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The Rise of the Asian Bicycle Business:

State Support and Survival Strategies

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Historically, the nexus of bicycle manufacturing and world export has shifted from country to country. Most recently, Asian countries have led in manufacturing and global exports beginning with Japan, then Taiwan, and currently China. This paper examines the historical development of the bicycle industry in each of these three countries. It examines how the industry started and developed, the role of government support in developing the industry, and strategic initiatives taken to achieve long term success.

This shift from country to country is nothing new. France, the undisputed production leader during the boneshaker phase, saw production virtually cease with the onset of the Franco-Prussian War in July 1870 (McGurn, 1999). Industry dominance passed to the United Kingdom and it slowly developed export trade in bicycles and parts. By 1892, the U.K. exports totaled over £900,000 and by 1896 it was selling £1.8 million worth of bicycles and parts abroad. However, the huge U.S. industry had been stimulated by a bicycle boom, followed by a crash in domestic demand, leading to a large growth of U.S. bicycle exports. U.S.

bicycle firms dominated international trading from 1898 through 1900.

In 1901, the U.K. virtually matched the U.S. share of world exports (then totaling nearly £2 million), each with just over 26%; however, Germany had now risen to the forefront of world trade with nearly 31% share of the market. Germany remained dominant through 1908, (although the U.K. did obtain an insignificant lead in 1907), but after that British exports expanded back to dominance which lasted through 1913. Harrison (1969) attributes British exporting success to the competitive structure of the industry,

the technical competence of its leadership, and its realization that alternative and profitable production opportunities outside of bicycles did not exist at that time.

In the later third of the 20th Century, the struggle for export dominance in bicycles continued. However, at this time, labor costs in the U.K., U.S., and Germany were too high to allow any of those countries to dominate export trade. Trade itself was dominated by low-priced bicycles, often sold through mass market outlets such as department stores, rather than through specialty bicycle shops. Export dominance was won by the country that could produce the high quality bicycles demanded by consumers in developed countries at the lowest cost.

Japan seized export leadership based on value away from the U.K. in 1967. That year it exported 750,000 bicycles with a value for bikes and parts of almost \$30 million (Ueda, 1981). By 1973, Japan was exporting 1.21 million bicycles, but a boom in sales in the U.S. allowed Taiwan to export 1.31 million, establishing export leadership based on the number of units of finished bicycles. Although Chu (1997) calculates that Taiwanese exports slumped in 1974 and 1975 to only about 800,000 units, restoring Japan to unit leadership, Taiwan rebounded in 1976, exporting 1.52 million bikes, exceeding Japan's 900,000 export units. Chu however asserts that Taiwan only achieved its number one export status in 1980 (Chu, 1997, p. 56). This would be based on value rather than number of bicycles, since Asian challengers have always started with low priced bicycles and then moved to higher valued models. For example, a single firm, Merida of Taiwan, in 1999 produced 510,000 bicycles from its Taiwan plant, earning \$105 million U.S. (over \$200 per bike), while making 650,000 bicycles in its Chinese plant, but those earned only \$59 million (\$90 per bike). Japan's exports of parts, particularly higher valued parts, remains strong, dominating the market for parts in developed countries.

The relative positions of Taiwan versus China is more troublesome due to a variety of export figures reported in the press. In terms of unit exports, China may have passed Taiwan as early as 1991, but the value of Taiwan's exports was not exceeded by the value of China's exports until 1997 (\$862 million U.S. versus \$951 million). The precise units and values of exports is not as important as how the industry developed and its strategies to obtain and maintain growth. Each country's industry is discussed in turn. Similarities and differences are then discussed. Figures

2401 and 2402 illustrate total production for each of the three Asian countries and total exports over time.

Japan

Early History

After the 1854 peace treaty between the U.S. and Japan opened Japanese ports to Western ships, bicycles began to trickle in. Uyeda & Koyasu (1936) and the Mitsubishi Economic Research Bureau (1936) both assert that imports did not begin until 1881 or 1882. While this may be true for a significant volume of imports, it seems likely that boneshaker bicycles (called "gatakurisha" or rattle wheels) were imported in the late 1860s and 1870s for three reasons. First, some are preserved in Japanese collections. Second, in 1870, the Osaka Prefectural Police enacted a traffic regulation concerning bicycles (Japan Bicycle Promotion Institute, 1979). Third, in 1875 vehicle taxes were promulgated that amounted to 1 yen for bicycles — the equivalent of 2–3 days' wages for a skilled carpenter (Takeuchi, 1981). Regulations and taxes would not have been imposed without a significant number of bicycles and most must have been imported.

By the late 1880s, some Japanese began assembling high-wheel bicycles out of metal parts. While some of these early bikes may have belonged to Westerners, most were available for rental. For example, Tokyo had more than 1,000 bicycles for hire by the late 1880s. However, by 1902, only 857 Tokyo bicycles remained available for rental, with 4,571 bicycles privately owned. Thus, the expensive bicycle became a status symbol owned by the wealthy rather than a curiosity rented by the lower class athletic men. Furthermore, bicycle usage increased. An 1898 traffic survey in the city of Nagoya found that bicycles were three times more numerous than horse-drawn vehicles (Takeuchi, 1981).

Economist Jane Jacobs in her classic book *The Economy of Cities* (1969, pp. 63–65, 145–150), describes the Japanese bicycle industry as having arisen gradually from small bicycle repair shops that began making parts to be sold more cheaply than imported parts in order to fix broken bicycles. As in the U.S., France and elsewhere, the industry was boosted by trained craftsman from the gun-making industry. While this model is generally accurate, there also is evidence of larger-scale efforts.

The earliest known full-scale bicycle factory was the Bicycle Factory in Yokohama, started in 1879. This factory originally assembled boneshakers but evolved to make ordinaries and then safety bicycles before its demise in 1916 (Japan Bicycle Promotion Institute, 1979). By 1892 it was supplying bicycles for the central telegraph office in Tokyo. It started by merely assembling bicycles from imported parts, but gradually started manufacturing its own parts and began selling bicycles under its own brand names “Gold Japan” and “Silver Japan.” It won a third prize in the 1895 National Industrial Promotion Fair. (Takeuchi, 1981).

In 1881, Miyata Eisuke started Miyata Gun Manufacturing in Tokyo. In 1892, this factory produced the first Japanese safety bicycle (Kajiwara, 2001). Soon after, it produced 500 safeties equipped with pneumatic tires (Japan Bicycle Promotion Institute, 1979). However, in 1892 the owner admitted his factory made everything except tires, rims, spokes and ball bearings, so that a completely self-contained factory had not yet developed. With a change in hunting laws in 1900 leading to diminished demand for rifles, the firm decided to concentrate on bicycle production. In 1903, Miyata’s Asahi model won third prize at the National Industrial Promotion Fair and the firm earned a contract to provide bicycles to the army, just prior to the Russo-Japanese War (1904–05)(Takeuchi, 1981).

Three other manufacturers merit brief mention. The Bicycle Factory was founded in Nagoya in 1899 and began general manufacturing in 1904. It was later named Nohritsu Bicycles (Japan Bicycle Promotion Institute, 1979). This factory was founded by Okamoto Matsuzo, who, as a forge worker at iron

works in Nagoya, had become increasingly involved in bicycle repairs, producing fender supports, small baggage racks, handlebars, etc., with only a bellows and a vice. In 1905, it produced 1,000 bicycles. A second firm was founded by Matsushita Tsunekichi, who built an experimental bicycle in 1898 in a bicycle rental shop owned by his son. This evolved into the Toyo (or Orient) brand, the number two brand in Japan after Miyata’s Asahi. Lastly, Takahashi Chokichi, a rickshaw producer in Tokyo since 1892, also manufactured bicycle replacement parts. By 1902 he began to produce and sell the Zebra brand bicycles (Takeuchi, 1981).

At this time, production techniques revolved around hand labor. Steel plates were cut with chisels and bent around iron rods and then soldered to make tubing for frames. When used for handlebars or forks, these tubes were bent by hand. Even cutting lathes were operated by human power (Takeuchi, 1981).

Around this same time, larger bicycle importing organizations also developed. Imported bicycles from America or Britain were known for being higher quality, but also were twice as expensive as Japanese-produced machines. In 1900, two of the largest importers were founded, Nichibeishoten (now Nichibeishoten Fuji Bicycles) and Ishikawashoten (Maruishi Bicycles) (Japan Bicycle Promotion Institute, 1979). The former distributed vehicles at wholesale for 160 yen that were sold at retail for 250 yen (Takeuchi, 1981).

In the Osaka area, bicycle development started later. The first two bicycle rental stores, Sorin Shokai and Otsuya, were founded in 1899 and 1900. Each soon also became bicycle wholesalers. Sorin Shokai began to produce bicycle racks and Otsuya began

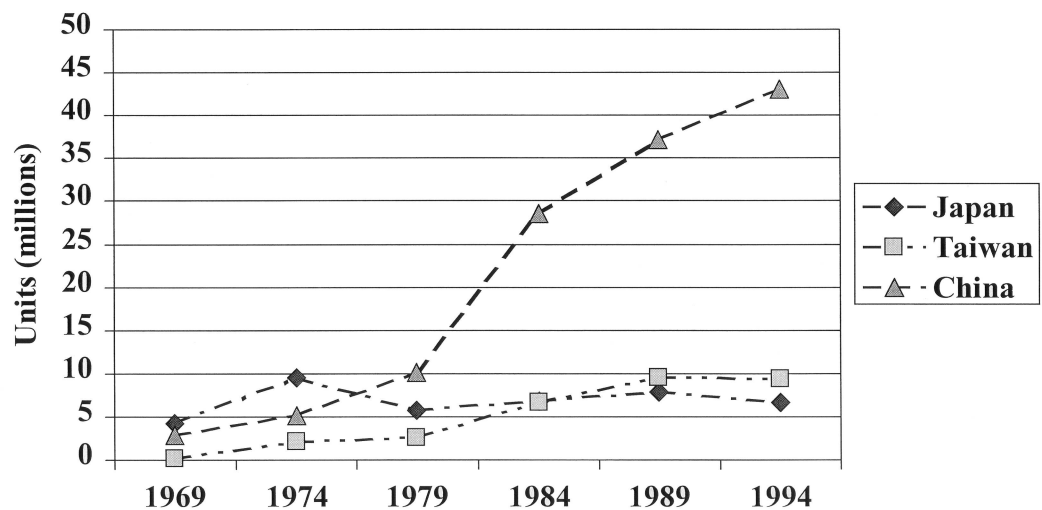


Fig. 2401. Bicycle production for Japan, Taiwan, and China, 1969–1994.

assembling its own bicycles from parts and later acquired its own frame factory. The city of Sakai in this area had a long tradition of metal forging going from cutlery to guns. As a result, bicycle development evolved quickly from a large number of skilled artisans. (Takeuchi, 1981).

1905–World War I

Prior to World War I, the Japanese bicycle industry gradually imported fewer bicycles. In 1900, Japan imported 15,092 bicycles that increased to 34,523 in 1907 (Japan Bicycle Promotion Institute, 1979). Imports decreased to 16,000 units by 1912 (Uyeda & Koyasu 1936). However beginning in 1908, the value of imported parts exceeded the value of imported bicycles. The number of imported bicycles declined until World War I made them virtually unavailable. This was also a period of expansion as bicycle use, retail shops and even small bicycle-related manufacturing spread throughout Japan. It even became commonplace for wholesalers to assemble and sell their own brands (Takeuchi, 1981).

In 1907, Sorin Shokai built a plant in Tokyo for the assembly of its Dayton brand bicycles. Several other wholesalers built their own assembly plants in 1910. In 1909, the Japan Dunlop Rubber Company was founded in Kobe, with British capital. The following year, a branch factory of the “Premier” bicycle company from Coventry England was established on the Dunlop factory grounds. This was the first truly large scale integrated production bicycle factory in Japan. It produced everything except coaster brakes and three-speed gears, which were imported from England and these bicycles were distributed through Maruishi Shokai, formerly Ishikawa Shoten (Takeuchi, 1981)

The Okataomo factory saw its production increase to 2,500 bicycles in 1908, but unsatisfied, it undertook a policy of “rationalization” in 1910. Okamoto Matsuzo personally toured Germany, France, and England and purchased the latest machinery for bicycle production. He reorganized the factory, producing 6,200 bicycles and winning another third prize award at a government-sponsored industrial fair. By 1914, this factory was producing 30,000 bicycles and in that year, the Imperial Household purchased some of these bicycles. Araya, founded in 1903 producing wooden wheel rims and soon enjoying a virtual monopoly position, also purchased machinery from England and began producing metal rims in Japan, used by the Okamoto factory,

among others. This is one example of the benefits of specialization. Large factories formed relationships with various component suppliers (Takeuchi, 1981).

Similarly, between 1904–1907, Miyata also introduced new and more advanced production facilities including its “limit gauge” system to ensure component interchangeability. It also patented its Asahi Coaster freewheel. Between 1905 and World War I, power lathes were gradually introduced as were improvements in grinding and polishing. In addition, steel-stamping techniques were introduced whereby gears and tubing couplings were stamped out of sheet steel. By 1913, the ratio of foreign to Japanese products at the Tokyo Industrial Promotion Fair had changed from 4 to 1 in 1907 to 1 to 2 in favor of Japanese products. Yet still no Japanese firm manufactured ball bearings, spokes or chains (Takeuchi, 1981).

World War I–World War II

With the outbreak of World War I, bicycle imports from Europe to Asia virtually ceased, creating shortages. The Japanese industry had just modernized and was in a position to slowly expand to meet this latent demand after the war. Bicycle production was valued at ¥460,000 in 1914, but exploded to ¥12.5 million by 1919. Yet exports of bicycles and parts remained modest being valued at ¥356,000 in 1919. Exports began to rise in 1924 (¥745,000) and jumped to ¥2.3million the following year. In 1929 exports reached ¥3.4 million and they surged with the re-imposition of the gold embargo in 1931 to ¥6 million in 1932, tripling to a peak of ¥18.9 million in 1934, owing in part to a favorable exchange rate (Uyeda & Koyasu, 1936). Ueda (1981) places this 1934 figure slightly higher at ¥19.4 and notes that it includes 104,000 finished bicycles. Total Japanese production for that year was 730,000 bicycles, valued at ¥25 million with ¥22 million worth of parts.

Ueda (1981) identifies 1930 as a crucial year in Japanese production. Output in the number of bicycles rose from 90,000 in 1929 to 552,000 in 1930. Value of this production and parts similarly rose from ¥18.5 million in 1929 to ¥30 million in 1930. Imported bicycles also declined in the last part of the 1920s from a peak of nearly 11 million vehicles in 1925 to only 539,000 vehicles in 1929 and down to 94,000 vehicles in 1930. Thus, in 1929, 15% of bicycles were domestic in origin, with 85% imported, but in 1930, this was reversed, with 85% of bicycles being domestic and only 15% imported. By 1936, over 1

million bicycles were being produced, with 142,000 being exported. Total value of production of both parts and bicycles was ¥75 million, with exports valued at ¥22.1 million. In 1940, ¥89 million worth of bicycles, representing 1.25 million units, of which only 32,000 were exported, were being produced, with parts totaling ¥23 million (Ueda, 1981).

Demeritt (1945) argues that between 1934 and 1937, roughly two thirds of Japanese production by value was exported, compared with less than one half in the early 1930s. However, Ueda's (1981) figures suggest only 10% of Japanese production by value was exported in the early 1930s, growing to around 30% later in the decade. By 1940, only about one quarter of Japanese output (based on value of parts and bicycles) was exported. In either case, Japan enjoyed a substantial increase in the proportion of bicycle industry output that was exported through the decade of the 1930s until 1938.

Most of this production occurred at small factories. Sixty-five percent of all workers in this industry worked in firms employing less than 5 workers. The two large factories employing over 200 workers constituted only 4% of the workforce (Uyada & Koyasu, 1936). The Mitsubishi Economic Research Bureau (1936) reports that in 1933, 92% of the 545 bicycle factories in Japan employed 50 or fewer workers, but that these small factories were well organized and equipped with efficient machinery. Shimano Shozaburo began a small parts manufacturing company in 1920. By 1931, Shimano began exporting cold forged freewheels to China. Similarly, Maeda Shikanosuke, who originated the SunTour brand, began making freewheels in 1912. Both were located in Sakai in Osaka prefecture.

This increase in exports was stimulated in part by overproduction in 1932. This led to government and industry control in order to avoid price-cutting and maintain profitability. In 1929, the Japan Bicycle Exporters' Association was formed. By 1934 it organized agreements among its members fixing minimum export prices and establishing export quotas for each. Similarly, in 1931, the Japanese Federation of Bicycle Manufacturers Associations was established to regulate the production and price of parts (Mitsubishi Economic Research Bureau, 1936). The government also assisted by increasing allocations of metal, reducing the prices of some materials, lowering inspection fees, but enforcing more rigorous inspections to improve the quality of exports (Demeritt, 1945).

World War II Through the 1974 Bicycle Boom

After World War II, the industry had to begin again virtually from scratch producing only 18,000 finished bicycles worth ¥6 million in 1945. Ueda (1981) categorizes production trends into 7 distinct cyclical phases from 1946 through 1978, alternating between growth and stagnation. During the first phase, reconstruction (1946–1950), annual output grew by a factor of ten from 100,000 to one million units. Latent domestic demand snapped up virtually anything that was produced, so that exports increased from virtually nothing to 159,000 units, mostly sold to other Asia countries. Nearly 10 million bicycles were owned in Japan before the war, but there were only about 5 million left at the end of the war, and many of those were in bad condition (e.g., ropes instead of tires around the rims). During this time, despite price controls, several former munitions firms began producing bicycles. By 1947, there were 69 bicycle plants with over 100 employees, compared with only 22 in the 1937 boom. By 1949, former munitions firms accounted for 38% of total Japanese bicycle production. When Shimano rebuilt its factory in 1946, only bicycle makers could get raw materials, so it began to produce complete bicycles, which were never profitable — only its parts manufacturing was profitable (Thidell, 1990).

The second post-war period from 1951 through 55 is referred to as “stagnation” by Ueda (1981), because output stagnated around one million bicycles annually. Exports actually declined to only 35,000 finished bicycles by the end of this period, but the export of parts jumped and held to around ¥2.5 billion for most of this period. The stagnation label is misleading because several things occurred to stimulate bicycle production in the next period. In 1949, the Ministry of International Trade and Industry (MITI) issued a report noting that Japanese bicycles were technologically inferior to their European counterparts and recommending that the industry study these rival machines and improve. A committee consisting of the founders of the Shimano and Araya bicycle component firms recommended that bicycle racing, including betting on the racing, be formalized into a system to raise money for both the bicycle industry and local government. In July 1948, the Bicycle Racing Law was passed to create financing for industry improvement. Keirin bicycle racing grew rapidly, so that by 1952 there were over 6,000 racers, including 600 women, in Japan (Kouno, 2001).

From 1949 through 1953, about ¥2 billion was drawn from the national treasury to support the bicycle industry and improve both product, its manufacture and marketing. Over half of this funding was in the form of loans to individual manufacturers to stimulate capital investment. Many producers began establishing and promoting their own brands at this time. For example, Matsushita Electric began bicycle manufacturing in 1952 under the Panasonic brand. In 1954, the Open Research Center for Bicycle Production Techniques also was established.

During this time as well, U.S. demands for munitions increased due to the Korean War, so many of the former munitions bicycle firms reverted back to munitions. A notable exception was Bridgestone, which still makes bicycles today. These munitions firms were replaced by wholesaler-assemblers who were better at selling bicycles to consumers and dealing with parts manufacturers. By 1955, these wholesalers accounted for 70% of national output.

The next period, 1956–1960, was a growth phase with output increasing from 1.4 million bicycles to nearly 3.3 million. Exports began to climb from 51,000 to 360,000 units, with exported parts fluctuating and declining slightly from ¥3 to ¥2.8 billion during the period. During this period, the Japanese economy was strong as was demand for utility bicycles. These bicycles also were exportable to other Asian countries. The proportion of utility bicycles produced in Japan peaked in 1959 at 75%. Lightweight sport bicycles accounted for only 12% of product. The government no longer gave loans to individual manufacturers, but heavily subsidized technological improvement more generally as well as increasing funding for the promotion of exports in

1960, when exporting to the U.S. began. Total subsidies rose modestly from nearly ¥400 million to just over ¥600 million (Ueda, 1981). New factories were constructed such as the National Bicycle Factory in Sakai in 1960 (Kotha, 1993).

The next period, 1961–1965, is a stable transition phase where production leveled off between 3.1 and 3.2 million bicycles. Exports, however, grew steadily from 258,000 units to 453,000. Imports grew from 371,000 to a peak of 3.2 million in 1963, exceeding domestic production and then receded to less than one half million by 1965. By that year utility vehicles had shrunk to only 28% of production and lightweight bikes accounted for half of production. Government subsidies during this period more than doubled from ¥537 million to ¥1.3 billion annually. Spending for rationalization decreased, while spending to improve production techniques substantially increased. This probably favored the large scale manufacturers over the bicycle assemblers whose proportion of production had declined to about 50% in 1962 (Ueda, 1981).

1966–1970 is called the “great leap phase” by Ueda (1981), because production skyrocketed from 3.6 million to 4.5 million. Government spending almost doubled again to ¥2.2 billion. Government subsidies to promote exports peaked in 1968 at ¥530 million and exports climbed from 512,000 to over one million bicycles in 1969 and 1970. Japan overtook the United Kingdom as the largest exporter of bicycles and parts by value in 1967. Imports continued to decline to a mere 120,000 units in 1970. The proportion of production dedicated to lightweight sport models peaked in 1967 at 57%. Domestic demand had evolved from utilitarian bicycles for

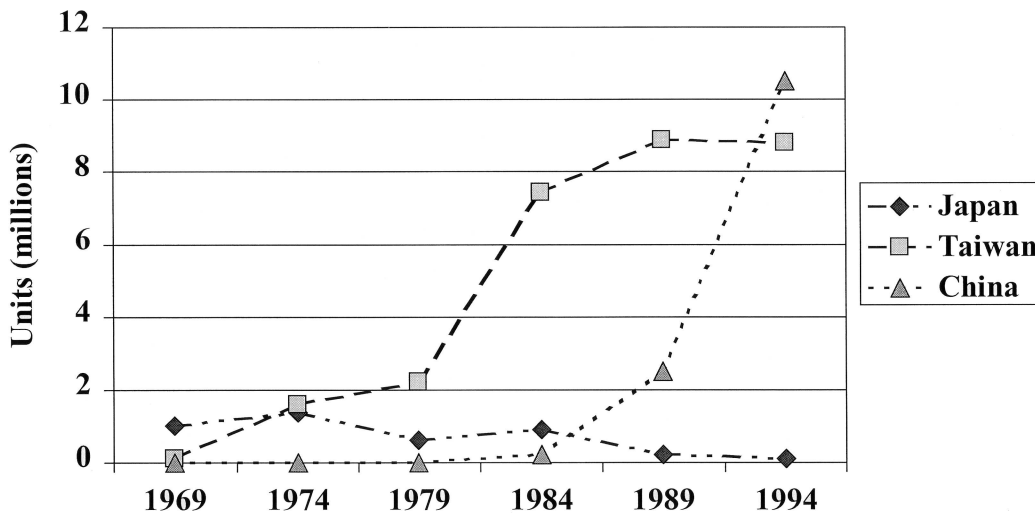


Fig. 2402. Bicycle exports for Japan, Taiwan, and China, 1969–1994.

utilitarian riding towards bicycles as a means of exercise and sport as depicted in a large promotion campaign by the bicycle manufacturers and the appearance of the 1964 Olympic Games in Tokyo. Again, this period of growth favored the larger firms. Assemblers' share of national output decreased to 30% in 1969. Furthermore, the number of manufacturing firms shrank to 100 by 1969, down from over 190 in 1958 (Ueda, 1981).

Shimano began selling three-speed hubs to the Columbia Manufacturing Company in the U.S. in 1961. This was the start of U.S. producers buying Japanese parts (Epperson, 2000, p. 40). Shimano began selling freewheels to Schwinn in 1965 and soon was selling three-speed hubs to Schwinn and other U.S. manufacturers (Berto, Shepherd, Henry, 2000). By 1971, Shimano had a dominating share of its domestic market accounting for 70% of the Japanese market for derailleurs, 80% of the market for freewheels and 100% of the market for three-speed hubs (Horridge, 1994).

In keeping with the cyclical pattern of growth and then stabilization, the next period should be modest, but instead is the pinnacle of success for the Japanese bicycle industry. From 1971 through 1973, although government subsidies remained stable between ¥1.8 and ¥2.3 billion, production leaped from nearly 5 million to 9.4 million and then declined to 7.6 million in 1974 (the yen appreciated more than 20% against the U.S. dollar between 1970 and 1973). However, the value of bicycle production peaked in 1974 at ¥118 billion, and the value of parts produced rose from ¥39.4 billion to over ¥100 billion in 1974. Exports in this period ranged from 1.2 to 1.5 million bicycles, with their value doubling from ¥11 billion to ¥22.9 billion. Despite this peak, Taiwan overtook Japan as the largest bicycle-exporting nation in 1973 (based on units exported), but Taiwan bicycle exports faltered in the next two years. By 1976, Taiwan was back on top in terms of unit exports and never looked back.

The downside of this period was that imports into Japan skyrocketed from 2.4 million to over 143 million in 1974, the latter being valued at nearly ¥2 trillion. Much of the strong internal demand was for mini-cycles used by suburban commuters, but these bicycles were less profitable than larger models (Ueda, 1981). Taiwan's Merida Industry Co. began producing and exporting Japanese style mini bikes in 1973.

While Japanese bikes had been imported into the United States since 1960, 1972 was the first year Schwinn imported Japanese bicycles into the U.S from

Bridgestone and National Bicycle. Although initially not even listed in the catalog or labeled as Schwinn's, by 1975, Schwinn imported 200,000 bikes from these two suppliers — about one third of Japanese exports for that year (Crown & Coleman, 1996).

The Modern Period

From 1976 through 1997, bicycle production in Japan has stabilized to around 6–7 million units annually, dipping to 5.9 million in 1998. Although exports did hit 1.1 million in 1977 and 1980, by 1990 exports stabilized between 100,000 and 200,000, with an increase in 1998 to 317,000 bicycles. Revaluation of the yen against other world currencies left Japan permanently disadvantaged. Imported bicycles into Japan declined to 32 million units annually in 1975–76 and then fell to 1,000 in 1980. From 1995 to the present, imports varied between 2.8 and 3.2 million units annually (Ueda, 1981; Japan Bicycle Promotion Institute, 2000). The top three Japanese manufacturers, Bridgestone, National Bicycle and Miyata control about 18%, 9%, 8% of the market respectively (1992 figures). Of these three, only Miyata predates World War II. The next two largest manufacturers, Maruishi and Michibei Fuji, account for 4% and 3% respectively of the market. These two firms started as bicycle importers in 1900. The top five Japanese assemblers, Yokota, Deki, Hodaka, Saimoto, and Wani, accounted for a total of 34% of the market, with individual market shares ranging from 4–9% (Kotha, 1993).

A number of factors caused this turnaround and stabilization and, unfortunately, they leave little hope for future booms. The yen appreciated dramatically vis-à-vis other currencies and the cost of Japanese labor is now among the highest in the world. Domestic demand for bicycles, which always provided a strong base for production, has stagnated, with little chance for growth, particularly with the bursting of the “bubble economy” in the early 1990s. Moreover, it currently appears as though Japanese consumers have become price conscious, so that inexpensive imports satisfy around one third of domestic demand (Ueda, 1981; Japan Bicycle Promotion Institute, 2000).

As a result, the industry is experiencing a major restructuring. The number of firms with 4 or more employees has declined from 730 in 1990 to 487 in 1997. The number of workers has decreased from 17,621 to 10,730 during the same period. Japanese wholesalers also have declined in number, with imported bicycles being purchased by large variety

retailers directly. The Japan Bicycle Wholesalers Association, established in 1959, disbanded in 1999. The Japanese Bicycle Exporter's Association ceased in 1995, with its functions assumed by the Japan Bicycle Trade Center in Osaka. The Center merged with Japan Bicycle Manufacturers' Association to become the Japan Bicycle Association (Japan Bicycle Promotion Institute, 2000).

There are two reasons for optimism concerning the continuing importance of the Japanese bicycle industry. First, National Bicycle instituted a program referred to as "mass-customization" in 1987. This provided customers with about 8 million possible variations in model, type, color, frame sizes, and other features. It caused the Panasonic brand to grow from 4% of unit production in 1986 to 18% in 1992. Other Japanese bicycle firms attempted to imitate this strategy, but National Bicycle earned the reputation as an innovator and the only firm with true mass customization. The system was studied extensively by many other manufacturing firms, such as General Motors (Kotha, 1993). A similar program was adopted by Cannondale of the United States in 1999.

The second reason for hope is the continued domination of Shimano in the market for drivetrain and other components. While SunTour retrenched in 1986, Shimano introduced Dura-Ace with index shifting and began a program of aggressive innovation to stay ahead of Taiwanese copies (Berto, Shepherd & Henry, 2000). It focused on mountain bikes and grew to dominate the drivetrain industry with about 80% of bicycles sold in North America and Europe being

equipped with Shimano components. Worldwide sales are close to \$2 billion. Shimano, recognizing the high cost of Japanese labor and the disadvantage of the Yen, built a factory in Singapore in 1973 for its lower priced lines. It built two more factories: one in Malaysia, in 1990, and one in Shanghai, in 1992. It is planning to increase the production capacity of its Shanghai factory by 50% by March 2001.

Taiwan

Early History Through the Initial Export Boom

After World War II, simple assembly of bicycles began in Taiwan to satisfy domestic demand. When trade with Japan was allowed in 1949, Japanese imports threatened local production. The government of Taiwan responded by banning the import of bicycles, allowing the importation of only 12 key bicycle parts. In 1952–54, the industry consolidated into four major bicycle assemblers: Da-Dong, Taiwan bicycle, Taiwan Machinery and Bicycle Company. Bicycle production stabilized at 30,000–40,000 vehicles. In 1954, the government further restricted the importation of bicycle parts, leading to the growth of "underground" bicycle assemblers. All four of the large assemblers went out of business between 1958 and 1965 (Chu, 1997).

In 1968, Taiwan exported 17,000 bicycles, increasing to 85,000 units the following year, when exports to the U.S. began. In 1970, exports rose to 107,000 units increasing by nearly ten times to 1.05 million units in 1972 and peaking in 1973 at 1.3 million units. In response to the surge in bicycle demand in the U.S., U.S. importers began placing large orders in 1972. For example, Halco Trading ordered 700,000 bicycles and Stelber ordered 100,000. At this time, the average wage of a skilled worker in Taiwan was \$73 per month, compared with \$272 per month in Japan (Crown & Coleman, 1996). Taiwanese bicycles also were popular because the country had over twenty years of accumulated experience in producing bicycles (Chu, 1997). Thus, it had worked out many of the initial challenges a new industry faces when beginning production.

In addition, Japanese general trading companies brought orders for bicycles to Taiwan that Japanese manufacturers were unable to fill. These companies also provided the needed Japanese parts inputs. Taiwan is a good example of the relationship between Japanese and Taiwanese firms at this time. It is a



Fig. 2404. Advertising posters for Fuji Bicycles, sold by Nichibeï company starting 1936 (*Bike Culture* No. 14, December 1977).

subsidiary of the Japanese firm (the third largest assembler of bicycles in Japan with a domestic market share of 7% in 1992) of the same name and was one of the first to export to the U.S., mostly shipping high rise and bicycles. Chu (1997) estimates that at least half (and perhaps as many as 90%) of the early orders were brought to Taiwan from Japanese trading companies. As trading rather than manufacturing firms these companies had less interest in maintaining long term production capacity in Japan.

Chu (1997) calculates that exports plummeted to 866,000 units in 1974, but *Trade Winds* (1979) asserts exports skyrocketed to 2.1 million units in 1974, but crashed to 800,000 units in 1975. Regardless of the precise timing, the bike boom in the U.S. dried up and a recession took hold. There also was a problem with the quality of Taiwanese bicycles. In 1974, some 150 factories, most of them quite small, produced bicycles, but there was little quality control. In the U.S., the government was enacting safety standards and foreign, in particular Taiwanese, bicycles were being criticized as unsafe.

The government of Taiwan stepped in and assisted the industry in solving production problems, ultimately setting national standards for bicycle exports. This effort began in 1972, when the government commissioned the Metallurgical Industry Development Center to assist the industry in developing production procedures and testing methods. By March 1976, the Bureau of Commodity Inspection covered bicycles in its export-qualified inspection system. The number of firms that qualified to export bicycles was only 37. Two firms that survived this culling were Giant and Merida, both established only in 1972.

The government has intervened twice more since the early 1970s. In 1978, after manufacturers refused to form a united export company to quote uniform prices, the government did get agreement from the companies to adopt a “floor price” system administered by the Taiwan Transportation Vehicle Manufacturer’s Association (*Trade Winds*, 1979). In 1991, the government helped the industry establish the Taiwan Bicycle R&D Center to assist Taiwanese parts manufacturers in improving their technological capability to better compete with Japanese companies (Chu, 1997).

Stabilization as an Export Leader

Exports rebounded in 1976 to 1.5 million units, rising reasonably steadily (at about 13% per year) to

10.2 million bicycles in 1986. Since 1986, exports have stabilized to some degree, fluctuating between 7 and 10 million units (Chu, 1997). Unlike Japan, which has always enjoyed a strong domestic market for bicycles, Taiwan’s exports account for roughly 90% of production. Thus, the industry has drastically outgrown its modest domestic market and must continue to sell on the world market to be successful.

Much of this initial increase up until 1986 is due to large orders from other bicycle firms that have willingly shared technology in order to be able to purchase bicycles of satisfactory quality. A good example of this is the relationship between Schwinn in the U.S. and Giant in Taiwan. In 1977, after four years of negotiations, Giant began producing Schwinn bicycles to undercut Japanese suppliers, particularly Bridgestone. By the end of the 1970s, Giant was selling 100,000 bikes to Schwinn. During the 1980 labor strike at Schwinn, the number rose to 200,000 bikes annually, making Giant Taiwan’s largest bicycle producer. By 1984, Crown & Coleman (1996) estimate Giant was shipping 500,000 bikes to Schwinn, accounting for about two-thirds of Schwinn’s U.S. sales. Tanzer (1992) estimates the figure at 700,000 units, fully 70% of Schwinn’s sales. Schwinn gave Giant technology and a ready channel of distribution, but also credibility and knowledge of the U.S. market to go out on its own. Although initially Giant would have been willing to sell Schwinn one third of its equity to close the deal, when Schwinn finally asked for an equity stake in Giant in the mid 1980s, Giant responded by proposing it purchase an equity position in Schwinn. This proposal was flatly rejected (Crown & Coleman, 1996).

However, Giant was interested in selling under its own brand name and so in late 1985, Giant and Schwinn began negotiating a joint distribution venture that would be majority owned by Schwinn and Schwinn would gain profits by distributing the Giant brand to its dealers. Giant would still make money by manufacturing bicycles. Meanwhile, as will be discussed in the next section, Schwinn also began negotiating with Shenzhen China Bicycles. In 1987, Giant did not learn of this new deal until Schwinn announced it.

Giant immediately established a U.S. distribution subsidiary and hired former Schwinn executive, Bill Austin, to head it. Giant could offer dealers comparable bikes that would retail for 10%–15% less than Schwinn models, but earn a 36% profit margin for the dealer instead of 34% (Crown & Coleman, 1996).

Giant had opened a Taiwanese sales company in 1981 to start branded sales. It established Giant Europe in 1986. In 1992 Europe received 36% of all Taiwanese production while the U.S. accounted for only 32%. Despite its selling efforts, Giant's brand name sales in 1987 still accounted for only 10% of total sales. By 1993, branded sales had risen to 43% and the following year reached 56%, exceeding private label sales. By 1992, Giant brand sales accounted for two thirds of its total sales (Horridge, 1994). In that year, it sold 300,000 units of its own brand in the U.S., which compares favorably to Schwinn's 543,000 U.S. bicycle sales (Crown & Coleman, 1996). In September 1997, Giant opened its European plant in the Netherlands and initially producing 100,000 bicycles there. By 1999, Europe was still the leading Taiwanese market in terms of value \$309 million compared to the U.S. \$289 million, but the latter bought more bicycles 3.13 million versus 2.35 million (Yueh-wen, 2000).

Contrary to Giant's push of its own brand-name in the U.S., the number two bicycle firm in Taiwan, Merida, while still promoting its own brand everywhere except in the U.S., sells 70% of its output under other brand-names. Just as Giant worked with Schwinn, Merida allied with Raleigh and produces the Raleigh brand bicycles for Taiwan. Both firms emphasize technological innovation as a competitive strategy. Giant spends roughly 2% of sales on research and development. It began mass-producing carbon-fiber frames in the 1980s, became the largest producer of carbon-fiber bicycles by 1990, and won a Business Week Best Product Award in 1997 for one of its carbon-fiber models. Merida began mass-producing carbon-fiber bikes in 1992, winning Taiwanese awards the following year, and is now producing bicycle frames from lightweight magnesium alloy, which is both stronger and 30% lighter than aluminum alloys (*Trade Winds*, 1999). Both are also beginning to produce battery-powered electric bicycles (*Financial Times*, 1997).

Both firms, and others, are also selling bicycles to their former rivals in Japan. Giant established a Japanese subsidiary in Japan in 1989, when total exports to Japan were 725,000 bicycles. Merida established a branch in Japan in 1992 when total Taiwanese exports to Japan decreased to 646,500. By 1993, Taiwan exports to Japan climbed back to 750,000 bicycles and Bridgestone and Merida formed a marketing partnership for the former to sell the latter's branded bicycles in Japan, ordering 90,000 bicycles in the first year.

Two threats face the Taiwanese bicycle industry. First is parts importation. As Taiwan improved the quality of its bicycles, it was forced to purchase more components from Japan. In 1981–85, Taiwanese parts self-sufficiency was around 78%. Yet with the upgrading of the quality of bikes produced there, parts self-sufficiency dropped to 53% in 1990 (Chu, 1997). This in turn forced Taiwanese parts manufacturers to fight back on cost and move manufacturing to mainland Asia, just as bicycle manufacturers and have done. For example, Taiwanese Falcon Cycle Parts Co. earned \$6.13 million in revenue from its Taiwan-based operations in the first two months of the new millennium, but earned \$5.7 million from its mainland China operations. Since 1998, the mainland has provided more bicycle parts than Japan to the Taiwanese industry (30.5% versus 29.6%) (Yueh-wen, 2000).

The second threat facing the Taiwanese bicycle industry is that its labor costs have increased and Taiwan's strong economy compared to other Asian countries has given the latter an advantage in world pricing. Giant and Merida, among others, have established factories in China to produce lower-cost bicycles. Giant manufactured about 2.5 million bikes in 1997, worth about \$400 million. One million bikes were made in Taiwan, 1.4 million in China and 100,000 in Europe. Merida made about 650,000 bicycles in Taiwan and about 450,000 in China. Its annual sales for the 1.1 million bikes amounted to \$140 million in 1997 (*Financial Times*, 1997). Both increased output in 1998: Giant making 1.2 million bikes in Taiwan, 1.1 million in China and 180,000 in Europe. Merida produced 665,000 bicycles in Taiwan and nearly the same number in China (*Trade Winds*, 1999).

China

The first bicycle was imported into China from Britain in 1879. Imports continued for 50 years from Britain, Germany, and Japan but were only for the rich. Emperor Yi, as a child, used to ride a bicycle around the Forbidden City in the early 1900s. In 1929, small workshops began producing some parts and assembling completed bicycles. For example, a small factory, The Great Wall, located in Tainjin, began producing hubs, freewheels, and chains in 1929. Two Shanghai repair shops, Nongchang and Daxing, began producing frames and some bicycle parts in 1930, the latter actually producing complete bicycles.

After Japan invaded Manchuria, a Japanese entrepreneur, Kojima Kazusavuro, started three small Chinese bicycle factories from 1936–1938, one each in Shanghai, Tianjin, and Shenyang (Yagami, 2001). They produced about 10,000 bicycles annually until the end of World War II. Then, in 1949, the three factories were taken over by the government, placed under the supervision of the First Ministry of Machine Building, and production increased to 15,520 bicycles in 1949 (Zhang, 1992).

As with Japan, it is easiest to describe the development of the Chinese bicycle industry in distinct phases. Three major phases exist: pre-reform, from 1949 through 1978; post-reform, from 1979 until 1988; and export, from 1988 onward. The first two phases in turn can be broken down into sub-time periods of industry behavior. Each period will be discussed below.

Pre-Reform 1949–1978

Zhang (1992) divides this period into three phases and divides the first phase into two sub-phases. We shall simply examine each of these four phases. 1949–1952 was a period of post-war recovery. As existing equipment, under-utilized during the war, came back into the production of bicycles, output grew from 15,520 in 1949 to 79,989 in 1952. From 1953 until 1957 (China's first Five-Year Plan period), the three bicycle factories were expanded with an investment of 11.25 yuan during the period. In 1954, a fourth factory was organized in Quigdao in the Shandong province from 49 existing small factories producing bicycle parts and repairs. In 1957, these four factories were decentralized to the local governments under the direct control of municipal light industry bureaus supervised by the central government's Ministry of Light Industry in order to provide more flexibility and incentives for local initiative. Also in 1957, the Shanghai Bicycle Factory was transformed into the Shanghai Bicycle Company by consolidating 25 smaller factories to report to and work with the one large Shanghai bicycle factory. Bicycle output rose to 805,792 during that year, a ten times increase over 1952 (Zhang, 1992).

The period 1958–1965 consisted of uneven development. During the Great Leap Forward, 1958–1960, 19.61 million yuan was invested in the bicycle industry, about 1.7 times the investment for the entire period 1952–1957. Annual output rose to nearly 1.8 million bicycles by 1960. However, Soviet aid ceased after August 1960, so investment plummeted in 1961

to one third of what it had been in 1960 in the bicycle industry, the steel industry similarly suffered, and employment also was curtailed so that bicycle output in 1961 was a mere 743,867 vehicles. After the failure of the Great Leap Forward, the entire Chinese economy retrenched and bicycle output grew slowly (10%) during 1963–1965 to finally surpass the 1960 level. Seven new bicycle factories were founded during this period, but their output was quite small, about 1% of the country's total output for each new factory. The shortage of bicycles after 1960 caused the retail price to increase from 152 yuan in 1960 to 205 yuan by 1963. The price leveled out in 1966 at 155 yuan (Zhang, 1992).

The period from 1966 through 1978, encompassing the Third, Fourth and first half of the Fifth Five Year Plans, marked slow, but steady growth to 6.7 million bicycles produced in 1976, surpassing Japan that produced 6.3 million. In 1978, bicycle output in China increased to 8.54 making China the largest bicycle producing country in the world for the first time (the U.S. produced 7.5 million bicycles in 1978). Labor productivity increased from 135 bicycles per worker in 1965 to 230 in 1973. In 1966, the second bicycle company was organized in Guangzhou, consisting, like its counterpart in Shanghai, of one large factory for bicycle assembly and several smaller factories making and supplying parts. In contrast to this large concern, from 1971 through 1975, 35 small new factories were built. These factories collectively accounted for only 9% of the national output in 1975. Average output per worker decreased to 222 bicycles annually in 1977, in part because of these less efficient factories. Thus by 1978, there were two Bicycle Company factories, two other large factories and forty-four smaller bicycle factories. These were all state-owned. There were also about 472 other factories producing parts and components, the largest of which were also state-owned. The remainder were collectively owned by the workers (Zhang, 1992).

At this point, only 3 of the 29 provinces did not have their own bicycle factory. This allowed most provinces to more readily obtain bicycles, particularly given concern over a possible war with the Soviet Union. Furthermore, since even these small factories produced their own components, they did not have to deal with supply problems or paying high prices (that included taxes) for parts. Unfortunately, the small factories were far less efficient than their large counterparts. The investment to start a small factory to produce 100,000 bicycles was four times the amount needed to expand the capacity of an existing

factory by the same amount. Additionally, setting up the small factory took over two times longer than adding capacity to an existing firm (Zhang, 1992).

1978–1987

The problem of new, but inefficiently small, factories was exacerbated after 1978, when the government allowed more profit retention by factories and local governments. Since profits were based on planned production, and planned production was easy to exceed, bicycle factories were quite profitable. Roughly 75% of profits retained by the factory went to workers in the form of higher wages, better benefits and more overtime bonuses, while roughly 25% went to expand or improve production. Between 1978 and 1981, 70 new factories were organized (many converted from heavy industry uses, now that light industry was given priority over heavy industry) to assemble bicycles, so the total was now 116. The following year, 24 new factories were added, bringing the total number of factories to a peak of 140. By 1983, the average annual output of one of the 94 bicycle factories built after 1978 was 31,000 bicycles, compared with an average output of 534,000 units produced by the 46 factories that predated 1978. Total bicycle output reached 27.6 million in 1983. Production had increased a remarkable 222 percent from 1978 to 1983 (26% annual growth rate). Employment also had increased from 115,400 workers to 244,800 workers and the average wage increased nearly 36 percent. Bicycle rationing was partially abolished in 1983, except for the three famous brands: Shanghai Phoenix, Shanghai Forever, and Flying Pigeon (produced by Tianjin Bicycle Factory). These three brands were still rationed and accounted for about 28% of national output (Zhang, 1992).

Despite general economic expansion, more employment and higher wages throughout China by 1984, pent-up demand for bicycles had largely been satisfied. The period 1984–1988 marks a period of market saturation for bicycles in China. In 1987, one out of four people in China owned a bike. To address this problem, 57 of the 116 bicycle factories existing in 1981 were designated as state-authorized and they were invited to a conference to coordinate and limit bicycle production. The conference planned on total output by those factories of 33 million by 1985, but the factories themselves developed plans for about 60 million bicycles. Total production in 1984 climbed to 28.6 million, with capacity to produce 33.8 million bicycles annually. The problem was that the annual

demand for bicycles in China was forecast to be only 30 million in 1990. By 1987, production totaled nearly 41 million bicycles, with a capacity of over 45 million.

To address the overproduction problem, bicycle factories were brought back under the national Ministry of Light Industry, to strengthen central planning. By the end of 1984, 54 of the then remaining 91 bicycle factories were granted three-year licenses to produce bicycles, and those who did not produce the three famous brands were allowed to reduce prices by up to 15%. Unlicensed firms could still produce bicycles, but were not included in plans that arranged necessary inputs, were not given bank loans or technical assistance and were not exempt from taxation. The number of unlicensed factories dropped to 14 in 1987 (Zhang, 1992).

The Ministry of Light Industry also took steps to increase the production of the three famous brands by expanding production of those brands to 14 other bicycle factories. Consequently the three brands increased from 28% of the national total in 1983 to 35% in 1986. Total output in that year for the three brands was 12.1 million (more than Taiwan's total production of bicycles), 8.9 million produced by the original three factories. In 1986, the government ended rationing of these three brands, increased their prices by 30% and added three more factories by 1987, when the three brands accounted for 40% of national output (Zhang, 1992).

While allying these other 14 factories with the big three helped improve quality, market saturation provided the incentive for everyone to improve quality as well as marketing. For example, most factories extended their product guarantees from six months to one or two years. More sales were made to farmers, so that the proportion of heavy-duty bicycles increased from 36% to 52% from 1983 through 1987. At the same time, to reach other market segments, the number of different varieties of bicycles increased from 90 to 150 and colored bicycles rose from 3% to 14%. Sixty new products were introduced after 1984. To further improve quality, foreign technology was imported. More than 50 foreign technology projects were completed between 1984 and 1987. By the early 1980s, supply and sale departments were split so that the sales group could do more than just receive orders, but actually conduct market research, perform sales calls, attend bicycle exhibitions and advertise. Not surprisingly, this period of market saturation also saw the beginning of significant bicycle exporting, perhaps facilitated by larger sales departments. In 1983, 2% of state investment was directed toward promoting

exports (Zhang, 1992). By 1987, 820,000 bicycles were exported out of a total production of 41 million.

1988–Present

The current period may be characterized as one of increasing exports, followed by anti-dumping investigations and, in most cases, anti-dumping duties, leading to a downturn in exports while competition intensifies in the saturated domestic market. Exports have risen steadily from 1.5 million in 1988 to 10.3 million bicycles in 1992, despite total production that has fluctuated from around 41 million in 1988 and 1992 to a low of 32 million in 1990. The vast majority of this export growth was fueled by partnerships between Chinese and foreign firms.

A case in point is Shenzhen China Bicycle Company. This joint venture began in 1984 between Hong Kong Link Bicycles (formed in 1972 and sold 150,000 bikes that year) and Shenzhen Municipal Light Industry Company. In 1980, Shenzhen had become an enterprise zone that allowed for such ventures to be established. The venture built a new factory in 1985, more advanced than others in China, to produce bicycles primarily for export. By 1987, it was exporting nearly all of its almost 700,000 bicycles annually, the majority going to Europe, when Schwinn bought a one third interest in the venture. By 1992, China Bicycle produced 1.8 million bicycles, sold 20% in China and exported the remaining 80%, with Schwinn as its largest customer at 13%. Thirty percent of China Bicycle's exports went toward its own brand name, Diamondback, that it had acquired in 1990 (Crown & Coleman, 1996). Since that level of output strained the capacity of the Shenzhen factory, China Bicycles opened a new factory in 1993, located in Longhua, about 30 kilometers north of Shenzhen. Once at full capacity, 2 million bikes per year, China Bicycles could match rival Giant for the title of the largest bicycle company in the world. It even plans on starting to produce carbon-fiber frames (Baldinger, 1993).

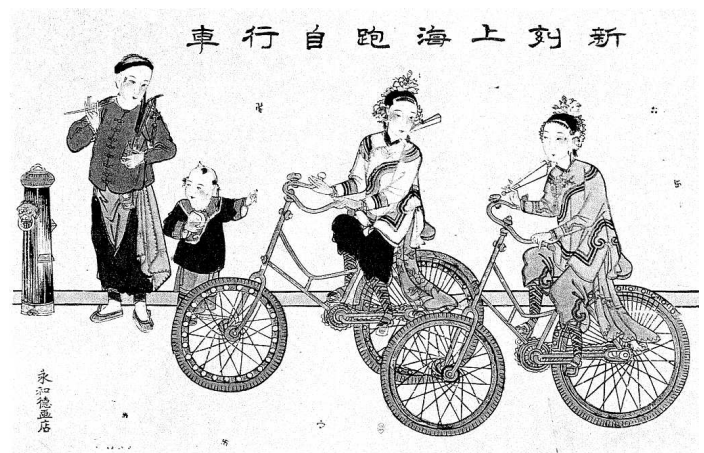
As noted above, Giant and Merida from Taiwan were also early entrants into mainland production. In 1993, Merida acquired Bicycle Co in China while Giant established a factory in Jiangsu province. This stimulated 10 other factories to be established in Jiangsu. (U.S. International Trade Commission 1996). In 1994, Giant formed a joint venture with Phoenix Bicycles to set up a factory in Shanghai. The factory's planned output of 300,000 bicycles would be split 50–50 between domestic sales in China and exports.

At least 50 Taiwan companies have established production bases in mainland China. Bridgestone of Japan announced its joint venture with Golden Lion in August 1995 to build a factory in Changzhou in the Jiangsu province to produce high-quality bicycles, 70% of which will be exported to Japan. Golden Lion has reportedly grown from a small factory established in 1976 to a large producer rivaling Shanghai Phoenix (Kyodo News International, 1995).

In response to this technological improvement and capacity expansion, Chinese exports have faced dumping challenges as well as the Asian economic crisis. In 1992, Canada imposed anti-dumping duties of 34 percent on Chinese bicycles priced below \$325 Canadian. The European Union imposed a 31 percent duty in 1993 on finished bicycles (in addition to the normal 17% tariff; Chinese exports to Europe reportedly plummeted to 19,000 in 1997), while Mexico, seeking to protect its nascent industry, imposed a 144 percent duty in 1994 (US International Trade Commission, 1996). Although threatened with similar duties by a U.S. investigation, the case ultimately was dismissed. Since 1992, production varied between 30 and 40 million and exports between 7 and 10 million.

The Chinese industry is restructuring in response to excess capacity. In 1994, there were 850 factories, 200 of which assembled complete bicycles. This includes some 200 Chinese-foreign ventures, of which 40 are wholly foreign-owned companies. The 12 largest factories, each producing over one million bicycles, collectively accounted for 56% of all production. The 5 next largest firms, producing between one half and one million bicycles annually accounted for only 7.5% of total production. By 1998, only four

Fig.240 3. "The first cyclists in Shanghai, 1900" (from Serena Beeley: *A History of Bicycles*, Secaucus: Wellfleet Books, 1992).



firms still produce more than one million bicycles annually, and 13 or 14 produce between one half and one million (*Asia Pulse*, 1998). Shanghai Phoenix, the largest firm, with 14% market share, has modernized and produces a broad variety of bicycles, but suffered financial losses in 1995 and 1996 and fired 2,000 workers in 1997. Its rival, Shanghai Forever, with 12% market share, is the best known brand in China. It still produces heavy utility bicycles as does Tianjin Flying Pigeon, both export heavily to 32 Third-World countries in Africa and South America, avoiding anti-dumping duties. Both are modernizing and attempting to produce a greater variety of bicycles.

Comparative Discussion

Although today China is known as the Kingdom of Bicycles, it is Japan that deserves the title of the country that loved bicycles. From the opening of trade with the West, the Japanese showed their love for bicycle technology. Most could not afford to own one, so they rented, and many craftsmen tinkered with the technology, learning how to repair bicycles and make replacement parts. The Japanese, of their own initiative, upgraded technology to produce and sell bicycles and became the leader in bicycle production and export, initially exporting to Asia after World War I. Figures 2401 and 2402 document Japan's early leadership in both bicycle production and exports. During the bike boom in the early 1970s, the U.S. could not build enough bikes, so sellers ordered from Japan.

As the Japanese loved bicycles, the Taiwanese love trading. Japan also could not build enough bikes for the booming U.S. market in the early 1970s, so the Japanese ordered from Taiwan. Taiwan's total production of bicycles has always been modest, although it did pass Japan in the 1980s, but unlike both Japan and China, Taiwan produces 90% of its bicycles for export. The early 1970s bike boom provided the incentive for Taiwan to improve its quality and bicycle firms from throughout the globe were happy to help Taiwan become the new dominant source for mainland quality bicycles as the cost of Japanese labor increased and the Japanese yen devalued. Its dominance in exports is illustrated by Figure 2402. However, Taiwan firms could see their own labor costs rising. As a result they began to specialize in high-technology and higher-priced bicycles, produced by automated robotic factories.

China is a country where others set up bicycle factories, first the Japanese before World War II and

now the Taiwanese. In each case, factories were established in part because of the large local market and in part because of low production costs. Initially Chinese bicycle production was targeted toward satisfying its large domestic market. By the mid 1980s, production had increased to about 30 million bicycles, and the domestic market finally became saturated. As Taiwan and others were looking for a source of low-priced bicycles, China was looking for an outlet from its overproduction. Unlike Schwinn, which failed to demand a financial stake in Giant at the beginning, and Japanese firms, which similarly largely did not become owners in Taiwanese ventures, Taiwanese bicycle companies have become equity partners with Chinese firms to jointly produce bicycles appropriate for the lower end of the Western market.

All three of these countries owe much of their success as bicycle exporters to substantial government involvement and support and cooperation among members of the industry. With government assistance, the Japanese industry set quotas and minimum export prices in 1931. After World War II, Japan passed a bicycle racing law that set up a fund from gambling on bicycle races to support the bicycle industry. This money was used to fund technological improvements and promote exports. The government of Taiwan took a more direct approach to intervention when shoddy quality threatened the viability of all Taiwan exports. It set standards and licensed companies for export that met those standards, dramatically reducing the number of firms. It also established a research and development center and persuaded the industry to set minimum export prices.

In China, of course, all the major bicycle factories are owned by the government. After the central government shifted resources away from heavy industry toward light industry, like bicycle production, local governments rushed to establish bicycle factories. When overproduction became a problem, the central government took back control, licensing selected firms and arranging alliances between firms to produce popular brands. The government also established enterprise zones where foreign investment was permitted. Bicycle production once again outgrew demand, but the government now is seeking freer trade rather than reducing the number of bicycle factories. Many factories are shifting to mopeds and electric bicycles, two items in heavy demand in the domestic market.

Whether this government investment is justified remains to be seen. None of these countries appear to

have any natural competitive advantages for producing bicycles, such as local iron-mining and mainland steel production. All have initially relied on low wage rates for competitive advantage, which for Japan and Taiwan have largely disappeared. To some degree, both have attempted to convert to technological leadership — Japan in components and Taiwan in frame building from exotic materials. Patents may provide some protection so that firms can try to maintain technological leadership. China appears to be seeking a mainland position by developing scale economies and reducing costs by following a learning curve. Learning curve theory suggests that, as a factory produces more product, it learns how to reduce unit costs, so that the factory that produces the largest volume develops the lowest unit cost. If it is successful, it may develop a long-term cost advantage over other countries and producers.

These countries vary somewhat in their long-term strategies for survival. Japan seemed largely unprepared for its currency devaluations and wage increases. It did try to keep higher-price bicycle production for itself and outsources inexpensive bicycles, but it largely gave away technology to produce quality bikes. Taiwan, the trading country, gives away nothing. When facing the same problems as Japan, it invested much more heavily in mainland factories in China, obtaining at least some ownership share in Chinese factories. Taiwan is becoming the origin for multinational companies and alliances of global bicycle production. China, currently still primarily producing utility bicycles for domestic production, seems uncertain as to its next step. Many of its exporters face high tariffs implemented by anti-dumping actions in major markets. The question for China is whether it should rely on freer world trade in the future and continue to upgrade its bicycle manufacturing facilities to lower production costs or diversify out of bicycle production to related industries.

Conclusion

As bicycle export leadership changes countries, some seem better able to adapt to the change. Japan appears to be struggling to adapt, following the U.S. model of importing cheap bicycles, but trying to produce more expensive models domestically. There are some signs that over the long term it may follow the U.S. industry to rely primarily on offshore production

of bicycles. Bridgestone has a joint marketing agreement with Taiwan's Merida and a joint venture with China's Golden Lion to import bikes to Japan. As Japan's economy recovers, it remains to be seen whether consumers will remain price sensitive preferring low priced bicycles, even if they are imported.

Taiwan, on the other hand, seems poised to remain a major producer of bicycles. Its high-tech factories still offer good value for higher-priced bicycles, and its firms have eagerly sought to move production to mainland China to reduce labor costs. Unlike Schwinn and most Japanese firms that freely transferred technology to Taiwan in the late 1970s and early 1980s, Taiwan firms obtain at least partial ownership of their Chinese facilities.

China will always have its large domestic market, but its continuing status as a major exporter is difficult to predict. On the one hand, China desperately wants world trade, seeking membership in the World Trade Organization. On the other hand, China has so much excess bicycle production capacity, it may decide to convert much of this capacity to other industries, just as it switched from heavy industry to light industry in the 1960s. This is particularly true since China is trying to develop a motor-vehicle industry, and domestic demand for bicycles is flat, as richer Chinese consumers seek mopeds, electric bicycles, and even cars. If it can join the WTO and remove the anti-dumping duties, it could decide to maintain much of its bicycle capacity and follow Taiwan's lead by upgrading technology to compete in exports.

Several countries appear poised to possibly increase exports. India has tremendous bicycle production capacity, second only to China, but currently its bicycles are considered too low in quality to be successful in developed countries. Thailand's bicycle exports are of higher quality and have increased in recent years. Malaysia, Vietnam, the Philippines, and even Korea before its economic crisis, all appear to be possible contenders for an increasing share of the world market. Moreover, in the U.S., Huffy and Brunswick are moving production to Mexico and encouraging Taiwanese firms to invest in Mexico plants and train the workforce. However, none of these countries begin to approach the capacity needed to dominate world trade, which has reached much higher levels in the past 20 years than back in the days when Taiwan or Japan became the leading exporter by shipping only 1–2 million bicycles.

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