Yet Another Route for Growth in Japan's Automobile Industry

The Formation and Development of the Three-Wheeler Sector

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In 1980 Japan produced 11,040,000 automobiles; in doing so it overtook the United States as the number one auto-producing country in the world. That year, exports of its automobiles, which had been climbing rapidly during the 1970s, reached the 5,970,000 mark, thus exceeding for the first time the number of vehicles sold on the domestic market. Two-thirds of what was exported were passenger cars. In the 1970s the eyes of the world turned upon the country whose automobile production had started out from zero in 1945 and in the course of a little over twenty years had achieved such amazing growth. Experts began to analyze the phenomenon from a variety of aspects.

Studies were made from a historical approach. The authors of these studies all worked with the same purpose in mind—that of tracing the roots of the Japanese automobile industry's international competitiveness. Some turned the spotlight on elements like the relationship between government and business and the busi-
ness strategies of manufacturers to explain the rapid growth.\(^1\) Others went from there to make meticulously researched empirical studies of how the automobile industry was formed before and during the war.\(^2\) Because of their common goal, even though these authors looked at different time periods and different manufacturers, their analyses concentrated on the role of the government and the manufacturers of ordinary vehicles.\(^3\)

But when one looks at the domestic market rather than the outward-directed aspect of international competitiveness, one discovers features in the Japanese automobile industry that are different from the same industry in countries of Europe and North America. Thus, for example, if one looks at the different types of automobiles owned in Japan in 1980, one finds that 38% were trucks—which was a much higher percentage than the 22% in the United States and the 10% in the countries of Europe. Again, 10% of the total number of vehicles produced that year were in the light vehicle class (engine displacement of 550cc or less); these light vehicles amounted to only 3% of the passenger vehicles produced that year, but they came to 23% of the trucks produced that year. This means that the percentage of trucks made that year was high because of the large number of light trucks made.

Now, this light truck was the result of improvements and advances

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\(^1\) Phyllis A. Genther, *A History of Japan's Government-Business Relationship: The Passenger Car Industry* (Ann Arbor: Center for Japanese Studies, The University of Michigan, 1990); Michael A. Cusumano, *The Japanese Automobile Industry: Technology and Management at Nissan and Toyota* (Cambridge, Mass., and London: Harvard University Press, 1985).

\(^2\) Masaru Udagawa, “The Prewar Japanese Automobile Industry and American Manufacturers,” *Japanese Yearbook on Business History 2* (1985); Masachika Shinomiya, *Nihon no jidōsha sangyō—kigyo-sha katsudō to kyōsōryoku 1918–70* [Japan's automobile industry: Entrepreneurship and competitiveness 1918–1970] (Tokyo: Nihon Keizai Hyōronsha, 1998); Yoshio Ōba, *Nihon jidōsha kōgyō no seiritsu to jidōsha setzō jigyōhō no kenkyū* [A study of the establishment of the Japanese automobile manufacturing industry and the Automobile Manufacturing Law] (Tokyo: Shinzansha, 2001).

\(^3\) According to the current Road Transport Vehicle Law, vehicles are classified by the size of the body and the engine displacement into three types: ordinary vehicle, small vehicle, and light vehicle. An ordinary vehicle is any vehicle that exceeds the small vehicle specifications. A small vehicle according to the present law is one whose engine displacement is no more than 2,000cc (before the war this was no more than 750cc, and then up to 1960 it was no more than 1,500cc). A light vehicle has been defined since 1989 as a vehicle whose engine displacement is no more than 660cc (this had been set at no more than 360cc in 1951, then at no more than 550cc in 1975).
made on three-wheelers. Three-wheelers as such were not a peculiar invention of the Japanese; at the end of the nineteenth century a three-wheeler was among the many models that made an appearance in the United States before the Model T Ford took over as the dominant design. After the end of each world war considerable numbers of three-wheelers were produced in Europe—and even now very small numbers are continuing to be made in various countries there. The three-wheeler in Europe, however, is mainly a passenger car, and in terms of production numbers and its influence on the subsequent market and supply structure, it represents only a temporary alternative in postwar restoration periods and a minor episode in the history of the automobile industry.

In Japan, on the other hand, the three-wheeler, principally in the form of a truck, was mass-produced over a period of many decades, from the 1920s until the 1970s. Not only that, but companies like Mazda and Daihatsu have used the experience and skills amassed during production of three-wheelers as the foundation for a shift into mass-producing four-wheelers. From the 1920s until the 1950s, except for the years of the war, the number of three-wheelers produced exceeded the number of four-wheeled vehicles produced in Japan, so much so that automobile production in this period could justifiably be termed “the three-wheeler stage.”

Therefore, any analysis of the history of Japan’s automobile industry should, by right, include the three-wheeler sector, and yet hardly any attention has been paid to this sector in all past research. A large part of the reason is the aforementioned purpose that researchers all had in mind in doing their studies, but another reason was the limited documentary material available. The historical study of the automobile industry compiled during the 1960s and 1970s includes information about the prewar period, but the core of its material deals with the process by which the manufacturers of four-wheel vehicles, which were the mainstream at the time the history was compiled, grew, and how this growth was related to industrial measures taken by the government.

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4 John B. Rae, *The American Automobile* (Chicago: University of Chicago Press, 1965).
5 Ken Hill, *Three-Wheelers* (Buckinghamshire: Shire Publications Ltd, 1986).
6 Japan Automobile Manufacturers Association (JAMA), comp., *Jidōsha kōgyōshi-kō* [Draft history of the automobile manufacturing industry], vols. 1–3 (Tokyo: Japan
And yet the documentary materials for the periods treated by that history include a great deal of valuable information on the three-wheeler sector. The purpose of this paper is to use those documentary materials, especially what is found in magazines, to shed light on the formation and development of the three-wheeler sector. The focus will be on the period from the 1920s to the 1950s, but I would like to keep in view the influences upon automobile production structures in Japan in the 1960s and later as I proceed with my analysis. I also keep in mind comparisons with the four-wheeler sector represented by the likes of Ford, General Motors, Toyota, and Nissan as I proceed through each period. And by synthesizing the story of three-wheelers and four-wheelers, I hope to revise the generally accepted image of the history of Japan’s automobile industry.

THE FORMATION OF THE THREE-WHEELER MANUFACTURING INDUSTRY IN THE 1920S: FROM THE AUTO-CYCLE TO THE THREE-WHEELER

The first automobile was imported into Japan around 1900. Up into the 1910s sales were not widespread, but the Great Kanto Earthquake of September 1923 proved a strong stimulation to sales. While only about 16,000 automobiles were owned in Japan at the end of 1923, by 1930 the number had risen to 89,000 vehicles.

The major reason for this increased ownership was the fact that U.S. automakers had built assembly plants in Japan and offered low-price models. Ford began its assembly plant in Yokohama in 1925, while GM began assembling autos in Osaka in 1927. As a result of cost-cutting through lower shipping costs, economies of scale, and lower sales margins, these two companies could supply the Japanese market at a greatly lower price than the market ever had experienced before. For example, the chassis price of a Chevrolet truck with a carrying capacity of 1.5 tons fell from 5,500 yen in 1922 to 2,044 yen in 1930. And whereas before this time the automobile

Automobile Manufacturers Association, 1965, 1967, 1969); Jidōsha Kōgyō Shinkōkai [Association for the Promotion of the Automobile Manufacturing Industry], comp., Jidōsha shiryō shirizu [A series of documentary materials on the automobile], vols. 1-3 (Tokyo: Association for the Promotion of the Automobile Manufacturing Industry, 1973, 1975, 1979).
showrooms had presented a department-store atmosphere with their many models imported from many different countries, the unexpected success of the two American companies changed all this and their models swept everything else aside. This was not all: they also brought production by Japanese automakers practically to a standstill. At the time, there were three companies producing trucks and buses for military purposes in accordance with the 1917 Military Automobile Assistance Act, and one company (Hakuyōsha) producing passenger vehicles. None of these companies was able to compete with Ford and GM, and Hakuyōsha ended up going bankrupt.

The same thing was happening in Europe, by the way. Local automakers in several countries were being hit hard by the inroads of U.S. automakers. To cope with the crisis, European manufacturers developed small cars. The reason was that, though in those days the Fords and Chevrolets were touted as “cars for the masses,” or “popular cars,” in Europe they were seen as high-priced and (oversized) medium-size cars. Europeans, after all, did not have the purchasing power of Americans, their roads were not as wide, and fuel was not as easy to come by. For these same reasons the production of motorcycles increased in Europe in step with their production of small cars.7

In Japan, on the other hand, the reaction to the American cars for the masses differed slightly from the reaction in Europe, because of the greater gap in purchasing power and in technological levels. The country’s automakers did not have the skills to develop a small passenger car that could compete with the cars for the masses. But of even more basic importance, there was little demand for small passenger cars for private use. What was developed instead, as a truck that held out hopes of being relatively in demand for private use, was a three-wheeler modification of a bicycle.

Small merchants and industrialists in the 1910s were using either carts capable of carrying 100 to 200 kilograms, or bicycles, as means to transport freight, rather than “trucks for the masses” (or “popular trucks”) of one or two ton capacity. Around the end of the 1910s, however, some of those who used bicycles began fitting out their

7 James M. Laux, The European Automobile Industry (New York: Twayne Publishers, 1992).
bicycles with a “motor wheel” device that could easily be attached to a bicycle and as easily detached from it. The motor that was used for these “auto-cycles” was produced by the American small motor manufacturer A. O. Smith Company.8

From around the middle of the 1920s, Japanese advanced from the Smith Motor to motorcycle engines of 350cc or 500cc that outperformed the Smith Motor. The body was also changed in order to carry more freight, by adding a second back wheel to a bicycle to make a three-wheel vehicle. The result was a three-wheel truck peculiar to Japan, one that was endowed with a certain degree of practicality. From the end of the 1920s demand for these three-wheel vehicles increased, principally because of its low price. At that time the price of a three-wheel truck was 800-some yen, which was less than half of what a “popular truck” cost, and it was even cheaper than the motorcycles that were being used to transport freight by means of sidecar attachments. Also, the three-wheel truck did not compete with the “popular truck” in the freight transport market; what it did was expand the market, even as it drove motorcycles, carts, and other traditional means of transport out of the market. No exact statistics regarding the number of three-wheel trucks owned at this time exist, but a survey by the Ministry of Commerce and Industry indicates that approximately 8,000 of these trucks were owned around 1930. Since there were 31,000 ordinary trucks owned at the time, it means that about one in five truck owners owned a three-wheel truck.

Let us next turn our attention to the way in which the first three-wheel trucks were made. The three-wheel truck, being an adaptation of the auto-cycle, basically consisted of a frame and an engine. As far as the frame went, bicycle frame technology in Japan at the time had reached a state of perfection, and in the beginning that technology could be appropriated just as it was. In the first half of the 1920s, when a Smith Motor or a 175cc engine was being attached

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8 This company was the forerunner of Briggs & Stratton Company, which presently manufactures motors for use in agricultural machinery such as grass cutters (see Jeffrey L. Rodengen, *The Legend of Briggs & Stratton* [Fort Lauderdale, Flor.: Write Stuff Syndicate Inc., 1995]). For an illustration of a Smith Motor Wheel and a discussion of its place in the beginnings of the Toyota Motor Co., see Kazuo Wada and Tsunehiko Yui, *Courage and Change: The Life of Kiichiro Toyoda* (Toyota City: Toyota Motor Corporation, 2002), pp. 208–11.
to the frame, even an ordinary bicycle frame raised no serious problems. But in the second half of the 1920s, when 350cc and 500cc engines were gradually being adopted, a stronger frame was needed because the ordinary bicycle frame could not stand up to the engine vibrations.

While engineers were working towards strengthening the frames, they also experimented with a differential gear (which they installed in a small percentage of the three-wheel trucks), which was needed to maintain the stability of the vehicle when turning corners. As a result of such improvements, by around 1930 mechanical engineers of the time were able to assess the three-wheel truck in the following terms:

Because demand was extremely high in the early stages of its spread, there was no time to think about improvements in design or construction. Two or three times there were even some very irrational and dangerous designs made. At the present time, though, these have been weeded out by natural selection, and what we have are products whose improvements and development are, engineering-wise, outstanding.  

When it comes to engine manufacturing technology, on the other hand, Japanese levels were not on a par with those in other countries. Even though Narazō Shimazu had experimented with an engine for an auto-cycle in Osaka in 1908, and its development had been continued by a handful of pioneers afterward, even in the 1920s the results of their efforts could not compete with imported engines. There was an exception: domestic production of a small gasoline engine for use on farms and by fishermen was nearing reality, and so the possibility existed for a shift from that to the manufacture of an engine for use in three-wheelers—as happened in the case of Osaka Hatsudōki, later known as Daihatsu.

In the 1920s, therefore, the engines used in the three-wheel trucks were almost all imported items. These engines were provided by motorcycle manufacturers in Europe and America; many of them came from such British companies as JAP, BSA, and Blackburn. An engine capable of competing with these imported goods

9 Kikai Gakkai shi [Journal of the Society of Mechanical Engineers] 34, no. 166 (1931), pp. 227–28.
was developed only around 1930 by Tetsuji Makita of Nippon Jidōsha. Besides the engine itself, other parts like carburetors, spark plugs, and transmissions also were imported because no domestically produced counterparts existed.

These technical conditions came to prescribe the manner in which three-wheel vehicles were manufactured, since "semidomestic" products, made up of domestically produced frames to which imported engines were attached, formed the mainstream. The domestically produced frames were manufactured from scratch by a single manufacturer in only extremely rare cases; most were merely assembled from parts ordered from several other manufacturers. As a result, the factories did not need much equipment, and the production method resembled that of a bicycle manufacturer more than that of an "ordinary vehicle" maker.\(^{10}\)

The production of three-wheel vehicles was in fact also carried out as a sort of side job by many such small businesses connected with bicycle manufacturing. When we look at the backgrounds of the manufacturers of three-wheel vehicles at this point in time, we find importers of machinery, manufacturers of small motors and other machinery, and people connected with the bicycle trade. This last category was the largest, and it included bicycle importers, bicycle wholesalers, and others involved in selling or repairing bicycles. For example, Ōsawa Shōkai was a bicycle importer, and Mōtā Shōkai was a company established through funding by the bicycle wholesaler Maruishi Shōkai. What made it possible for merchants in the bicycle business to become involved in making three-wheel trucks was the fact that the technology required for assembling an engine and a frame was such that it could be done "on a small scale in even a small ironworks or a bicycle retailer's shop."\(^{11}\)

\(^{10}\) Domestic manufacturers were mainly engaged in producing vehicles for military use. Though their output was extremely small in terms of vehicle numbers, their factories were equipped with imported machinery of outstanding performance, and as a rule they produced all parts within their own plants. On the other hand, credit for the production of 500,000 bicycles a year was not due to the efforts of large manufacturers of complete bicycles who produced them from the smallest parts to the final assembly, but almost entirely to the efforts of small parts manufacturers channeling their work through wholesalers.

\(^{11}\) Daihatsu Motor Co., comp., Gōjūnen shi [Fifty-year history] (Osaka: Daihatsu Motor Co., 1957), pp. 34–35.
With such a low barrier to entry, it is not surprising that, in the latter half of the 1920s, one small manufacturer after another entered the field. Whereas in 1926 there were only 2 three-wheeler manufacturers, in 1927 there were 8, then 16 in 1928, and a sudden jump to 35 in 1929. The annual production of these small manufacturers was about 100 vehicles each. This figure may seem extremely low, but because there were so many manufacturers, their total annual production would come to 3,600 to 3,700 vehicles. In the Kyoto-Osaka-Kobe area, where the manufacture of three-wheelers was more advanced, monthly production would be in the order of 200 vehicles a month, as opposed to about 100 per month in Tokyo and about 50 in Nagoya. Now, even though these production figures fall far behind the approximately 20,000 vehicles per year that Ford and GM were able to assemble, they were still much larger than the paltry 300 to 400 vehicles per year produced by the manufacturers of vehicles for military use.

The three-wheelers thus produced were sold through the long-established bicycle shops. The main reason for this is that bicycle shops also sold motorcycles, and so they were equipped to repair not only the frames but also simple engines. Shops specializing in the sale of three-wheelers did not begin to appear until in the 1930s. Because the three-wheelers were made in small quantities by small manufacturers, sales were limited in the early days to the locales where the vehicles were made, and it was not until the end of the 1920s that moves to extend sales farther afield began to be seen. Mostly this was done by Kansai manufacturers extending their sales into Kantō.

Competition became fierce, and this prompted many manufacturers to drop out of the three-wheeler market. The end of the 1920s saw a frequent repetition of two patterns—that of people in the business of selling or repairing bicycles and motorcycles who embarked on the production of three-wheelers if they had the technical capability, and that of three-wheeler manufacturers who had

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12 Committee for Compiling a History of Small Car Development, eds., Kogata jidōsha hattatsu shi [The history of the development of small cars], vol. 1 (Tokyo: Japan Automobile Manufacturers Association, 1968), p. 68.

13 "Jidō sanrinsha to sono kikan ni tsuite" [On self-propelled three-wheel vehicles and their engines], Moto [Motor], November 1930, p. 36.
to back out of the competition and who then contented themselves with the selling and repairing of bicycles, motorcycles, and three-wheelers.

GROWTH OF THE THREE-WHEELER INDUSTRY IN THE 1930S:
EXPANSION OF THE MARKET AND DOMESTICATION OF PRODUCTION

The small-scale production of three-wheelers by people in the bicycle trade using imported engines would undergo change in the 1930s. Engines and parts would be produced in Japan, frame technology would improve, and large manufacturers that specialized in three-wheelers would appear on the scene.

First, the frame. Through the 1920s it was a stronger version of a bicycle frame, more like a motorcycle frame. Around the mid-1930s, however, this was replaced by a frame made from a pressed steel plate, as was done in the manufacture of automobiles, and improvements were made to the solidity of the fork. This made it possible to increase the maximum load from 225 kilograms to 400 kilograms. The drive mechanism was changed as well, from the chain used in motorcycles to the shaft used in automobiles, and differential gearing came to be adopted in almost all models.

Next, the engine. The use of imported 500cc engines was common up to 1932, but beginning from the mid-1930s, when 750cc engines became the norm, domestically produced engines took over the market. This happened because it was maintained that the technological level then available dictated that the largest displacement possible with a single cylinder was 650cc and that a displacement of 750cc would require two cylinders, yet at the same time the only two-cylinder engines that could be imported were in the 1,200cc class.

Another factor was the competitive edge given to domestic products by the devaluation of the yen on exchange markets and by tariff amendments. Thus, the tariff on engines that had previously stood at 11% was raised to 35% in 1932, and the 1931 embargo on exports of gold led to a 60% fall in the yen/dollar rate in 1932, sending the yen price of imported goods through the roof.

All these factors encouraged the domestic production of not only engines but also such things as transmissions and electrical parts.
Bosch and Lucas had monopolized electrical parts, but in the early 1930s Hitachi Works and Mitsubishi Electric Corporation succeeded in producing the same equipment, and before long they took over the market. Another noteworthy change that took place in this period was the move by manufacturers of parts for ordinary vehicles, companies like Riken (maker of pistons) and Nippon Seikō (maker of bearings), into the supply of parts for three-wheel vehicles.

Because three-wheelers maintained the price gap between them and ordinary vehicles (see Table 1) despite the remarkable improvements made to them throughout the 1920s, demand for them rose rapidly in the 1930s. While ordinary-vehicle truck sales increased in the 1931-37 period from the 35,000 level to the 53,000 level, for an increase of 52%, the sales of three-wheel trucks rose from the 5,000 level to the 48,000 level, or an increase of 900%. The main reason for this was that the three-wheelers’ low prices were about one-third the prices of Fords and Chevrolets. Other factors influencing the growth in demand for three-wheelers were the lower automobile tax

### Table 1. A Comparison of Truck Prices (1935)

| Category            | Make         | Load Limit (tons) | Price (yen) |
|---------------------|--------------|-------------------|-------------|
| Ordinary vehicles   | Ford         | 1–1.5             | 3,230       |
|                     | Chevrolet    | 1–1.5             | 3,275       |
|                     | Diamond      | 1.5–2             | 4,990       |
|                     | Isuzu        | 1.5               | 5,300       |
|                     | Isuzu        | 2                 | 5,800       |
| Small 4-wheelers    | Datsun       | 0.67              | 1,640       |
| Small 3-wheelers    | Daihatsu     | 0.5               | 1,355       |
|                     | Matsuda      | 0.4               | 1,100       |
|                     | New Era      | 0.4               | 1,200       |
|                     | Harley       | 0.4               | 1,515       |

**Note:** For ordinary vehicles and small 4-wheelers, the price given is the lowest-priced model of that load limit; for 3-wheelers, the price is the highest-priced model of that load limit.

**Sources:** *Jidōsha nenkan* [Automobile annual] (Nikkkan Jidōsha Shinbunsha [Daily Automobile Newspaper], 1936); *Kogata jidōsha nenkan* [Small automobile annual] (Mōtā Fan Sha [Motor Fan Co.], 1936).
on three-wheelers,\textsuperscript{14} and the state of roads, for there were many more roads that three-wheelers could pass through but ordinary vehicles could not.\textsuperscript{15}

Yet another reason for the increased demand for three-wheelers could be found in the privileged place three-wheelers had in regulations governing the driving of vehicles: no license was needed. The Ministry of Home Affairs's Automobile Control Act of 1919, the first legal regulation dealing with the use of roads by automobiles, was concerned only with ordinary vehicles, and nothing was set down in regard to three-wheelers. In 1926, after the increase in three-wheeler use, amended regulations permitted three-wheelers of a certain size and displacement to be driven without a license. At first that displacement was designated as 350cc (or three horsepower); in 1930 this was extended to 500cc.

In 1933 the legislation was amended to cover any small vehicle, no matter how many wheels it had, and it stipulated that drivers of such vehicles could receive their licenses without a driving test. The regulation defined a small vehicle as one having a width of 1.2 meters or less and a length of 2.8 meters or less, with an engine displacement of 750cc or less. All three-wheelers therefore qualified as small vehicles. Since a considerable amount of time and money was required to pass the required driving test, the waiving of a driving test for drivers of such vehicles was a major factor in the increased demand for three-wheelers and other small vehicles.

Now, because the small vehicle regulations extended the displacement qualification up to 750cc, a stimulus was given to produce small four-wheel vehicles. The model that best exemplified this was the Datsun. There was a Datsun passenger vehicle and a Datsun truck being made, and it was the truck division that had the capability for competing with three-wheelers. Still, in actual fact rivalry between the two did not eventuate. "Though the development of the [small] four-wheeler contributed to the evolution of

\textsuperscript{14} In 1935, for example, the annual automobile tax in Tokyo was 171 yen for private-use trucks of 18 horsepower and under and for passenger cars; 46 yen for commercial-use trucks; and 30 yen for three-wheelers.

\textsuperscript{15} In 1934, of all the roads in the country, only 3.5\% were able to be used by ordinary vehicles, whereas 20.9\% could be used by three-wheelers with their smaller turning radius.
TABLE 2. Numbers of Vehicles Supplying the Demand for Automobiles in Prewar and Wartime Japan

(Year: vehicles)

| Fiscal Year | Ordinary Vehicles | Small Vehicles |
|-------------|-------------------|----------------|
|              | Domestic Produced | Imported/Knockdown | Subtotal | 4-Wheelers | 3-Wheelers | 2-Wheelers | Subtotal |
| 1931        | 434               | 23,200           | 23,634   | 2          | 552       | 1,200      | 1,754   |
| 1933        | 1,055             | 16,353           | 17,408   | 626        | 2,372     | 1,400      | 4,398   |
| 1935        | 1,181             | 32,731           | 33,912   | 3,908      | 10,358    | 1,672      | 15,938  |
| 1937        | 9,462             | 33,939           | 43,401   | 8,593      | 15,230    | 2,492      | 26,315  |
| 1939        | 30,089            | 500              | 30,589   | 4,425      | 8,194     | 2,429      | 15,048  |
| 1941        | 43,878            | 0                | 43,878   | 2,620      | 4,666     | 2,596      | 9,882   |
| 1943        | 24,205            | 0                | 24,205   | 1,072      | 2,259     | 1,965      | 5,296   |

Source: Jidosha Kogyokai [Automobile Manufacturers Association], Jidosha kogyo shiryo [Sources on automobile manufacturing], 1948, pp. 35-36.

the three-wheeler, it made few incursions into the demand for the latter." True, there was a 20% difference in prices between small four-wheel trucks and three-wheel trucks, but it was a level that only added differentiation in the market. As we shall see, it was not until the mid-1950s that competition between the two categories actually materialized. At the time of which we speak now, the small four-wheel truck and the three-wheeler maintained a relationship of complementarity, and the two contributed jointly to the expansion of the truck market.

Let us next look at the changes that took place in the production of three-wheelers during the 1930s. Table 2 shows the trends that occurred in the numbers of vehicles supplied, according to different categories. The first thing we can see is that, in the case of ordinary vehicles, supply remained very stagnant up to the mid-1930s, and that the market was concentrated on imports and domestically assembled vehicles from knocked-down parts, even more than it was

16 Kyokuto mōtā [Far Eastern Motors], January 1935, p. 79.
in the 1920s. Production figures for small vehicles, on the other hand, were lower in absolute numbers than those for ordinary vehicles, and even at their peak in 1937 small vehicles came to only about 60% of the numbers of ordinary vehicles. Nevertheless, these small vehicles were all produced by domestic manufacturers, and the three-wheelers, which all fell within the truck category, represented the largest proportion of all the small vehicles. Earlier studies have pointed out that this was the time when foreign vehicles, particularly the Ford and Chevrolet "cars for the masses," were at the peak of their popularity. This assertion may be accurate if one looks only at ordinary vehicles, but if one includes small vehicles in the picture, then it would be more accurate to say it was also when three-wheelers were at the peak of their popularity.

The many small three-wheeler manufacturers that existed in the 1920s were joined in the 1930s by larger manufacturers. In 1932 Nippon Nainenki [Japan Internal Combustion Engine] Co. was hived off from, and established by, Nippon Jidōsha Co., which had in the late 1920s developed the first engine to be commercially produced in Japan, the JAC. Nippon Nainenki produced, besides the New Era three-wheeler, a large number of motorcycles for military use. The company also had outfitted its plant with outstanding imported machine tools. But two other companies had even bigger equipment for full-scale manufacturing of three-wheelers: Hatsudōki Seizō (later known as Daihatsu) and Tōyō Kōgyō (producer of the Matsuda, which in 1984 was changed, along with the company name, to Mazda). Originally a company that manufactured machinery and tools for railway rolling stock and small engines for use on farms and fishing boats, Hatsudōki Seizō had also developed in the late 1920s an engine for three-wheelers. Its attempts to supply existing three-wheeler manufacturers with its engine went unrewarded, so the company decided to go into manufacturing three-wheelers itself. It built a casting plant and machine processing plant and laid out a testing ground; its equipment was head and shoulders above

17 The figures in Table 2 for the number of three-wheelers produced in 1931 and 1933 are far lower than the figures given towards the end of the last section (on the 1920s). I believe this is because the figures shown in Table 2 do not include "semidomestic" three-wheelers—that is, three-wheelers that were produced by attaching imported engines onto domestically made frames.
that of other three-wheeler manufacturers. As its production of three-wheelers increased, it built in 1937 a separate factory exclusively for making three-wheelers, and it even introduced presses in order to facilitate mass production.\textsuperscript{18}

Toyo Kōgyō, on the other hand, originally specialized in manufacturing cork products, but in the latter half of the 1920s it went into manufacturing machinery. In the beginning it manufactured parts for airplanes as a subcontractor to military arsenals, but in a search for more stable work it turned in the early 1930s to making three-wheelers. Because, unlike Hatsudoki Seizō, it had no previous experience making engines, it made copies of imported engines. To compensate for this weakness, it devoted greater energy to improving the structure of the body. At first the manufacture of three-wheelers was looked upon as a secondary business, but by 1937 three-wheelers comprised 70\% of all the company’s products.\textsuperscript{19}

These three large companies produced the whole of their three-wheelers, from the parts to the final assembly. The smaller companies continued the production method they pursued during the 1920s, that of ordering parts from other companies and concentrating on assembly. Naturally, in performance and price the products of the three large companies gained in competitiveness, and by 1937 the three companies’ share of the three-wheeler market pie was two-thirds.

Changes also took place in the manner of sales. Whereas in the 1920s three-wheelers were sold by shops that also sold bicycles and motorcycles, now many of them switched to specializing in only three-wheelers. Although these shops did not sell exclusively one brand, as the Ford and GM shops did, the three large companies used these shops to set up a sales network across the country. Strategies to encourage sales, such as monthly-installment purchases, were also adopted.

In this way mass production of domestic vehicles was making

\textsuperscript{18} Daihatsu Motor Co., Gojūnen shi [Fifty-year history] (Osaka: Daihatsu Motor Co., 1957); Daihatsu Motor Co., Rokujūnen shi [Sixty-year history] (Osaka: Daihatsu Motor Co., 1967).

\textsuperscript{19} Toyo Kōgyō, Gojūnen shi—enkaku hen [Fifty-year history: The origin and development of the company] (Hiroshima: Tōyō Kōgyō, 1970).
progress in Japan in the mid-1930s, with large three-wheeler manufacturers leading the way. The production of small four-wheelers was also going strong, and Nissan, which was making Datsuns, was particular active, investing larger sums of money in equipment than the three-wheeler manufacturers were. At that point moves began to be made to work from a core of small vehicles (three-wheelers and four-wheelers combined) to develop a domestic car that would fit into the popular-car niche that made up the largest market, the niche that was then monopolized by Ford and GM. The plan was to achieve the goal in gradual stages: the small-vehicle production base would be expanded and, using that as a foundation, manufacturers would make parts for popular cars, and then they would go on to develop their own popular cars. At that time, however, there were also strong voices being raised to urge the immediate development of a popular car for use in the Army. It was the latter strategy that was adopted when the Automotive Manufacturing Industries Law was promulgated in May 1936. 

This did not mean that small vehicles were immediately banned by the new law. Although the small-vehicle sector would not receive any government assistance the way those involved in popular-car production would, it was expected that the small vehicle industry would continue to enjoy independent growth in the private sector as it had in the past. But this all changed in 1937, when government controls came in with the start of hostilities in China. When in August 1938 a ban in principle was issued against producing small vehicles and passenger vehicles, the production of small vehicles was curbed (see Table 2). Three-wheeler manufacturers were compelled to switch to making parts for military trucks and airplanes.

REVIVAL AND REORGANIZATION OF THE THREE-WHEELER MANUFACTURING INDUSTRY AFTER THE WAR: FROM THREE-WHEELERS TO LIGHT VEHICLES

After the war automakers in Japan very quickly began the production of automobiles for civilian requirements. Still, the production of passenger vehicles lagged behind, hampered by prewar technol-
ogy levels and market conditions; until the 1950s most of Japan’s automobile production consisted of trucks. Thus, if we compare the number of passenger cars and trucks produced in 1955, ten years after the war ended, the figure for the former stood at only 22,000, while the figure for trucks came to 135,000.

Three-wheel trucks outnumbered the four-wheel variety (Figure 1). As in prewar times, the term “small vehicle” referred to an automobile that fell within certain size specifications, regardless of the number of wheels. Whereas before the war the small-vehicle category set a maximum engine displacement of 750cc, after the war this maximum was raised to 1,500cc. As a result, small four-wheel vehicles began to be produced in larger numbers than in prewar times, but (until the mid-fifties) in fewer numbers than small three-wheelers. A new category was introduced after the war: the light vehicle. A size smaller than the small vehicle, it had to have an
engine displacement of no more than 360cc. In effect, the equivalent of a 1920s small vehicle was now classified as a light vehicle. What we see in Figure 1 is that, in this new category as well, the three-wheel variety experienced more rapid growth than its four-wheel counterpart in the latter half of the 1950s.

In the period of Japan's postwar rehabilitation from 1945 to 1950, there was an explosive growth in demand for trucks. Manufacturers of ordinary trucks from prewar days, such as Toyota and Nissan, were unable to meet the demand, so the government pinned its hopes on the production of small four-wheel trucks. For reasons of price and other factors, however, purchasers of small trucks were looking for three-wheelers rather than four-wheelers, so Daihatsu, Tōyō Kōgyō, and Nippon Nainenki resumed the production of their three-wheelers. Other players entered the three-wheeler market also, among them airplane and machinery manufacturers that made a quick switch from military to civilian needs, companies like Mitsubishi Heavy Industries, Kawanishi Aircraft Co., and Aichi Aircraft Co. This increased to eight the number of companies manufacturing three-wheel trucks. Even though a sudden increase in production was limited by the general difficulty all companies faced in procuring raw materials during the period of rehabilitation, the production of three-wheel trucks surpassed the highest prewar production level of the same type of vehicle as early as 1948.

Around this time the three-wheeler manufacturers, in the wake of the extension of small-vehicle specifications to a 1,500cc displacement, developed a 1,000cc engine and were planning to switch to the production of four-wheelers. But then the Korean War broke out in 1950, and a shortage of trucks developed in Japan. The three-wheeler manufacturers changed their plans and decided to continue producing three-wheel trucks. Now, in the early 1950s the load limit of ordinary trucks was four tons, that of small four-wheel trucks was from half a ton to one ton, and that of small three-wheel trucks was up to half a ton. There was a void, therefore, in the 1–2 ton slot that used to be in highest demand before the war, the slot

21 The trucks developed by Toyota and Nissan before the war with a view to competing with the Ford and Chevrolet trucks had load carrying capacities of 1.5–2 tons, but during the war Toyota and Nissan produced bigger trucks, and the capacities of their trucks after the war were four tons.
that Ford and Chevrolet trucks used to fill. Since Toyota and Nissan were directing the limited resources available to them to the development of ordinary trucks and passenger cars, they showed little interest in developing this portion of the market. This left the way open for the three-wheeler manufacturers to aim at filling this void.

To meet that goal they had to make the three-wheelers bigger, so they expanded the range of engine displacement from 1,000cc to 1,500cc, and the load limit to between 1 and 2 tons. These larger models began taking over a bigger and bigger share of three-wheeler sales with every passing year; the model with a load limit of 750 kilograms, which had enjoyed 58% of the sales in 1952, fell to 9% by 1957, while models of 1.5 tons or more rose from 2% in 1952 to 53% in 1957.22

Besides enlarging the three-wheelers, manufacturers also made corresponding improvements in performance. The starter, which used to be a kick pedal similar to that on motorcycles, was replaced by a battery-operated motor, and the handlebars were replaced by a circular steering wheel. Thus by the mid-1950s three-wheelers were on a par with four-wheelers in performance, and larger than small four-wheelers in size.

Approximately half of the three-wheel trucks were bought by merchants and shopkeepers, and about 20% were bought by manufacturers. Four-wheel ordinary trucks were mostly bought by transport and communication businesses, with merchants and shopkeepers buying no more than 10%. The three-wheeler was, therefore, truly the vehicle of choice of Japanese merchants and shopkeepers. And they had a very wide selection of three-wheel trucks to choose from: in 1956 Tōyō Kōgyō and Daihatsu each was producing 12 different models, Mitsubishi was producing 9 different models, and Nippon Nainenki was producing 7 different models.23

As I mentioned earlier, the sudden increase in the number of three-wheelers meant that the three-wheeler sector was the largest in the country's automobile industry. At the end of 1956 the number of three-wheel trucks owned in the country stood at 531,000.

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22 Nihon Kogata Jidōsha Kōgyōkai [Japan Small Automobile Manufacturers Association], Kogata jōhō [Small vehicle news], several issues, esp. those for the years 1952–53 and 1957–58.

23 Mōda fann [The motor fan], October 1956, p. 82.
while the figures for small four-wheel trucks was 188,000, for ordinary trucks was 185,000, and for four-wheel passenger cars was 218,000. Three-wheeler manufacturers employed a total of 23,000 workers, as opposed to 13,000 people working on four-wheelers, and they had more equipment and machinery than four-wheeler manufacturers did.24

The production of three-wheel trucks peaked in 1956. While their production faltered from 1957 on, that of small four-wheel trucks began a sharp rise. The first cause for this that comes to mind is a technical factor. Despite the improvements in the performance of the small three-wheel truck, the noise and vibrations made it impossible to have a closed cabin, and there was also a limit on raising the speed of the vehicle. Yet these defects could be offset by such advantages as its ability to transport heavy loads, its shorter turning radius, and the ease with which it could be repaired. No, the most important cause for the decline of the three-wheeler must be sought in the fact that the price gap between the three-wheeler and the four-wheeler had disappeared.

Until the mid-1950s the considerable difference in price between the two types of small vehicles was maintained at prewar levels. But when Toyota developed a small four-wheel truck with a 1,500cc engine in 1953, it took advantage of the opportunity to turn its old 995cc small four-wheel truck into an improved model that could compete with the three-wheelers. That is, it converted the old cab-behind-engine truck to a cab-over-engine truck, it sacrificed comfort by increasing load-carrying capacity, and it tried to reduce costs by simplifying options. Then in 1956 it bit the bullet and drastically lowered the sale price in a move aimed at narrowing the price gap with three-wheelers. Toyota’s stratagem proved to be a great success, and the other four-wheel truck manufacturers followed suit. This marked the beginning of a switch from three-wheel trucks to four-wheel trucks in the 1-ton load category.

To counteract this change, the manufacturers of three-wheelers tried the following remedies. First of all, they tried for a soft landing by restricting themselves to models in the 1.5-ton and higher categories, because these models were still relatively competitive with the four-wheel trucks. Secondly, they embarked again on the plan

24 Ibid., November 1957, p. 92.
they had first mooted before the Korean War intervened, that of manufacturing four-wheel trucks. Thirdly, they turned their hands to the development of the light three-wheel truck, in order to open up a new market for three-wheel vehicles. In this three-pronged counterattack, they devoted most of their efforts and resources to the third prong, and their efforts were rewarded with great success.

Light three-wheel trucks had already appeared on the market in 1953 (Fig. 1), when small three-wheel trucks were still in their heyday. It was hoped that demand for them would grow because of certain advantages they had over other vehicles, such as a simpler test to obtain a driver's license, and lower taxes. But because there was no difference in price between a light three-wheel truck and a secondhand small three-wheel truck, and technologically the light three-wheeler did not rise much above the level of three-wheelers of the 1920s, sales of the light three-wheeler did not take off. Once Daihatsu began supplying the market with the high-performance, low-price Midget in the second half of the 1950s, however, demand grew at an astonishing pace. Even though the Midget remained the same price as earlier light three-wheel trucks, and was the same size as the small three-wheel trucks of the 1920s, in maneuverability, design, and horsepower it represented a remarkable improvement over the 1920 vehicles. While some owners of motorcycles or motor scooters switched to the light three-wheelers, as a rule the core of the demand came from small merchants and small manufacturers, who found that the load limit of 300 to 350 kilograms suited their purposes ideally. Stimulated by Daihatsu's success, other three-wheel truck manufacturers developed their own light three-wheel trucks, and by 1959 the number of light three-wheelers produced had surpassed the output of small three-wheelers (Fig. 1).

This sudden boom in light three-wheel trucks again made the market prospects for three-wheelers in general look rosy, and an expansion of the three-wheeler market was predicted for the 1960s, with light three-wheel trucks leading the way. It was assumed that it would take about ten years for a switch from three-wheelers to four-wheelers to take place in the light three-wheeler sector, as it had taken in the small three-wheeler sector. That was not to be, however, for in fact light three-wheel truck sales peaked in 1960, and by 1961 manufacturers were producing more light four-wheel trucks.
Behind the abrupt drop in light three-wheeler production lay a “change in long-term planning” by the three-wheeler manufacturers. They had learned from their experience of the switch from small three-wheel vehicles to small four-wheel vehicles, and they had decided to themselves be in control of, and accelerate, such a change to the production of light four-wheel vehicles. Still, devotees of three-wheel trucks remained, and to satisfy these customers, production of three-wheelers continued on, albeit in small numbers, up to the mid-1970s. 

Thus it was that three-wheeler manufacturers were able, thanks to increased three-wheeler numbers in the 1950s and especially the totally unexpected success of the light three-wheelers in the second half of the 1950s, to acquire the necessary technical and financial foundation for a switch to making four-wheel vehicles in the 1960s. So, for example, if we compare the performance in the 1950s of Tōyō Kōgyō with the performance of Toyota, the largest manufacturer of four-wheel vehicles, we find that, except for the years 1956–58, Tōyō Kōgyō’s sales and net profit continued to amount to better than half of what Toyota made.

CONCLUDING REMARKS

While Ford and General Motors were exercising an almost complete stranglehold over the ordinary-car market in prewar Japan, domestically produced smaller vehicles that did not compete with ordinary cars were being produced in gradually increasing numbers. The core of these small vehicles was the three-wheel truck. Whereas the small passenger cars that were appearing in Europe at the time were “smaller versions of ordinary cars”, the three-wheel truck in Japan sprang from “a larger version of a bicycle.” The reason it could be produced in large numbers was that, in an adaptation to the market condition of a lower purchasing power in Japan, the appropriate technology of bicycles and motorcycles could be used to good advantage to manufacture a low-priced product.

25 Light three-wheelers were produced until 1971, and small three-wheelers were produced until 1974. Japan Automobile Manufacturers Association, *Nihon jidōsha sangyō shi* [The history of Japan’s automobile industry] (Tokyo: Japan Automobile Manufacturers Association, 1988), p. 389.
After the war the three-wheel truck was on the one hand made larger so as to fill in a void left by the ordinary-truck market, and on the other hand stirred up the market again through the development of the light three-wheeler. Through this expansion in two directions, upward and downward, the three-wheeler widened the truck market by offering load capacities of from 300 kilograms to two tons, and in doing so it formed the basis for the four-wheel truck market of the 1960s and beyond. Also, a switchover from three-wheeler manufacturer to four-wheeler manufacturer was made possible by the accumulation of financial resources and technology through three-wheeler production. This became one key element in a Japanese automobile industry structure in which a large number of automakers—eleven to be exact (more companies than in the U.S. and in any European countries)—would compete in mass-producing automobiles from the 1960s on.

In short, whereas three-wheelers in Europe were no more than temporary things, in Japan they were transitional things that had a great impact on the automobile industry’s later market and structure by reason of the fact that they had been produced over such a long period of time and in such large numbers. This phenomenon can rightly be described as a special feature of the history of Japan’s automobile industry.