oboegaki" (Memorandum on steam railcars in Kyushu); Ichigami Ichiji, "Kudō-shiki jōkidōsha" (The Kudo system steam railcar); Imamura Kiyoshi, "Jōkidōsha no hoshu o kaerimite" (Reflections on the maintenance of steam railcars); Imashiro Mitsuhide, "Shūmatsuki ni okeru shitetsu no jōkidōsha" (The last of private railroad steam railcars). There is also Imashiro Mitsuhide's "Jōkidōsha ni tsuite," (Steam railcars), in *Meiji-ki Tetsudo Shi Shiryo Geppo* (Monthly bulletin of materials on railroad history in the Meiji period), no. 12 (1981), which has a table comparing the operating expenditures of steam cars and steam-locomotive trains.

Roads

Hirofumi Yamamoto

Developments in Mixed Transportation

Road transportation in the 1910s and 1920s was a situation of increasing mixture in means of transport, with bicycles, motor cycles, motor cars, lorries, and buses, the new modes, sharing the road with traditional horse-drawn carts, ox carts, handcarts, and rickshaws. Of course the phenomenon of mixed transport was in itself not new, having begun in the 1870s with traditional horse, palanquin, and pushcart transport being used at the same time as horse-drawn carts, horse-drawn railways, and other imported modes. From the 1870s to around 1900, vehicles powered by man and beast gradually became more uniform. However, as we move into the 1910s, motor cycles and motor cars begin running on the roads to add motorization to the highly mixed, heterogeneous combination of human- and animal-powered transport. The figures in table 5 give some idea of what it was like for vehicles operating in Japan at the time: bicycles, motor cycles, lorries, motor cars, and buses rapidly increasing in the 1910s and 1920s, but traditional vehicles – horse-drawn freight carts, ox carts, and human-powered carts also continuing to increase. Of course, the coexistence of these new and old transport modes is an indication in itself that the time was getting closer for the new to supplant the old, but in this era, there was fierce competition between the two and the situation of mixed transport was intensifying.

Of all the new transport modes, the one that increased most rapidly during this period was the bicycle. As mentioned earlier, bicycle manufacturing in Japan began to develop around 1900 with the production of the safety bicycle, which combined traditional technology and imported components. The use of imported machine tools and electric motors gradually led to the building of a base for domestic production. With the suspension of the import of finished bicycles and parts during World War I, the process of domestication of production was virtually fixed.

Domestic production of bicycles rapidly increased the number of vehicles owned from 240,000 in 1910 to 4,070,000 in 1925, a ratio of vehicles to people of 1:15 (1 bicycle for every 3 households). The increase in vehicles

Table 5. Total vehicles 1910–1930

	Horse-drawn carriages					Motor vehicles			
Fiscal year	Passenger	Freight	Ox carts	Carts	Rickshaws	Motor cycles	Passenger	Freight	Bicycles
1910	8,565	158,590	35,448	1,667,520	149,567	?	?	?	239,474
1915	8,091	183,969	32,010	1,842,594	115,229	660	873	24	706,467
1920	6,178	252,747	44,455	2,143,397	110,405	2,478	7,023	889	2,051,104
1925	3,905	306,038	66,308	2,186,775	79,832	12,378	18,562	7,884	4,070,614
1930	2,175	308,914	98,690	1,807,788	42,635	23,136	57,827	30,881	5,779,297

Source: Nihon Teikoku tōkei nenkan (Statistical yearbook of the Empire of Japan).

dealt a decisive blow to the rickshaw, the use of which had been declining since around 1900.

Motor vehicles were first imported around 1900, and by the 1910s hired cars, which had absorbed some of the demand for luxury motor cars, metered taxis, and buses, able to carry 10 to 20 people, appeared throughout the country, giving motor vehicles a gradual toe-hold as a new means of road transport. Examples of the growth in vehicular operation can be seen in the Tokyo vicinity. In April 1913, Keio Electric Tramway began operating buses on a route linking Shinjuku, Sasazuka, Chofu, and Fuchu. By 1919 there was a rapidly growing number of companies starting bus operations: Itabashi Bus Company; Tokyo City Bus Company; Tokyo-Yokohama Electric Railway; and Keisei Electric Tramway. In 1924, the year after the Great Kanto Earthquake, Tokyo began operating its own buses.[1]

The few freight-hauling motor vehicles operating at this time were thwarted in growth by the cheap rates that horse-drawn freight wagons and carts charged, but they demonstrated their mobility in recovery work after the earthquake and later increased at a very fast rate. The number of vehicles owned, both passenger and cargo-carrying, had risen to 26,000 by the end of fiscal 1925.

Test construction of motor vehicles began quite early, and the founding of the two companies Kaishinsha in 1911 and Hakuyosha in 1920 represented one of the first attempts to create a corporate base for motor car manufacture. But, with the technical levels available to these companies at the time, competing with American- and European-produced vehicles was too difficult. Because of the lack of an ability to compete, many different models of motor cars were imported from Great Britain, the United States, France, and Italy, but after the earthquake, the incursion of US motor car makers into the Japanese market was dramatic, with Japan Ford set up in Yokohama in 1925 and Japan General Motors founded in Osaka in 1927. Both companies shipped parts in from the parent company in the United States, and through their assembly and sale, held sway in the Japanese market until about the mid-1930s.[2]

Enactment of the Road Law and Road Reconstruction

While this situation of mixed transport was progressing, Japan enacted its first systematic traffic and road law, the Doroho, in April 1919, which was to come into force in April of the following year. Japan had been introducing horse-drawn carts and trains and steam-powered railways all at the same time, but it never developed an age of the horse as the West had but had immediately embarked on the age of the railroad. This lack of an evolutionary process in which roads developed naturally and of a government that emphasized road construction rather than railroads meant that policies on road transportation and construction were not considered of primary importance. There were of course ordinances on the construction of roads and regulations for freight haulers when long-distance road transport began to

play an important role during the 1870s and 1880s. But in the railroad age that started in the 1890s, although laws such as the Railroad Construction Law of June 1892 were enacted, there were no similar systematic laws for roads, despite repeated calls for them in the Diet. However, with the growth in motor vehicles and the increasingly mixed nature of transport in 1910 and thereafter, more attention began to be paid to the seriousness of the problem. There was a growing need to create regulations on type and class of road, to determine who would supervise the roads and what the responsibility of the supervisor would be, what the distribution of costs for roads should be, and what the regulations on road structure would be.

However, the thinking behind the 1919 Road Law was the same old-fashioned thinking that had been the rule for hundreds of years. Rather than looking at the roads as paths for industrial and commercial use, they were viewed as the arteries of military and administrative welfare. In determining the types and classes of road, the law designated as national highways those roads that were primarily of military use, such as the routes connecting Tokyo with Ise Shrine, the prefectural capitals, the army division command posts, and the naval base commands. The traditional notions of who should pay for these roads also remained, with all costs other than for constructing and reconstructing military roads and national highways designated to be borne by local governments. The Road Structure Ordinance of December 1919 was based on the Road Law and its provisions for width (national highways: at least 7.3 m), gradient (at least 30:1), curve radius (at least 55 m), and surface load-bearing capacity (375 kg for 3 cm) were conceived more with horse- and ox-drawn carts than with motor vehicles in mind. Due to this lack, the Detailed Regulations on Road Structure was created in 1926 as a supplement to the Road Structure Ordinance to take into account the increase in motor-vehicle transportation.

The enactment of these laws encouraged the rebuilding of existing roads and bridges throughout the country. In the five years from 1921 to 1926, cities, towns, and villages in Kanagawa Prefecture, as one example, built 343,800 square metres of new road, rebuilt 22,843,000 square metres of road, and built or rebuilt 2,439 municipal bridges. This was 1.9 times as much new construction and 2.1 times as much reconstruction as in the period from 1905 to 1909.

National roads were reconstructed in every area, and the reconstruction from 1924 to 1926 on National Route 1 between Tokyo and Yokohama is a good example. A joint government and private effort set up the Road Improvement Association in March 1919. The reconstruction of Route 1 was based on a proposal by the association after the Great Kanto Earthquake of 1923 and was paid for by funds for earthquake recovery projects from the national treasury and a combined Tokyo and Kanagawa fund. The area reconstructed extended for more than 21 km. The structural standards for Kanagawa at the end of construction in January 1926 were 12.13 m standard width; 4.5 m narrowest effective width; and 8:1 steepest gradient. This was a marked improvement over the 1920 specifications of 7.27 m standard

width, 3.63 m narrowest effective width, and 7:1 steepest gradient. This construction also made it possible to convert all wooden bridges over the Rokugo and Tsurumi rivers to concrete, so that they could hold up under the increasing levels of motor vehicle traffic.[3]

Reforms in the Railroad Freight-Handling Industry

As mentioned earlier, road transportation during the age of railroads consisted mainly of carrying goods to and from freight customers in points not far from the stations. Rickshaw and horse-drawn coaches carried passengers, but in the 1910s, small and large operators of motorized buses made their appearance, along with operators of hired vehicles and taxis. Table 6 shows that horse-drawn coaches had already disappeared from Kawasaki and Yokohama in 1924, although a mixed transport situation of rickshaws and motor vehicles continued there, while operators of rickshaws, horse-drawn coaches, and motor vehicles coexisted in other areas of Kanagawa Prefecture. We can also see that the number of operator-owned motor vehicles was extremely small, an average of less than three. This shows that, with the exception of the motor car operations of private railroads and hotels, the motor vehicle operators were extremely small in scale, usually one vehicle per owner.

The same situation was prevalent in freight transport. Pick-up and delivery of railroad freight required a much lower level of funding and fewer facilities than long-distance road transport. This is why the number of operators rapidly increased as track mileage increased, with 5,000 in 1907, 6,500 in 1916, and, by virtue of the good economic conditions during World War I, 8,000 in 1918, serving 1,671 stations.[4] However, the scale of these businesses was extremely small, with the average operation handling only 22 tons of freight a day in 1907. Equipment available for pick-up and delivery was also limited. In the Tokyo vicinity, demand for transport was very high, but the figures on equipment per operator at the end of March 1924 show only 1.6 horse-drawn carts, 0.5 motor vehicles, 5 freight carts, and 1 bicycle.[5] The lack of equipment meant that much of the pick-up and delivery work was jobbed out to carrier subcontractors, but most of them, too, were very small, having only one to three carts to use in eking out a living. The small scale of these operators prevented improvements in the pick-up and delivery business and increased its cost. They also had very little ability to pay for damages if they occurred, and the owner of the freight frequently suffered losses. This made for an ever widening gap as the freight handlers were unable to keep up with the increasing capabilities of the railroads to transport as the latter continually improved its locomotives for freight hauling and built new freight depots and loading docks. The end result was that most were forced out of business.

The Railway Agency took the above into consideration and instituted regulations on the official certification of freight handlers to improve the quality of railroad freight handling. These regulations extended to the

Table 6. Number of road transporters in Kanagawa Prefecture (1924)

	Rickshaw			Horse-drawn coach			Motor vehicle		
	Operators	Commercial vehicles	Private vehicles	Operators	Commercial vehicles	Private vehicles	Operators	Commercial vehicles	Private vehicles
Kawasaki and Tsurumi region	93	223	14	0	0	0	20	41	35
City of Yokohama	827	1,311	34	0	0	0	183	419	218
Miura region	87	307	0	7	24	0	45	125	23
Shonan region	429	587	47	8	31	2	64	178	21
Inland rural region	244	239	32	21	25	0	44	144	9
Total	1,680	2,667	127	36	80	2	356	907	306

Source: Kanagawa-ken tōkei sho (Statistics for Kanagawa Prefecture).

amount of taxes paid and the capital sources that the operator had available, requiring certain standards in order to be certified by the Railway Agency as a freight handler. Improvements included the posting of the names of freight handlers and of their business at depots and the provision of special privileges, such as the right to pay railroad fares at a later date. This intervention by the railroads in the railroad freight-handling business was only half-hearted, for it still allowed non-certified operators to continue in business. But beginning in 1920, the worsening economic recession called for policies geared toward greater efficiency, for improvements in the ability to pick up and deliver freight, and for reductions in cost. The intervention of the railroad authorities gradually grew stricter. By the end of February 1921, 5,187, or about five-eighths of all freight handlers, were certified.[6]

Notes

1. Nihon Noriai Jidosha Kyokai, *Basu jigyō goju-nen shi* (Fifty-year history of the bus industry) (Nihon Noriai Jidosha Kyokai, 1957).
2. Yanagida Ryozo, *Jidōsha sanjū-nen shi* (Thirty-year history of motor vehicles) (Sansui Sha, 1944).
3. Kanagawa Prefecture, ed., *Taishō kyūnen Kanagawa-ken tōkei sho* (1920 statistics for Kanagawa Prefecture); idem, *Taishō jūgonen Kanagawa-ken tōkei sho* (1926 statistics for Kanagawa Prefecture); *Kanagawa-ken Koho* (Official report on Kanagawa Prefecture), no. 1287 (25 August 1925); Nihon Doro Kyokai, *Nihon dōro shi* (History of Japanese roads) (Nihon Doro Kyokai, 1977).
4. Railway Ministry, Bureau of Transport, *Kokuyū Tetsudō no kounsō mondai* (Problems in small-scale transport on the National Railways) (Railway Ministry, Bureau of Transport, 1935).
5. Ibid., *Tōkyō-shi oyobi sono fukin ni okeru kounsō no genjō* (The situation in small-scale transport in the city of Tokyo and its environs) (Railway Ministry, Bureau of Transport, 1924).
6. *Kokuyū Tetsudō no kounsō mondai.*

Coastal and River Transport

Hiromi Masuda

Effects of the First World War

The shipping industry recovered in the first half of 1910 from the recession caused by the post–Russo-Japanese-War excess in number of ships. It also increased its speculative imports of foreign ships because of the government's decision to revise tariffs, beginning in July 1911, which would lead to an increase in taxes on old ships. The number of ships built also increased, a reflection of the favourable conditions in the world shipping market. At the end of 1913, the year before the First World War broke out,