objectives of the investment were to reduce times between trains

and distances between stations on suburban railways, increase the speed of the trains, and achieve rationalisation, thus increasing transportation capability and frequency of trains. It was as a result of the transport controls during the war and the reorganisation after it, that the foundations of today's major private company routes were built, and most of the construction was carried out between the first and second world wars.

If the suburbs were the service area for the private railways in the cities, the trend for the tramways within the cities was towards public ownership. Meanwhile, in Tokyo, the first underground line (the present -day Ginza Line, run by the Eidan Underground) was constructed by a private company. The development of electrified railway technology put the railways in an unassailable position as the transport medium for the cities. The country's first electrified tramway was the Kyoto Denki Tetsudo, opened in 1895, and was followed by Nagoya, Osaka, and Tokyo, but these were all tramlines along roads. The first electrified railway per se was the Iidamachi – Ochanomizu section of the Kobu Tetsudo, completed in 1904. This was also the first electrified section to be nationalised under the nationalisation programme.

Wartime Increases in Transportation Capacity

After the outbreak of the war with China in 1938, railway construction, along with other civil engineering projects, was suspended for a while as the country was put on an all – out war footing, but after the war in the Pacific had started several lines were constructed with the objective of utillising domestic mineral resources for the war.

In 1936 work started on the Kanmon Tunnel which went under the seabed between Honshu and Kyushu. It was opened in 1942. The idea for this tunnel had been conceived in the 1890s, when the Railways Office had carried out feasibility studies. It was started at this particular time because the section between Shimonoseki in Honshu and Moji in Kyushu

was a bottleneck for wartime transport, and because they wanted to switch the transportation of coal and other freight from coastal shipping to the railways, thus creating extra space in the holds of the ships, increasing transportation capacity between Japan and the Chinese continent. The shield tunneling method was used for the excavation of the tunnel, this was the first time it had been used on a major project in Japan. The economic and military benefits provided by the Kanmon Tunnel were enormous.

There were, from 1937 to 1944, four spells during which private provincial rail/tram lines were purchased by the government. The ones targeted at first were the "planned lines" listed in the 1922 Law, but later the purchases were mainly for military purposes. A number of stopgap measures were taken to meet the rapidly increasing transportation needs – increasing the number of wagons that could be coupled by increasing the avaiable length of track, dividing block sections by increasing the number of signal points. Also, relatively inactive lines were closed for a period, or reduced to single line, with the rails etc. being transferred to other lines.

After the outbreak of the war with China, transportation capacity was particularly tight on the Tokaido Line – Sanyo Line routes which linked the Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe and Kitakyushu industrial belts with Korea and Manchuria. To counter this problem radical plans were drawn up for an extra line between Tokyo and Shimonoseki with international standard wide gauge track. It was to have a maximum speed of 200 kph for its passenger trains, using a very powerful locomotive and carriages with a very large cross section, and would cover the 970 kilometres between Tokyo and Shimonoseki in 9 hours 50 minutes, the section between Tokyo and Osaka in 4 hours 50 minutes. It was called the bullet train concept by the populace.

In 1939 a Main Line Study Committee was set up within the Ministry of Railways, and a construction budget for railway improvements based on its findings was approved by the Railways Conference, and accepted in the 75th session of the Imperial Diet. Surveying, design, and purchase

of land proceeded, and in 1941 work was started on the Nihonzaka Tunnel, the Shintanna (New Tanna) Tunnel, and the Shinhigashiyama (New Higashiyama) Tunnel. However, when things started to go badly in the Pacific War, materials and labour shortages made it difficult to continue construction and the plan was aborted. The new Tanna Tunnel was abandoned, but work on the other two tunnels continued, and they were used on the existing main line. The land purchased and the facilities were used after the Second World War for the construction of the Tokaido Shinkansen Line.

Post-War Railway Construction and the Railway Construction Commission

After the end of the Second World War the emphasis had to be placed on repairing damage incurred during the war, and the "Dodge's Line" economic policy demanded a period of austerity, so hardly any new railways were constructed. The functions of the Railway Conferences, established by the 1892 Law, had been strengthened by the 1922 Law, but the conferences were abolished in 1949. Also in 1949, as part of the post-war reforms, the National Railways were separated from the Ministry of Transport, and a public corporation, the Japanese National Railways was set up. After the end of the war the range of subjects the Railways Conferences should discuss had been widened and the number of participants increased, as part of the so-called democratisation of National Railways, but in the end they were abolished.

However around the time of the 1951 Peace Treaty it again became possible to construct new National railway lines, and it was deemed necessary to have an independent body to discuss railway construction. In 1951 the 1922 Railways Construction Act was amended, and a new Railways Construction Commission (Tetsudo Kensetsu Shingikai) was set up. This commission was a consultative organ for the Minister of Transport, and it was made up of members of the Diet members of related government boodies, the

head of the National Railways, representatives from industry, and experienced academics. During the early 1950s several new national lines were constructed, and by 1954 there were more than 20,000 kilometres of national railway lines in operation. After the end of the war private railway companies had made many plans for new railways, but very few were completed because of the shortage of capital and materials.

After the war the supply of coal was totally unable to meet demand, and the ensuing coal shortages resulted in work commencing in 1946 on the electrification of main lines, such as the Joetsu Line, the Tokaido Line, the Ou Line, and the brought enormous economic benefits in two ways. It greatly increased transportation capacity, and enabled rationalisation to be carried out. Hence, it was the objective of considerable investment under the first five year plan which commenced in 1956.

The abuse of the railways during the war was responsible for a series of major accidents after it, one of which, the fatal accident on the Toya Maru Honshu – Hokkaido railway ferry link ship in 1954, was the worst disaster in Japanese waters in her maritime history, and was the stimulus for the construction of the Aomori – Hakodate Tunnel.

The electrification of the Tokaido Line was completed in 1956, making it a very efficient service, but its transportation capacity was still unable to keep up with the rapid growth of the Japanese economy, and it was stretched to the limit. The National Railways formed a Tokaido Line Expansion Committee in 1956, and the government also established a National Railways Main Line Study Group (a consultative body for the Minister of Transport), which investigated radical proposals for constructing a new, separate international standard gauge line. The Study Group reported to the Minister that it was necessary. The plan was decided upon in cabinet in December 1958, and work was started on the Tokaido Shinkansen (Shinkansen means new main line). It is well – known that the construction and opening of the Shinkansen ushered in a new railway are not only in Japan, but throughout the world.

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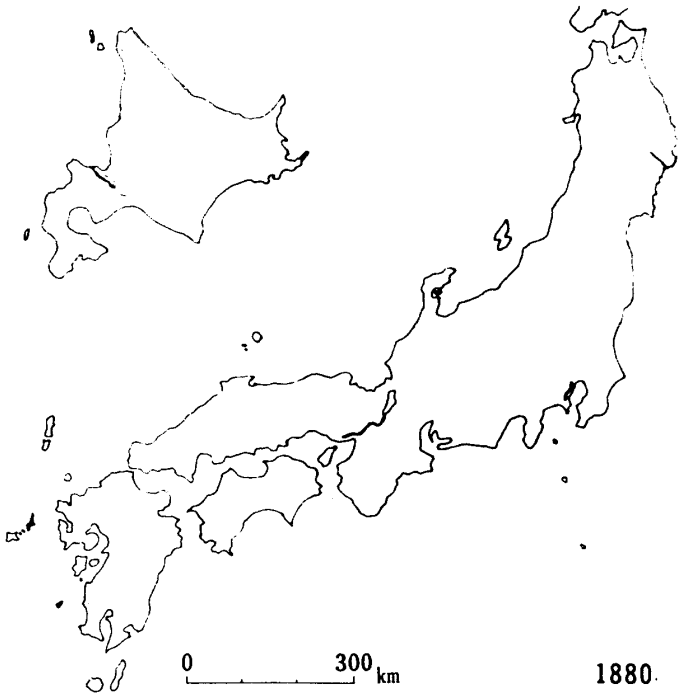
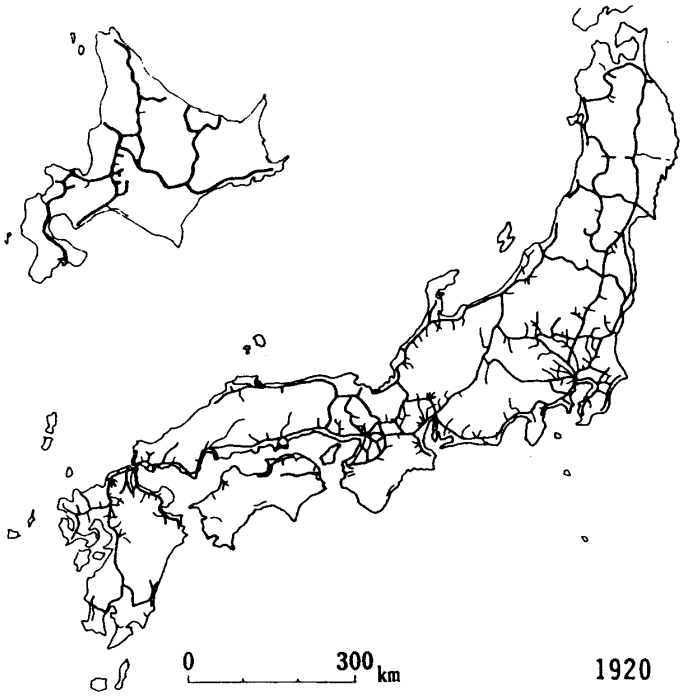
Appendix 1 Route kilometres

Year	Government lines	Private lines	Trams (kido)	Total
1872	29.1	–	–	29.1
1875	61.7	–	–	61.7
1880	123.0	61.4	–	184.4
1885	269.0	299.3	16.0	585.2
1890	885.9	1,365.3	82.0	2,333.2
1895	954.6	2,730.9	128.0	3,813.5
1900	1,528.3	4,674.5	409.1	6,611.9
1905	2,464.5	5,231.3	607.4	8,303.2
1910	7,836.3	823.7	1,318.6	9,978.6
1915	9,266.2	2,648.1	2,019.4	13,933.7
1920	10,427.9	3,520.1	2,125.1	16,073.1
1925	12,590.6	4,903.1	2,540.0	20,033.7
1930	14,574.9	7,018.1	2,711.5	24,304.5
1935	17,138.2	7,097.6	2,553.6	26,789.4
1940	18,400.0	6,698.9	2,208.2	27,307.1
1945	19,619.8	5,791.0	1,589.0	26,999.8
1950	19,786.4	5,943.6	1,621.6	27,351.6
1955	20,093.1	5,987.3	1,590.5	27,670.9
1960	20,481.9	5,885.6	1,544.8	27,912.3

Souce, Railway statistics

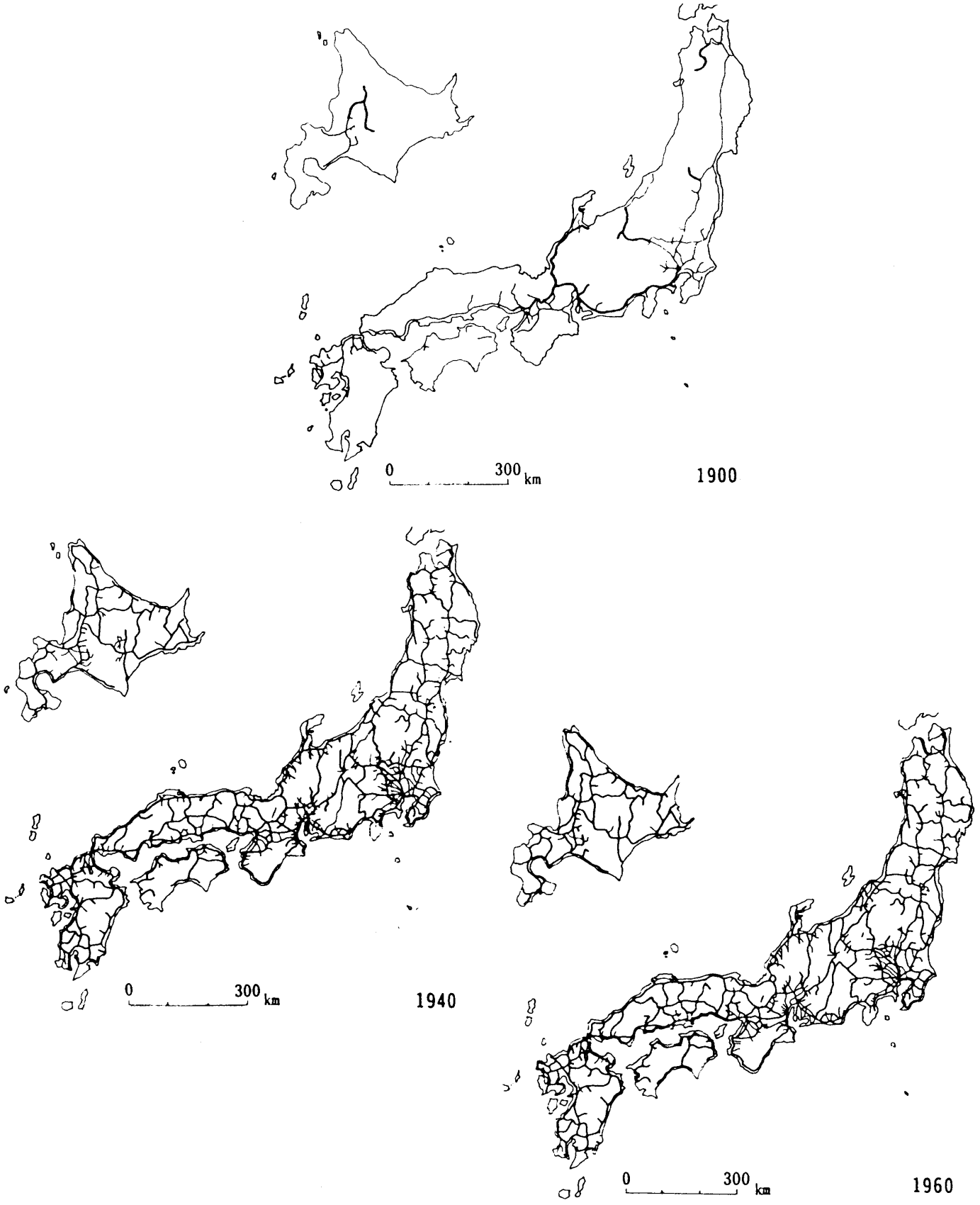
Appendix 2 Maps of the Railways





—— Government railways

—— Private railways



Souce, Aichi Aoki, Nihon no Tetsudo, 1986