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Joint venture companies and technology transfer from the West to Japan: Citizen Watch Co and the Swiss watchmakers (1890-1940)

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Introduction

Until the end of the 19th century, the main vehicles for technology transfer were the individuals and objects moving from one country to another.[1] Trips by engineers and merchants, the emigration of craftsmen and workers as well as trade in goods all provided means of acquiring new technical skills that led to industrial projects. Even though it did not entirely disappear, this mode of technology transfer gave way in the 1880s to a new driver that became widespread during the 20th century: capital, in the form of either licensed manufacturing or foreign direct investment (FDI).[2] The adoption of a system for the international protection of patents, introduced when the major powers signed the Paris Convention in 1883, played a key role in this respect because it established a world market for technologies and a framework for their marketing.[3]

Japan provides an excellent illustration of an industrialization policy driven by technology transfer in which FDI has played a decisive role, making the country a textbook case for

[1] JEREMY David J, (ed.), *International Technology Transfer. Europe, Japan and the USA, 1700-1914*, Aldershot: E. Elgar, 1991, 253 p.

[2] BRULAND Kristine, "Skills, Learning and the International Diffusion of Technology: a Perspective on Scandinavian Industrialization", in BERG Maxine et BRULAND Kristine (eds), *Technological Revolutions in Europe. Historical Perspectives*, Cheltenham/Northampton : Edward Elgar, 1998, pp. 161-187.

[3] CONTRACTOR Farok J. and TAGI Sagafi-Nejad, "International Technology Transfer: Major Issues and Policy Responses", in *Journal of International Business Studies*, Vol. 12/2, 1981, pp. 113-135.

United Nations development policy in the 1970s.[4] Research conducted by American and Japanese historians has highlighted the essential role of the joint ventures and subsidiaries of Western firms in the acquisition of new technologies linked to the traditional sectors of the second industrial revolution, such as automobiles, electricity, oil and chemicals.[5] The complex technical processes employed within these industries makes their transfer by individuals more difficult and reinforces the role of multinational companies on the technology market. However, even though it became the focal point of research, heavy industry was not the only beneficiary of FDI-driven technology transfer in Japan during the first part of the 20th century. This was also clearly the case with the consumer goods industry, along with watchmaking, which is taken up in this article.

1. Technology transfer and FDI in Japan

After opening up to foreign trade in the mid-1850s, Japan embarked upon a policy of industrialization and economic development characterized by a clear goal: to catch up with the West. Technology played a decisive role in the quest for modernization. Even though there was no clean break with the technical culture of the Edo era but rather technological hybridation,[6] imported foreign technologies form a key part of Japan's contemporary economic history. Notwithstanding, the attitudes of the Japanese authorities and the industrial elites towards technology transfer have changed considerably over time, depending on the prevailing economic and political conditions. Three major periods can be distinguished between 1868 and 1945.

1.1 Technologies without capital (1868-1895)

The first phase covers the three decades from the Meiji Restoration to the Sino-Japanese War. It is characterized by the active acquisition of foreign technology and a ban on inflows of foreign capital. The Meiji authorities were determined to ensure that economic modernization did not give European powers an opportunity to meddle in domestic affairs; moreover, they

[4] CNUCED, *Monographies sur le transfert de technologie : Politiques de transfert et de développement de la technologie dans le Japon d'avant-guerre (1868-1937)*, Genève : Nations Unies, 1978, 47 p.
[5] YUZAWA Takeshi and UDAGAWA Masaru, *Foreign Business in Japan Before World War II. Proceedings of The Fuji Conference*, Tokyo: University of Tokyo Press, 1990, 291 p.
[6] MORRIS-SUZUKI Tessa, *The technological transformation of Japan. From the Seventeenth to the Twenty-first Century*, Cambridge, Cambridge University Press, 1994, 304 p. et NAKOKA Testurō e.a (eds), *Sangyō gijutsushi*, Tokyo: Yamagawa Shuppansha, 2001, 461 p.

favoured technology transfer based on individuals rather than companies. In 1870, the State, which was already regulating contacts with foreign countries during the Edo period, set up a new body responsible for establishing the requisite infrastructure to ensure the country's economic growth, the Department of Civil Engineering (Kobusho).[7] The State relied on Kobusho to hire foreign engineers and scientists who came to Japan to oversee various projects relating to mines, machines, railways, telegraphs and lighthouses. Between 1870 and 1885, Kobusho employed a considerable share of the foreigners hired by the government - around 750, of whom nearly 75 per cent were engineers.[8] As they worked to set up an infrastructure, in 1873 these engineers helped found the first technical institute, the Imperial College of Engineering (Kogakuryo), which would become part of the University of Tokyo in 1886. The purpose of this establishment was to train an elite corps of Japanese engineers who would soon replace the foreigners working in public and private Japanese firms. By 1880, Kobusho only employed 76 foreigners, compared with 199 in 1875. Yet the graduates of Imperial College were not the only ones working to modernize the Japanese economy. They were aided by an impressive number of young men who went abroad to train at US and European universities and technical institutes. Between 1868 and 1874, of the 550 students who went abroad, 209 went to the United States, 168 to the United Kingdom, 82 to Germany and 60 to France, an upward trend that was to continue.[9] For the entire period from 1868 to 1912, Japanese historians have identified 4,200 students who trained abroad.[10] By and large, private companies pursued this dual policy of hiring foreign engineers and sending Japanese students to Western universities during the 20th century. It fuelled the transfer of Western technology, playing a decisive role in the initial phase of modernization.

From a Japanese perspective, this policy offered a clear advantage: it kept foreign influence to a minimum. Japan, which wished to catch up with the West and to assert itself as a world power, sought to remain master of its destiny and to prevent foreign powers from gaining control of its basic infrastructure. Accordingly, the few European investments in mines during the 1860s were gradually taken over by the Japanese authorities after the Meiji Restoration.[11] Moreover, in 1881, the government prohibited inflows of foreign capital, a ban that remained

[7] BEAUCHAMP Edward and IRIYE Akira (ed.), *Foreign Employees in Nineteenth-Century Japan*, Boulder: Westview Press, 1990, 312 p.
[8] BEAUCHAMP, op. cit., p. 242.
[9] BURKS Ardath W. (ed.), *The Modernisers: Overseas Students, Foreign Employees and Meiji Japan*, Boulder and London: Westview Press, 1985, p. 169.
[10] TEZUKA Akira (ed.), *Bakumatsu Meiji kaigai tokōsha sōran*, Tokyo, 1992, 3 vol.
[11] MCMASTER John, "The Takashima Mine: British Capital and Japanese Industrialization", in *Business History Review*, 1963, pp. 217-239.

in place until the Sino-Japanese War.[12] As a result, FDI flows were virtually nil until the late 1890s and were primarily limited to the trading companies established in the five Japanese ports open to foreigners – Yokohama, Kobe, Hakodate, Niigata and Nagasaki. However, these had only a limited, indirect impact on industrialization.

1.2 The era of joint ventures (1895-1930)

Yet the limits to the policy restricting FDI became clear during the 1890s. Even though it facilitated the establishment of a basic infrastructure – railways, mines and telegraphs – and the modernization of the major traditional industrial sectors such as textiles, shipbuilding and light engineering, the technology transfer strategy proved unsuited to the innovations of the second industrial revolution. As these relied on complex production processes and skills, held by companies or groups of companies that controlled their application and use, it was difficult to simply copy imported Western products without concluding an agreement with these firms. This was the case, for example, with the electric motors that Shibura Works (the future Toshiba) produced in the early 1900s by copying models manufactured by General Electric (GE). However, given their low quality and high price, these motors could not compete on the Japanese market with imported products. Consequently, Mitsui, which controlled Shibura, launched negotiations with GE's management. An agreement was signed in 1909: Shibura let GE take a 24 per cent interest and a 1 per cent share of royalties on all sales on the Japanese market in exchange for patents, technical information and specific training for Japanese engineers in GE factories in the US. The convergence and sharing of skills enabled a Japanese firm to move from copying to developing industrial products and to manufacturing goods that could compete on the market.[13] This example of a joint venture was representative of the new modes of technology transfer that emerged in the late 1890s and characterized the industries of the second industrial revolution. To benefit from such technologies, the country had to open up to foreign capital and allow foreign companies into the country.

In order to do so, Japan adopted a series of measures in the late 1890s to bring the country into the world economy and to make it easier for foreign firms to operate. The yen went on the gold standard in 1897 and a new business code liberalizing the economic activities of

[12] ASAI Yoshio, "Nisshin sengo no gaishi donyu to Nihon kogyo ginko", in *Shakaikeizaishi*, n°50, 1985, pp. 655-675.

[13] UCHIDA Hoshimi, "Western Big Business and the Adoption of New Technologies in Japan: The Electrical Equipment and Chemical Industries, 1890-1920", in OKOCHI Akio and UCHIDA Hoshimi, *Development and Diffusion of Technology. Electrical and Chemical Industries. Proceedings of The Fuji Conference*, Tokyo: University of Tokyo Press, 1980, p. 154.

foreigners on Japanese soil was adopted in 1899. Finally, in 1900, Japan signed the Paris Convention on the protection of patents, whereas Japanese law had until then authorized Japanese firms to copy foreign products. Yet this opening-up was not complete. The State introduced a number of constraints in several key sectors that gave rise to bans or restrictions. For example, FDI was prohibited in maritime commerce in 1899, in mines in 1905 and in powder manufacturing in 1910, and FDI restrictions were introduced in the insurance industry in 1900, in dye manufacturing in 1925 and in the banking sector in 1927.[14] Likewise, the nationalization of the railways in 1906 was a means of discouraging foreign capital from investing in this industry.[15] Lest one forget, foreigners were barred from buying land in Japan until 1926.[16]

Lastly, changes in Japanese customs policy affected FDI.[17] In 1899, Japan once again became free to set its own customs duties and to abrogate the unequal treaties imposed by the Western powers in the mid-1850s, adopting increasingly protectionist policies up to the Second World War. There were comprehensive revisions of duties in 1906, 1911 and 1926, but virtually every year was marked by a specific rise for product types or certain States. In the interwar period, a targeted policy of customs hikes was introduced to help budding industrial sectors. The number of articles spelled out in these treaties rose from 532 in 1899 to 1,599 by 1911 and 1,699 by 1926. In general, customs duties went up from 3.7% in 1898 to 9.9% by 1903, 19.8% by 1913 and 23.8% by 1933. Thus, customs protectionism indirectly favoured FDI because setting up a subsidiary or a joint venture on Japanese soil made it possible to circumvent these commercial barriers.

Characteristics of FDI

Several academic studies devoted to the question of FDI in Japan from 1895 to 1930 have showed that the companies set up in this way had little impact in terms of capitalization but were vital for the transfer of new technologies.[18] An official survey published in 1948 listed a

[14] MASON Stark, *American Multinationals and Japan. The Political Economy of Japanese Capital Controls, 1899-1980*, Cambridge: Cambridge University Press, 1992, p. 25.
[15] MASON, p. 24.
[16] MASON, p. 23.
[17] YAMAZAWA Ippei and YAMAMOTO Yūzō, *Bōeki to kokusai shūshi*, Tokyo: Toyo Keizai Shinposha, 1979, 267 p.
[18] UDAGAWA Katsu, "Senzen Nihon no kigyō keiei to gaishikei kigyō", in *Keiei Shirin*, 1987, vol. 24/1-2, pp. 15-31 et 29-40, YAMAMURA Kozo, "Japan's Deus Ex Machina: Western Technology in the 1920's", in *Journal of Japanese Studies*, vol. 12/1, 1986, pp. 65-94, UCHIDA Hoshimi, "Western Big Business and the Adoption of New Technologies in Japan: The Electrical Equipment and Chemical Industries, 1890-1920", in OKOCHI Akio and

total of 88 companies with less than a 50% share of foreign capital that were founded before 1931.[19]

Table 1: Foreign firms in Japan, 1931[20]

Country of origin	Branches	Japanese firms (foreign ownership as a %)			Total
		100	>50	50	
US	15	6	6	9	36
UK	5	5	2	9	21
Germany	5	2	2	8	17
Other	4	-	-	10	14
Total	29	13	10	36	88

The 88 foreign companies in Japan consisted of firms wholly owned by Westerners (42) and joint ventures (46). Their main characteristics reflected their country of origin and their field of activity. The key players were American (40.9%), British (23.9%) and German (19.3%), a breakdown amply explained by their branches of activities. These companies represented the main sectors of the second industrial revolution – automobiles, oil, chemicals and electrical engineering – as well as some more traditional sectors, such as machines and textiles. The majority were multinationals operating worldwide for which Japan was merely one of many markets, such as Dunlop, Ford, General Motors, Siemens, Victor Talking Machine and Western Electric. Finally, there were many *zaibatsu* (business conglomerates) among the Japanese partners of the joint ventures. For example, Mitsui teamed up with General Electric to establish Shibura, Vickers Armstrong helped found Japan Steel Products, and Babock & Wilcox partnered Nippon Electric Co (NEC). Mitsubishi worked together with English Electric to set up Tokyo Electric, Westinghouse Electric backed Mitsubishi Electric, and

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UCHIDA Hoshimi, *Development and Diffusion of Technology. Electrical and Chemical Industries. Proceedings of The Fuji Conference*, Tokyo, University of Tokyo Press, 1980, pp. 145-172.

[19] *Nihon ni okeru gaikoku shihon*, Tokyo, 1948, 156 p.

[20] UDAGAWA, p. 17.

Tidewater Associated Oil cosponsored Mitsubishi Oil.[21] Primarily geared to international trade, the *zaibatsu* saw joint ventures as a means of repositioning themselves in domestic industry following customs hikes that hurt their traditional activities.

Overall, FDI volume rose steadily during the first three decades of the 20th century. The Ministry of Finance estimates FDI flows at US$ 50 million in 1913, US$ 72.5 million for 1919-1922 and US$ 122.5 million by 1929.[22] In all, by 1941, companies in Japan in which foreigners had at least a 50% stake had overall assets of ¥326 million or some US$ 145 million, with the ten largest companies accounting for 51.4%.[23] Yet these were trifling sums compared with domestic industry: none of these foreign firms had made it onto the list of the top 100 Japanese industrial firms by 1940.[24]

Nevertheless, even though the overall investment volume was modest, these foreign companies had a considerable qualitative impact on the Japanese economy: they made possible the transfer of new technologies and helped Japanese companies fit into worldwide marketing networks. With joint ventures, transfers were direct and took place in two stages. Japanese partners began by distributing the goods manufactured by Western parent companies. During this phase, they acquired the necessary know-how to manufacture in Japan. In a second stage, manufacturing was increasingly shifted to Japan. This was, for example, the case with Fuji Electric, linked to Siemens: whereas Fuji produced only 6.4% of its output in Japan in 1925, this share rose steadily, passing the 90% mark by 1934.[25] In the case of Mitsubishi Electric, its cooperation with Westinghouse enabled the Japanese firm not only to use patents but also to internalize blueprints, new materials and machine tools.[26] In this way, the joint ventures set up in Japan in the early 20th century gave birth to several titans of Japanese industry, such as NEC (1899), Toshiba (1905), Fujitsu (1923), Mitsubishi Electric (1923) and Sumitomo Aluminium (1931).[27]

Subsidiaries of Western companies also played an important part in technology transfer, albeit less directly. The automobile industry is a case in point. Ford Japan (1925) and General Motors Japan (1927) unwittingly gave the Japanese automobile industry a boost via two main channels. First, product and sales managers from these US companies continued their careers

[21] MASON, p. 45.
[22] MASON, p. 46.
[23] UDAGAWA, p. 17.
[24] YAMAZAKI Hiroaki (ed.), *Nihon keieishi no kisochishiki*, Tokyo : Yuhikaku, 2004, pp. 410-411.
[25] UDAGAWA, p. 25.
[26] UDAGAWA, p. 28.
[27] UDAGAWA, pp. 18-20.

with Toyota or Nissan, bringing organizational and technical skills with them. Second, the scores of workshops and companies to which Ford and GM subcontracted work acquired a body of technologies that were also utilized by Japanese manufacturers.

1.3 Japan closes up (1931-1945)

In the early 1930s, the Japanese authorities jettisoned their relatively liberal approach against a backdrop of nationalism and militarism. Like other powers of the time, Japan went off the gold standard in 1931, introducing exchange controls in 1933, followed by restrictions on foreign trade in 1937. The State, with the military at the helm, resumed its dominant role in the economy. It sought both to limit foreign influence on domestic industry and to harness the latter for wartime production. The restrictive policy adopted during the 1930s relied primarily on two types of law.[28] The first was the 1931 law on industrial controls, which allowed for various types of State intervention, notably to introduce compulsory cartels when two-thirds of the companies in a given branch were associated. By the end of 1937, there were no less than 1,172 industrial associations operating nationwide under this law.[29] Yet it was sectoral laws that generated the strongest pressure on foreign companies. The State adopted a system for the granting of manufacturing licenses in order to control certain strategic sectors such as oil (1934), automobiles (1936), steel (1937), machine tools (1938), aeronautics (1938), shipbuilding (1939) and machines (1941).[30] Licenses were usually reserved for Japanese firms, a policy which hamstrung foreign companies.[31] Finally, mention should be made of a tendency to "Japanize" joint ventures. Foreign investors, who were facing strong pressure, saw their shares diminish drastically.[32] Out of the 27 main foreign companies in Japan in 1930, 19 were at least half foreign owned (70.4%). By 1941, only 15 out of a total of 35 companies, or 45.9%, fell into that category.[33]

Conclusion

[28] JOHNSON Chalmers, *MITI and the Japanese Miracle. The Growth of Industrial Policy, 1925-1975*, Stanford University Press, 1982, pp. 116-156.
[29] COHEN Jerome B., *Japan's Economy in War and Reconstruction*, Minneapolis: University of Minnesota Press, 1949, p. 11.
[30] JOHNSON, pp. 132-133.
[31] UDAGAWA, pp. 32-39.
[32] UDAGAWA, pp. 18-20.
[33] UDAGAWA, pp. 18-20.

Research on FDI and joint ventures shows that as Japan opened up to foreign capital, it was able to acquire new technologies in the main sectors of the second industrial revolution. Yet this process of incorporating new skills was not specific to heavy industry. Manufacturing, even though it was not a significant component of relevant literature, also flourished thanks to the acquisition of foreign technology provided by Western companies via joint ventures and subsidiaries. This was the case, for example, with medical equipment, records, matches, boilers, sewing machines and air conditioners.[34] However, an exhaustive analysis of these industrial sectors is not possible because the Japanese authorities failed to register some small firms.[35] This was precisely the case with the watchmaking industry, which was not mentioned in the official survey published in 1948. This sector was facing a classic situation on the Japanese market. Swiss companies, which were the main importers of watches, were slapped with steadily rising customs duties from 1899 onwards aimed at protecting the domestic watchmaking industry, primarily Hattori (Seiko).[36] Yet despite this customs barrier, none of the major Swiss watchmaking firms relocated to Japan in the interwar period, as did multinationals in many other sectors. On the contrary, it was a small Swiss trading firm with no production facilities in its country of origin that set up a watchmaking plant in Tokyo in the early 1900s. There is a very specific reason for this surprising development: the existence of a Swiss watchmaking cartel, one of whose roles was to combat technology transfer.

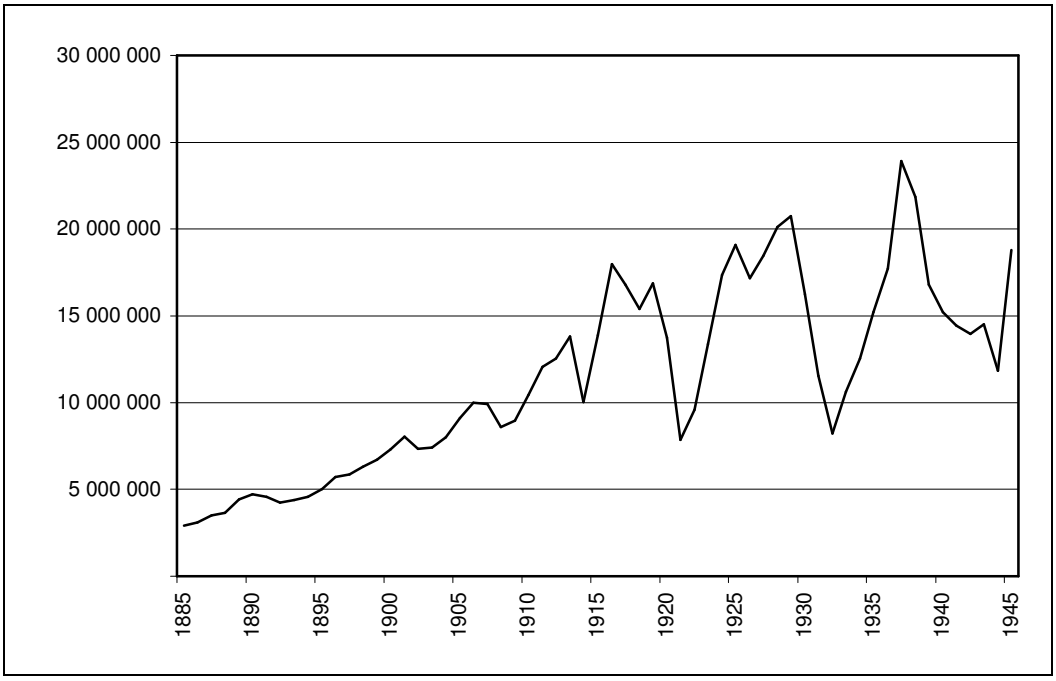
2. The Swiss watchmaking industry and efforts to deter industrial relocation

After having modernized its plant from 1880 to 1900 by introducing machines as means of production, around 1900 the Swiss watchmaking industry enjoyed a virtual monopoly on watch sales, accounting for 90% of production worldwide.[37] The main strength of Swiss watchmaking was its "vertically specialized, horizontally fragmented" structure,[38] a flexible production mode that allowed the Swiss watchmaking industry to offer a sweeping range of products in terms of quality, price and design and to largely dominate the world market,

[34] YAMAMURA, pp. 68-69.
[35] YAMAMURA, p. 71.
[36] DONZE Pierre-Yves, « Le Japon et l'industrie horlogère suisse. Un cas de transfert de technologie durant les années 1880-1940 », in *Histoire, Economie et Société*, 2006, pp. 105-125.
[37] UTTINGER Hans W. and PAPERA D. Robert, « Threats on the Swiss Watch Cartel », in *Western Economic Journal*, 1965, p. 206 and LANDES David S., *L'heure qu'il est : les horloges, la mesure du temps et la formation du monde moderne*, Paris, Gallimard, 1988, pp. 446-449.
[38] GLASMEIER Amy K., *Manufacturing Time. Global Competition in the Watch Industry, 1795-2000*, New York, The Guilford Press, 2000, p. 136.

unlike its main rival, the American watchmaking industry, which was geared to the domestic market and the production of standardized, cheap goods. The modernization process introduced in Switzerland between 1880 and 1900 was characterized by systemized, rather than standardized production.[39]

Figure 1: Swiss watchmaking exports, number of units, 1885-1945[40]



The Swiss watchmaking industry experienced a boom from the 1880s to the First World War (see figure 1). The volume of watch and movement exports rose steadily from 2.9 million units in 1885 to 10 million units by 1914. During the interwar period, however, the situation was nowhere near as rosy. First, two major crises in 1920-1922 and 1930-1936 led to numerous bankruptcies and high unemployment rates. Second, overall business growth slowed: when measured by unit volume, watchmaking exports grew by 18.4 per cent from 1920 to 1939, compared with 49.9 per cent for 1895 to 1914. But above all, the main challenge facing the Swiss watchmaking industry was the development of *chablonnage* and the corresponding risk of technology transfer.

[39] On that distinction, see SCRANTON Philip, *Endless Novelty. Specialty Production and American Industrialization, 1865*-1925, Princeton: Princeton University Press, 1997, p. 99.
[40] *Statistique du commerce de la Suisse avec l'étranger*, Bern : Département fédéral des Douanes, 1885-1945.

2.1 The development of chablonnage

Chablonnage is a practice which consists of exporting disassembled watches (movements or movement parts) and assembling them in the countries in which they are sold. The primary aim is to avoid paying high customs duties on finished watches. Yet Swiss watchmakers feared that the techniques and know-how transferred via *chablonnage* in watch assembly shops set up abroad would allow new industrial competitors to emerge, jeopardizing Switzerland's dominant position. The rise of customs protectionism after the First World War gave *chablonnage* a real boost, leading watchmakers to establish a cartel in Switzerland in an attempt to put an end to such practices.

On the basis of foreign trade statistics for Switzerland, we can determine movements' share of watch exports (number of units) and pinpoint the spread of *chablonnage* after the First World War.[41] Until 1914, Swiss watchmaking circles were not unduly concerned about this practice. Exports of movements did indeed show a steady increase, rising from 297,000 units in 1890 to 1.2 million in 1914. In relative terms, however, this growth was not that significant: watch movements' share of Swiss watchmaking exports (number of units) went up until 1906 (13.6% as against 5.9% in 1890), then fell during the years leading up to the First World War. After the war, however, exports of movements began to pose a problem. Such exports not only rose sharply in absolute terms – 2.4 million units in 1918, peaking at 5.6 million units in 1929 – but above all tended to become the dominant practice in exports, as their relative share of watchmaking exports jumped from 11.9% in 1914 to a high of 31.6% in 1926. In general, movements averaged 25.1 per cent of watchmaking exports from 1920 to 1935, compared with 11.5 per cent for 1900 to 1920.

Table 2: Main destinations of movement exports for Swiss watches, 1900-1930

	1900	1910	1920	1930
Movements exported, no. of units	498,892	873,522	3,340,982	3,421,959
United States (%)	40.7	29.1	70.3	36.3
Russia (%)	15.3	21.4	-	-
Japan (%)	19.8	10.3	10.9	8.6

[41] *Statistique du commerce de la Suisse avec l'étranger*, Bern : Département fédéral des Douanes, 1890-1935.

Germany (%)	9.8	7.7	-	8.7
Canada (%)	9.6	21.6	9.1	11.2
Other (%)	4.9	10.0	9.7	35.2

Initually, *chablonnage* was limited to a small number of countries until the mid-1920s, when it became more widespread (see table 2) as a result of customs protectionism. Before 1930, North America (US and Canada), Germany, Russia and Japan alone accounted for nearly 90 per cent of all Swiss watch movements exported. In these four regions, the practice of *chablonnage* reinforced the national watchmaking industry, with the development of companies such as Bulova in the US or Hattori in Japan.[42]

2.2 A cartel to combat technology transfer

As *chablonnage* spread during the interwar period, the desire to put an end to the transfer of watchmaking technology grew, materializing in the establishment of a cartel (see figure 2). This was a two-stage process: industrial circles intervened on several occasions in the mid-1920s, followed by the State in the mid-1930s.

First of all, the various watchmaking companies grouped together according to their branch of activity: watch manufacturers within the Fédération horlogère (FH, 1924) and producers of movement-blanks within the company Ebauches SA (1926), while the other subcontractors came together in the Union des branches annexes de l'horlogerie (UBAH, 1927).[43] Subsequently, in 1928, these three groups signed a series of agreements known as the *watchmaking conventions*, whereby they undertook to do business exclusively with each other and to respect the minimum prices for the purchase of watch components. However, the cartel did not intervene in the field of production quotas and the sharing of commercial outlets. Moreover, the conventions adopted in 1928 prohibited members from engaging in *chablonnage*.

Nevertheless, the lack of any legal constraints allowed breakaway firms to continue selling watch movements and parts abroad by simply refusing to sign the 1928 conventions. To close this loophole in the convention-based system, financiers helped found a super holding

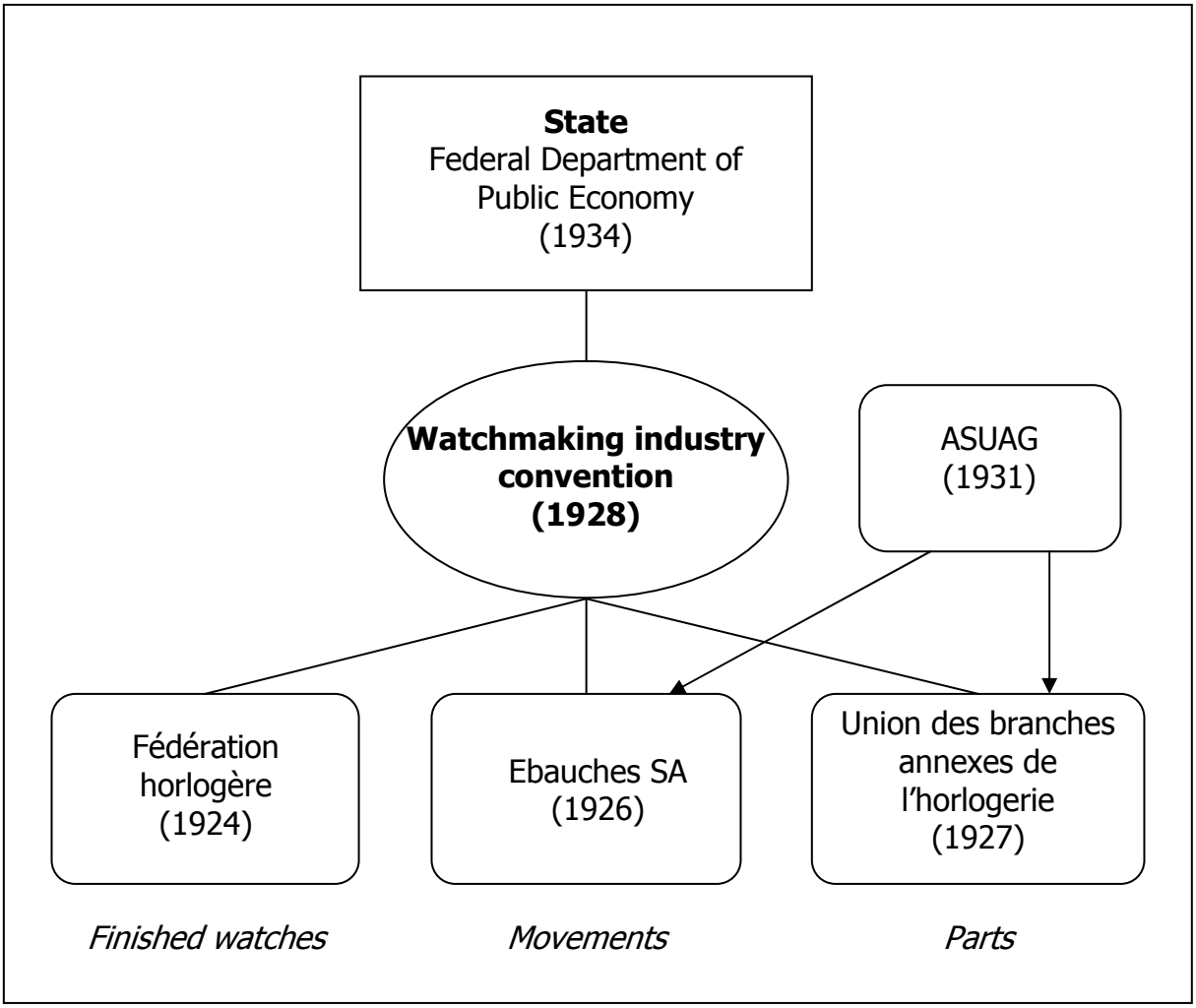
[42] DONZÉ Pierre-Yves, *A cartel to combat technology transfer. The Swiss watchmaking industry, 1920-1970*, working paper presented at Konban University, 23rd of June 2007 (unpublished).
[43] *Feuille fédérale (FF),* 1950, p. 68.

company in 1931, the Allgemeine schweizerische Uhrenindustrie AG (ASUAG).[44] The shareholders of ASUAG, whose share capital came to SF 10,006,000, consisted of watchmaking industrialists (SF 5 million), banks (SF 5 million) and the Federal Government (SF 6,000 of shares in return for the payment of SF 6 million of support). In addition, the State granted an interest-free loan of SF 7.5 million and the banks extended credit to the tune of SF 15.5 million, for a total of SF 23 million, repaid in full by the early 1940s. The government justified its stake in a private enterprise by stating that ASUAG "obviously cannot be an ordinary, purely profit-making joint stock company. Its mission is to safeguard the interests of the Swiss watchmaking industry as a whole."[45] In fact, ASUAG's goal was to reinforce the convention-based regime of 1928 via large-scale industrial concentration. It bought up scores of plants producing movement-blanks and movement parts and controlled four holding companies: Ebauches SA (movement-blanks), Les Fabriques d'assortiments réunies SA (assortments), Les Fabriques de balanciers réunies SA (balance wheels), and La Société des fabriques de spiraux réunies SA (balance springs), the last three of which were UBAH members. As the Chairman of ASUAG's Board of Administration, Paul Renggli, recalled in November 1942, "the primary objective of this course of action is to prevent our industry from relocating abroad – a danger that posed a serious threat some twenty years ago."[46]

Yet ASUAG did not manage a clean sweep in terms of industrial concentration and several breakaway firms emerged, allowing *chablonnage* to continue. Only when the State took legal measures could this practice be eliminated. Thus, the federal decree of March 1934 extending legal recognition of the convention-based regime of 1928 introduced official permits for exporting movement sets, movement-blanks and movement parts. This new legal framework sharply curtailed exports of movement sets and watch parts. Yet such exports were not prohibited, merely limited to companies with long-standing ties to foreign firms. The watchmaking conventions of 1934 were extended on several occasions up until 1961.

Figure 2: The Swiss watchmaking cartel in 1934

[44] *Société générale de l'horlogerie suisse SA. ASUAG. Historique publié à l'occasion de son vingt-cinquième anniversaire, 1931-1956*, Bienne : Arts graphiques SA, 1956.
[45] FF, 1931, p. 213.
[46] Quoted in FF, 1950, p. 75.



Conclusion

When viewed from this perspective, the watchmaking industry's transition to a cartel during the interwar period was a protectionist response aimed at preventing technology transfer and the emergence of rivals on the world market. Given these conditions, it is easy to understand why the commercial strategy of the 1920s and 1930s was geared to promoting exports of finished products. FDI, whether in the form of subsidiaries or joint ventures, not only ran counter to watchmaking policy, but was forbidden by law after 1934. Yet the real situation was more complex, because some major Swiss watchmakers discreetly adopted a policy of relocating certain assembly operations before 1945. This was primarily the case with the American market, the main commercial outlet for Swiss watchmakers. It was probably also what happened in Japan, whose importance as a trading partner grew during the interwar period. Japan's share of the value of Swiss watchmaking exports rose from an average of 1.9 per cent from 1910 to 1919 to 7.3 per cent from 1920 to 1929 before falling steadily thereafter (2.2 per cent in 1935 and 0.3 per cent in 1940). The importance of the Japanese market is

particularly clear in the case of Longines.[47] Before the First World War, Japan was a bit player: Swiss watch sales totalled SF 19,852 in 1913, putting the country in 27th place with a 0.3 per cent share. A dramatic change occurred after the war, however. Not only did turnover rise sharply, peaking at SF 705,761 in 1926 and accounting for 7.3 per cent of the company's sales for 1920 to 1926, but Japan became one of Longines' main outlets, fluctuating between first and tenth place between 1920 and 1936. Given that Longines' agent in Japan from 1912 onwards was none other than the company Hattori – also the leading Japanese watch manufacturer – and since the Swiss company in question changed over to producing movements during the interwar period, one cannot help but wonder whether Longines watches were exported in a disassembled form and assembled in Hattori's Tokyo workshops. Yet this type of practice, even though it allowed the indirect transmission of technical knowledge to Japan, did not rise to true technology transfer as with direct investment. In Japan, this type of transfer also occurred during the interwar period, leading to the establishment of Citizen Watch Co.

3. The beginnings of Citizen Watch Co

The development of the Japanese watchmaking industry follows the model of Japanese manufacturing in general, which is characterized by a process whose main stages are imports of foreign products, the birth of a national substitute industry for imports, and domestic exports.[48] Yet the two main Japanese watchmaking companies followed different paths to acquire mainly Swiss and American technology. Whereas Hattori (Seiko) emerged in the late 19th century as a result of technology transfer primarily driven by individuals, Citizen Watch Co, founded in 1930, came from Swiss direct investment in Japan.

3.1 Hattori and the start of the Japanese watchmaking industry

Although the first watches from the West arrived in Japan back in the 1860s,[49] the Japanese market did not really take off until the end of the century. Before the mid-1880s, watches were essentially deluxe consumer goods for a small elite, a factor which explains the low volume of watches exported to Japan. As the country industrialized, the railways developed

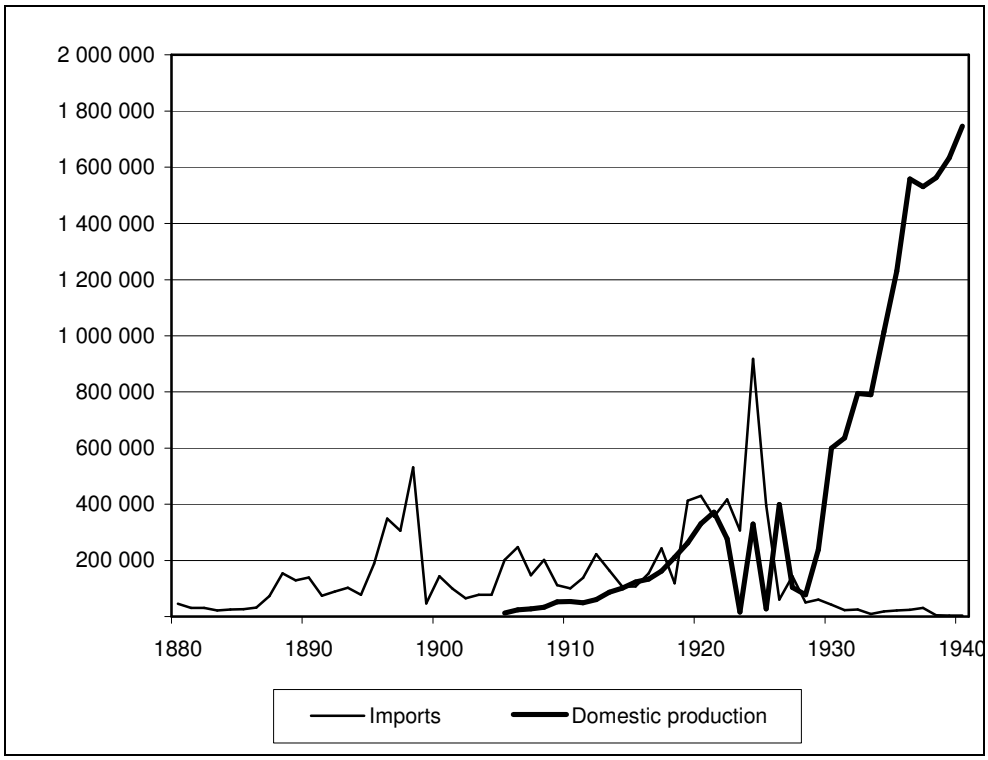
[47] PARATTE Véronique, *Marketing et publicité dans l'horlogerie. Le cas de Longines de 1900 à 1962*, Université de Neuchâtel : mémoire de licence, 2003..
[48] KYOKAWA Yukihiko, *Nihon no keizai hatten to gijutsu fukyū*, Tokyo: Toyo keizai shinpōsha, 1995, 358 p.
[49] KOJIMA Kenshi, *Meiji no tokei*, Tokyo: Kōsōshobō, 1988, 354 p.

and lifestyles became more modern, watches turned into useful objects and mass consumer goods during the 1890s.[50] The historian Hoshimi Uchida estimates that the percentage of Japanese with watches rose from 0.8 per cent in 1887 to 4.2 per cent by 1897 and 10 per cent by 1907.[51] This boom is the main factor behind the strong growth of watch imports until 1898, the volume of which came to 140,335 units in 1890 and 531,372 by 1898. This market was largely dominated by Switzerland, which had a 92.6 per cent share in 1890, far ahead of the United States and France with 3.3 per cent each.

Watch exports to Japan fluctuated during the 20th century, primarily due to a single factor: steadily rising customs duties. Three major increases in customs duties on watch imports in 1899, 1906 and 1926 led on each occasion to a spike in imports prior to their entry into force for purposes of stockpiling. This customs protectionism was primarily aimed at guranteeing protection for the manufacturer Hattori Kintaro on the Japanese market.[52] After opening a watch repair shop in 1877, followed by a watch shop in 1881, Mr. Kintaro started making clocks in 1892 then pocket watches in 1895. His firm, which later took the name of Seiko, dominated the Japanese watchmaking sector at the time. His products accounted for a considerable share of domestic production from 1906 to 1930, with clocks representing 47.9 per cent and watches, 85.2 per cent.

Figure 3: Watches imported to or produced in Japan, number of units, 1880-1940[53]

[50] NISHIMOTO Ikuko, *Jikan ishiki no kindai*, Tokyo : Hōsei daigaku, Tokyo, 2006, 406 p.
[51] UCHIDA 2002, p. 190.
[52] UCHIDA Hoshimi, *Tokei sangyou no hattatsu*, Tokyo, Seiko Institute, 1985, 494 p. and DONZE Pierre-Yves, « Le Japon et l'industrie horlogère suisse. Un cas de transfert de technologie durant les années 1880-1940 », in *Histoire, Economie et Société*, 2006, pp. 105-125.
[53] HIRANO Mitsuo, *Seikoshashi hanashi*, Tokyo : Seikosha, 1968, annexes, pp. 2-30.



Hattori's development in the watch manufacturing field relied on the incorporation of technologies imported from Switzerland and the US. At the time, these transfers were driven by traditional vehicles in Japan in the second part of the 19th century, which gave pride of place to individuals. Kintaro Hattori made two business trips to the US and Europe in 1899 and 1906, in the course of which he visited watchmaking plants and purchased machine tools. He also hired young Japanese who had learned watchmaking skills from importers of Swiss watches in Yokohama and at Le Locle Watchmaking School, in Switzerland.[54] Finally, his business activities brought him into contact with several major watchmakers, such as Waltham (US) and Longines (Switzerland), whose products he marketed in Japan. Yet despite these various contacts with foreign countries, Hattori remained at the helm of his firm. During the interwar period, his company did not seek to attract foreign investors. The same cannot be said about his main rival on Japanese soil, Citizen Watch Co, a direct product of Swiss foreign investment.

3.2 A Swiss watch manufacturer in Tokyo: Rodolphe Schmid & Co

[54] Swiss federal archives (SFA), E 6.172, letter of the Swiss embacy to the Commerce Division, 6th of December 1895.

Owing to the policy of combating *chablonnage* and establishing a cartel, the increased customs duties did not lead the major Swiss watch manufacturers to assemble or produce watches on Japanese soil. In the early 1900s, however, a Swiss citizen set up a watchmaking factory. Yet unlike the major watchmaking companies, he had no production facilities in Switzerland and started out as a watch merchant.

Born in Neuchâtel in 1871, Rodolphe Schmid settled in Yokohama in 1894, where he had an import-export business.[55] For some 15 years, he imported Swiss watches to Japan, where his business thrived. According to a business report of the company Omega drafted in 1912, "his company, after Schwob's, probably did the most business in Japan."[56] However, the watch trade was hard hit by the customs hikes in 1899 and 1906. As a result, Schmid shifted from importing, to producing watches in Japan. In 1908, he began importing *chablons* (movement sets), which he assembled in his Yokohama workshop[57] and cased into watch cases of his own making. From 1908 onwards, his family owned a watch case factory in Neuchâtel, under the name of Jobin & Cie.[58]

His company went through a new development phase between 1910 and 1913, when it changed over from assembling to manufacturing in Japan, which was, however, limited to watch cases (1913). Swiss watchmaking circles were outraged by this relocation of production facilities. The Neuchâtel Chamber of Commerce, Industry and Labour wrote to the Federal Department of the Economy to denounce "the selfishness of such an approach, as well as the grave harm that Swiss citizens, who have learned the trade in our country, can do to our watchmaking industry by setting up a factory for producing silver watch cases."[59] The Chamber asked the Tokyo Legation and the Swiss Commercial Agency of Shanghai "without placing obstacles in the way of the above-mentioned company, […] to avoid doing anything to facilitate its business activities."[60] Likewise, in 1915, the Federation of Manufacturers of Silver Watch Cases denounced Schmid's business activities and wrote to the Swiss Federal Council, stating that "our national industry stands at a crossroads; watchmaking is threatened by exodus as a result of lures on all sides."[61] Nevertheless, production was limited to watch

[55] SFA, E2200.136, 1973/37.
[56] Archives Omega, commercial report, 10th of December 1912.
[57] Musée international d'horlogerie (MIH), La Chaux-de-Fonds, report of Mr. P. Würmli, director of Fidhor, about *chablonnage* in Japan, 6th of October 1930.
[58] *Feuille officielle suisse du commerce*, 1908.
[59] SFA, E6.178.
[60] Ibidem.
[61] Ibidem.

cases and Schmid continued to import movements from Switzerland, which was why he refused to sign the conventions of 1928.[62]

Schmid's factory, which moved to Tokyo in 1912, [63] grew rapidly during the next two decades. The number of workers rose to some thirty by 1913,[64] then to 110 by 1920 and finally some 200 by 1927. Although it was far behind Hattori in size, it was the second largest watch manufacturer in Japan. It was a genuine factory, with industrial working conditions, and was the venue of one of the first workers' strikes in Japan, in 1921.[65]

Table 3: Main watchmaking firms in Japan, 1920[66]

Company	Location	Activity	No. of workers
Hattori Tokei	Tokyo	Watches, clocks	1943
Aichi Tokei	Nagoya	Clocks	702
Nagoya Shoji	Nagoya	Clocks	172
Schmid	Tokyo	Watches	110

3.3 The founding and early phases of Citizen Watch Co

Exactly how Schmid's company became Citizen Watch Co is not very clear. Documents are very sketchy, and the official version of the history of Citizen Watch Co speaks of the independent development of the company rather than continuity with a Swiss company.[67] Nevertheless, there are two elements that testify to the continuation of Schmid's activities within Citizen Watch Co: people and technical assistance.

It was doubtless the desire to expand further in Japan that led Schmid to look into establishing a new watchmaking company. Citizen Watch Co came into being in 1930, when the management of the Schmid factory bought up Shokosha, a watchmaking workshop set up by

[62] MIH, ibidem.
[63] ISHIKAWA Hiroyoshi, *Citizen no seimitsu keiei*, 1971, p. 76.
[64] SFA, E6.178, lettre od the Swiss embacy to the Commerce Division, 23rd of May 1913.
[65] *Shashi*, Tokyo : Citizen Life, 2002, vol. 1, p. 6.
[66] CHOU Kouken, *Nihon tokeisangyō no hatten to kigyōka katsudō. Daiichijidaisen izen no Seikosha to jirei tochite*, Kyoto University: master's thesis, 2002, p. 23.
[67] *Shashi*, Tokyo : Citizen Life, 2002, 2 vol., 156 et 130 p., and YAMADA Eiichi, *Waga seishun. Waga fūsetsuroku,* Tokyo: Yamada, 1996, 156.

the Japanese in 1918.[68] Shokosha had been founded in Tokyo by Kamekichi Yamasaki, who had owned a goldsmith's shop since 1893 and was eager to produce his own watches. Like Kintaro Hattori, he had made two business trips, to Europe in 1911 and to the United States in 1915, bringing back machine tools from the two countries. He had produced a first pocket watch in 1924 and had opened a private watchmaking school, which boasted some 40 students by 1926. However, the company ran into financial difficulties and was declared bankrupt in the late 1920s.

It was then taken over by "straw men"[69] acting on behalf of Rodolphe Schmid, who seems to have been interested in buying Shokosha directly. According to business information provided by Omega, Schmid in person "wanted to buy 100,000 yen worth of shares in the company", but his request was turned out for unknown reasons.[70] Be that as it may, Schmid had indirect control over the new company, which took the name of Citizen Watch Co. The shareholders of this new company came from two different groups (see table 4).

Table 4: Main shareholders of Citizen Watch Co, 1930[71]

Name	Activity	Capital (yen)	Capital (%)
N. Nakajima	Director, Schmid Co, Tokyo	30,000.-	15
Suzuki	Director, Schmid Co, Tokyo	30,000.-	15
Y. Kawamuro	Employee of wholesaler D. Kobayashi	20,000.-	10
K. Yamasaki	Dealer in gold plate and watches	20,000.-	10
Y. Osawa	Watch dealer, wholesaler	10,000.-	5
Y. Kanamori	Watch dealer, wholesaler	10,000.-	5
Unknown		80,000.-	40
Total		200,000.-	100

[68] *Shashi*, vol. 1.
[69] SFA, E7004, 1967/12, report on Japanese watches given by Mr. Tissot, 16th of February 1934
[70] Archives Omega, op. cit.
[71] Archives Omega, commercial report, 23rd of October 1930.

First, the main shareholders were two directors of Schmid Co. Nakajima was a salesman. Born in 1864, he had worked for various Japanese dealers and had travelled to the US before joining Schmid in 1897, when the latter was just an importer. Suzuki was hired by the company as soon as he finished his studies in 1908. For all practical purposes, the two men managed Citizen, even though they were still, strictly speaking, employees of Schmid Co up until 1933.

Second, there were several other major Japanese watch dealers. They invested in the company at the urging of Nakajima and Suzuki, who were raising funds, but did not intervene directly in Citizen's operational management. Yet their financial backing served their own purposes. By helping to set up a new watch brand, they sought to break free of Swiss business control and reap greater profits from the distribution of watches in their country. [72]

Citizen Watch began operating in 1930 on the premises of the Schmid factory. The new company hired some sixty former Shokosha employees. Initially, Citizen's employees merely assembled stocks of Shokosha pieces. However, these parts were hard to sell and the firm ran into problems. Operating at a loss until 1933, the company was propped up by Yasuda Bank. It also had to cope with worker discontent, when a strike broke out in 1933. In the final analysis, it was the designing and marketing of wristwatches that enabled it to improve, thanks to its ties with Schmid.

Schmid's commitment to Citizen was vital in ensuring technical assistance until 1945. He imported machine tools (1933)[73] and had a Genevan engineer design plans for new calibres (1934). [74] Likewise, important technical assistance came from the company Star Shokai, founded in 1926 by Schmid, Nakajima and Suzuki with a view to importing Swiss watches bearing the Mido brand to Japan. All three wristwatches marketed in 1931, 1935 and 1941 by Citizen until the end of the war were copies of Mido products.[75] Star Shokai, which was officially taken over by Citizen in 1932, was thus an essential intermediary in the transfer of technology between the two countries. Finally, mention should be made of Schmid's role in providing technical training for Citizen's staff. Many Schmid employees simply kept on working within the new company. [76] Moreover, there was a certain continuity as far as subcontracting was concerned. This was especially true for Nihon Keigi, a company founded

[72] *Shashi*, vol. 2.
[73] SFA, E7004, 1967/12, letter of the ASUAG to the Federal Office of Industry, 27th of April 1933.
[74] SFA, E7004, 1967/12, report on Japanese watches given by Mr. Tissot, 16th of February 1934.
[75] *Shashi*, vol. 2, pp. 106-114.
[76] *Shashi*, vol. 2, p. 4.

in 1927 by Sugamo, a Schmid employee at the time, who opened a watch assembly factory to which Citizen farmed out work until the 1960s.[77]

Thanks to the technical assistance from Schmid, Citizen's business picked up in the mid-1930s. The company built a new factory in 1934 and started exporting watches to China in 1936.[78] Unfortunately, there are no details as to production volume before the end of the 1930s. By 1939, Citizen was producing nearly 248,000 watches,[79] or 15% of domestic output. Although it was still lagged far behind Hattori and the latter's 1.3 million units, it was far ahead of imports, which had remained under 50,000 units since 1930. Schmid stopped operating in Japan sometime in the mid-1930s and returned to Switzerland. However, he kept a stake in the Tokyo watchmaking factory until 1945.

Conclusion

Rodolphe Schmid's career and the beginnings of Citizen Watch Co provide a textbook example of the transfer of Western technology to Japan via FDI in the consumer goods industry. Western trading companies set up in the Japanese port cities thus played an important role in technology transfer through a shift from the marketing of products, which was characteristic of their operations during the second half of the 19th century, to watch manufacturing, primarily in response to customs hikes. Manufacturing on Japanese soil was therefore an extension of commercial activities, which did not always take the legal form of a subsidiary or a joint venture. What we have here is a type of FDI that was less visible and harder to identify than with heavy industry but which nonetheless clearly facilitated the emergence of new industrial sectors in Japan during the interwar period. The watchmaking industry was no exception to the rule. Similar examples abound in the photographic industry, for example Minolta, set up in 1928 as a joint venture between a Japanese dealer and a German trading company based in Kobe,[80] or in the food industry, with the case of the beverage manufacturer Kirin, originating from an American brewery which was founded in the late 1860s to meet a demand created by Western expatriates and taken over by the Japanese in 1907.[81]

[77] *Shashi*, vol. 1, p. 7.
[78] *Shashi*, vol. 2, p. 10.
[79] *Shashi*, vol. 1, p. 11
[80] *International Directory of Company Histories*, vol. 18, pp. 339-342.
[81] *International Directory of Company Histories*, vol. 1, pp. 265-266.

The birth of Citizen Watch Co also reflects the failure of the Swiss watchmaking cartel, which set out to control technology transfer. In the final analysis, neither the convention-based system of 1928 nor the State's intervention in 1934 managed to establish strict control over the circulation of specialists, watches and capital. As the Swiss industrial district where watchmaking was located had several hundred independent workshops and firms, it seems unrealistic that cartel bodies could exercise absolute control over technology transfers. Nevertheless, there was limited industrial relocation of assembly plants. In the case of Japan, only a small company such as Schmid, loosely integrated into Swiss watchmaking networks, could risk opening up a production unit abroad. Unlike certain Anglo-Saxon and German multinationals, which managed to position themselves on the Japanese market by sharing know-how and capital within the framework of joint ventures, the major Swiss watchmaking companies opted during the interwar period to go it alone, which by and large explains the difficulties they encountered in the 1960s and the 1970s with the advent of electronic watches.[82]

[82] CREVOISIER Olivier, *La transformation de l'industrie horlogère dans l'Arc jurassien suisse de 1960 à 1990*, Neuchâtel : IRER, 1990, 51 p. and PERRET Thomas, TISSOT Laurent e.a., *Microtechniques et mutations horlogères. Clairvoyance et ténacité dans l'Arc jurassien. Un siècle de recherche communautaire à Neuchâtel*, Hauterive : G. Attinger, 2000, 333 p.