

A History of Industry in Japan

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After World War II, the Japanese economy expanded and revived its industrial production through the introduction of foreign capital and technology. Eventually, Japan began developing its own technology, inventing many new products and industries, becoming one of the world's leading exporters of manufactured goods. But for a country to be successful in introducing technology, its existing technology must already have achieved a certain level to enable it to stretch itself to assimilate more advanced technology from the outside. To be able to integrate advanced technology into an industry or a manufacturing process, a country must have an infrastructure, certain educational standards, and a domestic market.

In the Meiji Period (1868–1912), Japan took the initiative in introducing foreign technology and successfully launched itself as an exporter of manufactured goods. Before that, in the waning years of the Tokugawa Shogunate (or Edo Period, 1600–1867), Japan had already formed the foundation that allowed it to accept and absorb foreign technology. Sir Rutherford Alcock, the British plenipotentiary minister to Japan who lived in Japan at the time, wrote in his *The Capital of the Tycoon: A Narrative of a Three Years' Residence in Japan*:

"... theirs was a material civilisation of a high order, in which all the industrial arts were brought to as great perfection as could well be attainable without the aid of steam—power and machinery—an almost unlimited command of cheap labour and material supplying apparently many counterbalancing advantages... their capacity for a higher and better civilization than they have yet attained, should be ranked, I conceive, far before that of any other Eastern nation, not excepting the Chinese."

In all eras of Japan's history, there has been a gap between the level of technology in Japan and that abroad, but that gap was never wide enough that Japan was unable to breach it and catch up.

Whenever Japan had contact with other countries through trade, it was able to absorb advanced technology in a relatively short period of time. This series will pay special attention to this fact as it traces the history of Japanese industry.

The birth of the artisan class and industry

An industry is said to be established when a large number of businesses are engaged in producing and selling large numbers of a particular product as a commodity, even if the commodity is made by hand. "Industry" in this sense began in Japan in the Edo Period (1600–1867). Before then, handicrafts and agricultural goods and derivatives were produced on self-sufficient *shoen* (landed estates), with some of these sold as commodities.

Pre-Edo

In the Heian Period (9th to 12th centuries), a portion of the tax yield of the *shoen*—paid in rice and other products—was sold in the Kyoto market. Store shelves in the second, fourth and seventh quarters displayed the products of various regions, including rice, wheat, flax (ramie), silk floss, silk cloth, sesame seeds, fish, vegetables, fruit, paper, swords, iron pots, needles and more. In addition to farmers, metal casters, blacksmiths, carpenters and shippers, who transported the rice and other taxables to Kyoto, lived on the *shoen* and were granted tax-exempt rice paddies by the the *shoen's* proprietor. These craftsmen made steel, swords, farming tools, paper, pots, needles and *miso* not only for everyday use on the *shoen* but also to sell on city streets.

In the Kamakura Period (13th to 14th centuries), agricultural productivity shot up dramatically. Metal farming tools and cultivation with the aid of horse and cattle came into widespread use, fertilizer and types of agricultural products were improved, and double cropping wheat

along with the primary crop of rice became common. With improvements in agricultural productivity, farmers were able to involve themselves in more handicraft production which consequently expanded. Regular markets sprang up all over the country, providing a place for the buying and selling of agricultural products and handicrafts produced on the *shoen*.

In the Muromachi Period (14th to 16th centuries) following the Onin War (1467–1477), local samurai seized control of the estates from their proprietors (aristocrats or religious institutions), who were no longer able to collect taxes. The *shoen* system was dismantled, and in its place rose the *sengoku daimyo*, or the warring states lords, who created a new unit of control: the *daimyo* fiefdom. They carried out land surveys, abolished the land tax system, creating instead a three-tier tax system that included a basic land tax, a roof tax and a paddy tax. The local proprietor (regional samurai proprietor or religious institution) received income from the land tax, and the *sengoku daimyo* received income from the roof tax and a special paddy tax.

The *sengoku daimyo* also built castle towns. These were separate from the market towns that were controlled by merchants' guilds under the protection of religious institutions or members of the nobility. At the core of the castle town was the castle itself, from which radiated outward the rest of the settlement. The innermost ring was formed by samurai residences, which were surrounded by artisans and tradesmen quarters. Artisans and merchants were separated from the farmers and the villages and forced to cluster in these castle towns. The *sengoku daimyo* abolished harbor fees and customs and abolished all market taxes and promoted the opening of markets, adopting a policy to cultivate castle town commerce known as *rakuichi rakuza*, or deregulatory market system.

Great numbers of merchants and artisans settled in the castle towns where

they could participate freely in trade. There were artisans' villages for blacksmiths, sawyers, dyers and others, and merchants' villages of fish and fabrics dealers. The artisan and merchant classes, as distinct from the farmer class, took form at this time.

The Edo Period

In the Edo Period, each domain produced goods in excess of its needs, and these extra goods were distributed and sold around the country. Among these were handicrafts and agricultural products including: textiles (linen, cotton, floss, silk); soy sauce and saké; pottery and lacquerware; paper; wood products (charcoal, cypress, cedar); marine products (salt, *nori* seaweed, tuna, salmon, herring, *kombu* seaweed and sardines); tea, indigo, safflower, red dye, ramie fiber (flax), tobacco, rush (*tatami*, materials for wicks) oil; and, mineral products (gold, silver, copper, iron).

In the latter half of the Edo Period, each domain would exhort its farmers and artisans to produce specialized products, which it would then buy up and sell outside of the domain for silver coins that could be added to the domain's coffers. The Yonezawa Domain, for example, promoted increased production in wax, lacquer, safflowers, crepe, cotton, mulberries, sericulture (silkworm husbandry), indigo, *aidama* and silk fabric. Of the country's 260 domains, one third used their monopolies over such specialized products to maintain their finances. Regional specialities were transported to Osaka or Edo where they were sold by tradesmen in those areas to regions across the country. For mineral products such as gold, silver, copper and iron, domains managed mines and refineries directly, and sold the products through special service merchants to tradesmen in the Osaka area. Merchants would also often buy up products from farmers, fishermen and artisans, sell them to Osaka-area tradesmen and transport them there.

After the middle of the Edo Period, handicraft goods and agricultural products were produced in great numbers all over the country under the direction of wholesale merchants and were sold on the commercial market.

The textile industry

Visitors to the Japan Folk Craft Museum in Tokyo's Komaba neighborhood are often surprised at the ancient Japanese costumes on display. For instead of the bright cotton and wool clothes to which the Japanese of today are accustomed, the museum displays yellowed, sedate-looking linen kimono.

Farmers in ancient and medieval times made clothes by scraping the flax-like fibers from the stem of the ramie plant, spinning a glossy thread, and then weaving linen. It was something they did by themselves, for themselves as a matter of self-sufficiency. By the Muromachi Period, merchants were buying up the flax-like fiber in the Echigo, Shinano and Kanto regions and selling it in Kyoto, Nara and other cities of the textile belt. Linen artisans of the castle towns would buy large quantities of this thread which they would weave into linen and dye. Ramie, flax and linen were produced in quantities that exceeded local demand, and were thus sold on the market.

Cotton fabric began to be produced and sold in large quantities much later than linen, in the 17th century. Cotton had entered Japan in the eighth century, and was used in the form of silk floss, but there was no technology to spin it into thread, or weave it to make cotton cloth.

In the 15th century, trade with Ming-dynasty China and Korea brought the importation of cotton thread, cotton cloth, silk thread and silk cloth, along with pottery, copper coins, rice and sugar. Although linen is strong, it is too poor an insulant and breathes too easily for it to be good for winter clothes. Cotton was warm, absorbent, easy to dye and had a good texture. Cotton goods and clothes became popular as winter wear among upper class urbanites.

In the 16th century during the Tenmon Period (1532-1554), the first domestic cotton cloth was produced in Satsuma. In the century that followed, raw cotton cultivation gradually spread northward through the Japanese archipelago, and cotton cloth was produced from locally produced raw cotton in the regions of Kyushu, Sanyo, Kinki and Tokai (southern Japan). By the mid-Edo Period, cot-

ton cloth production had spread to the northern regions of Kanto and Tohoku. At the time, male farmers supplemented their agricultural work with gathering firewood and making charcoal, while women wove cotton. This cloth was used for their own clothing, but it also became an important supplementary product for farmers. Urban wholesalers bought up the farmers' supplementary products which passed through the hands of many merchants and artisans before the finished product was sold at dry goods stores.

Only the cotton-producing regions of Kinki, Shikoku and Kyushu could sell white cotton cloth to other regions. Cultivation of raw cotton in the Kanto and Tohoku regions was difficult, and the farmers there had to buy ginned cotton from the market. Merchants would buy ginned cotton from the farmers of the Kinki and Tokai regions, collect it in Osaka and transport it to Edo. In the Edo Period, the rice tax and products of various domains would be bought up in Osaka, then resold all over the country, especially in Edo.

In 1736, of the items bought and collected in Osaka, rice comprised the largest share. Next came lumber, paper, white cotton cloth, fabric from Kyoto and silk. White cotton cloth ranked fourth among these. That year there were 1,178,391 rolls of white cotton cloth worth 5,172,475 *kan* in silver (19,400kg), while Kyoto fabric was worth 1704,278 *kan* (6400kg). In the middle of the Edo Period, the twilling loom was introduced into the silk goods industry, but in the cotton fabric industry a loom that was able to weave only plain fabric was used. In due time, a twilling loom was also introduced to the manufacture of cotton goods. As a result of improvements in production, the small-scale production from home crops of raw cotton that met the demands of the immediate region shifted to constant, large scale commercial production from acquired crops of raw cotton. Merchants would loan farmers the raw cotton and would buy the cloth they produced, which they would then sell to dry goods stores in the cities. In this way, an extensive new industry of

wholesaler-controlled household production came into existence in the cotton producing regions of Kinki, Shikoku and Kanto.

The steel industry

Japan's oldest ironworks ruins are those of Enjo in Iyasaka-cho in Kyoto. They date from the sixth to eighth centuries, and are outfitted with a storage hole for the magnetic sand used to manufacture steel, a kiln used to make charcoal, an ironworks furnace, and a metal-working furnace used for smelting. Japanese iron manufacturing typically employed magnetic sand as its raw material and was connected to the manufacture of swords.

Beginning in the 11th century, Noto iron pots and Kawachi pots were traded as regional specialties, and in the Kamakura Period hoes were mass-produced by blacksmiths making farming tools. In the 14th century, in the early Muromachi Period, demand for and production of swords increased, and Hoki (in modern-day Tottori), Mutsu (Aomori) and Bizen (Okayama) became centers of iron production and sword manufacturing. In the 15th century, with the beginning of licensed trade with Ming-dynasty China, swords became an important Japanese export. With swords being produced in such large quantities for export, a sword dealers' guild was established in Kyoto. Colonies for iron manufacture and swordsmiths were built at the edges of trading ports such as Hakata and Sakai.

By the mid-16th century, *wako*, (smugglers who sailed the seas among Japan, China, Korea and Southeast Asia) were extremely active. Portuguese merchants and missionaries had, around the same time, entered Southeast Asia and China, demanding trade relationships and spreading Christian teachings. *Wako* traded saltpeter, sulphur, raw silk and cotton cloth with Japan, the Philippines, Vietnam, Thailand and Malacca. It was in this atmosphere of international commerce that in 1543 a *wako* ship with about 100 people on board was shipwrecked on Tanegashima, an island off the southern tip of Kyushu. Two of those on board were Portuguese, who proceeded to take out their match locks and give a firepower demonstration. The feudal

lord of the island, Tanegashima Tokitaka, bought two of the muskets. Tachibanaya Matasaburo, a tradesman from Sakai, visited to learn how to manufacture the firearms and upon his return home he began to mass-produce guns.

Tanegashima Tokitaka presented the muskets brought by the "southern barbarians," as the Portuguese were known, to Shimazu Yoshihisa, proprietor of the Satsuma Domain of southern Kyushu. Yoshihisa in turn presented them to Shogun Ashikaga Yoshiharu. Ashikaga Yoshiharu ordered the swordsmiths of Omi Kunitomo (modern-day Nagahama city) to make match locks on the model of those same guns. Kohoku region produced iron sand and was home to many swordsmiths and blacksmiths who manufactured iron and steel farm tools.

These artisans had acquired excellent tempering techniques through years of making Japanese swords, so it was easy to absorb the southern barbarians' gun manufacturing technology. The most difficult problem was cutting the inner screws, but they learned to fit a tap which they banged down into the gun as it was forged to create the contours for the screws. Gun-manufacturing technology was passed on to blacksmiths in all regions, and gun-making blacksmiths responded to demands of the daimyo by making large quantities of guns. Guns became widely available both because they were imported by *wako* and because of the expansion of domestic production. Battle styles changed accordingly, so that the pick of the troops were no longer mounted and armored samurai warriors carrying lance, sword and bow, but foot soldiers armed with guns.

With his three-tiered, 3,000-man musketeer corps, Oda Nobunaga unified the whole country. As gun manufacturing spread rapidly, so did demand for great quantities of good quality iron and steel. Improvements were made on the traditional foot bellows or *tatara* iron manufacturing technique, by which pig iron and steel were made from magnetic sand. *Tatara* ironworks were established in Iwami, Izumo, Harima and Aki (modern-day Shimane, Tottori, Hyogo, and Hiroshima prefectures), and domestic steel production increased rapidly. With the expansion of steel production and the

improvements in forging techniques, steel farming tools became common among farmers, and sharp knives and other metal tools became popular among artisans. Pots, pans and iron kettles were produced in increasing quantities, and metal engraving and watch production laid the foundation for the development of technology for metal working and manufacturing of small devices.

Early foreign account

V.M. Grovnin, a Russian naval officer who was held captive in Japan from 1811 to 1813 wrote the following account in his book, *A Russian Officer's View of Tokugawa Japan*:

"The Japanese are almost the equal of the Europeans in terms of agriculture, horticulture, fishing and hunting, the production of silk and cotton cloth, pottery and lacquerware, and metal working. They know how to refine mineral ore, and are skilled in the production of many kinds of metal products. The Japanese have reached perfection in cabinet work and pulley-driven devices. In terms of this country's industries, those that are top rate are silk goods, steel manufacturing, and various factories producing pottery and lacquerware . . . In terms of steel goods, Japanese long and short swords are better than comparable products made anywhere else in the world, with the possible exception of the Damask . . . In terms of grinding and abrading, the Japanese have a special ingenuity . . . We frequently saw the tools of Japanese cabinet makers and carpenters that were hardly inferior to English-made specimens in terms of durability and beauty. Japanese saws are of extremely high quality, and can cut even the hardest wood into very thin boards."

The end of the Edo Period found a rich artisan class doing everything from metal working to cabinet making firmly established, and to the eyes of Grovnin, Japan seemed indeed to be a nation of artisans.

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