

Regimes of Technology Transfer in Japan's Cotton Industry, 1860s-1890s*

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not for citation

Introduction

The Kansai area around Ōsaka was the heart of Japan's cotton textile industry during the pre-industrial period as well as during the industrialization period after the 1880s, when it came to be labelled 'the Manchester of the Far East'. The prominence of the region attracted the attention of a number of Western commentators from the 1900s onwards, and its development has been discussed in recent English language works, notably those by Mosk and Farnie *et.al.*¹ Many of these writings focus almost exclusively on the period after the 1890s, the decade that is invariably identified as the 'take-off' period for Japan's modern cotton spinning production. They acknowledge that the transformation of the Kansai cotton industry of the Edo period into its mechanized successor

* Please note that with the exception of references to Japanese authors writing in English, Japanese names are in the conventional Japanese order, with family name preceding given name

¹ Carl Mosk, *Japanese Industrial History: Technology, Urbanisation and Economic Growth* (Armonk NY & London: M.E.Sharpe, 2001); Douglas A.Farnie *et.al.* (eds.), *Region and Strategy in Britain and Japan: Business in Lancashire and Kansai, 1890-1990* (London: Routledge, 2000); Heber, *Die japanische Industriearbeit* (Jena & Zürich: G.Fischer, 1912); Arno S.Pearse, *The Cotton Industry of China and Japan* (Manchester: International Federation of Master Cotton Spinners and Manufacturers Associations, 1929); Claus Moser, *The Cotton Textile Industry of Far Eastern Countries* (Boston MA: Pepperell Manuf. Co., 1930).

was neither simple, nor a foregone conclusion, but do not necessarily analyse the transition years of the late 1860s-early 1890s.

This paper is concerned with the 'hiatus' years of the 1860s-1890s, during which institutional change and the country's opening to foreign trade were key factors in the cotton industry's experiencing major dislocation in existing patterns of production and trading. It focuses on the transfer of new cotton technologies up to the early 1890s, and the development of the scientific and engineering knowledge in which they were grounded. Using as a starting point Patrick O'Brien's definition of regimes of useful and reliable knowledge,² it analyses in particular how far urban sites (Tokyo and Ōsaka), institutions, incentives and patronage supported the technological changes that enabled the survival and growth of the earliest mechanized production facilities. A full analysis of patterns of investigation, and the assumptions behind them, lies beyond the scope of this paper, but individual experiences can give some indication of how methods were adopted and difficulties overcome.³

Much of the search from the late 1860s for innovation and change in cotton production, including the first production facilities using imported technology, took place outside the Kansai region. It was the Tokyo region (Kantō), rather than Ōsaka, that played the critical role in the initial diffusion of the new scientific and technical knowledge in which the

² Patrick O'Brien, 'Regimes for the Production and Diffusion of Useful and Reliable Knowledge', GEHN Konstanz Conference Paper, p.4.

³ For some interesting papers on the cultural context of technology in Japan see Ian Inkster & Fumihiko Satofuka (eds.), *Culture and Technology in Modern Japan* (London & New York: I.B.Tauris, 2000). See also Tadao Umesao, James Bartholomew & Shigeharu Sugita (eds.), *Japanese Civilization in the Modern World*, vol.10, *Technology* (Kyoto: National Museum of Ethnology, 1998).

modern spinning industry was grounded, and a Tokyo-based government that was behind the early attempts at the promotion of a modern cotton industry. The Ōsaka Cotton Spinning Company, acknowledged as the first of the large mechanized companies to be associated with commercial success, was the result of a Tokyo-based initiative. It was in large part supported by Tokyo capital. The first Japanese engineers possessing a thorough grounding in Western techniques, were almost exclusively educated in Tokyo. Most were beneficiaries of the general education in applied (useful) knowledge provided by the state, which, in conjunction with training offered through the private sector, helped to bridge the technological gap. This useful knowledge was diffused more widely through the individuals who had received that education. Yet it was in the Ōsaka area that mechanized cotton spinning really took off. The earliest attempts to set up modern cotton spinning facilities, both before and after the Meiji Restoration, in Kantō and elsewhere, failed to break Ōsaka's traditional dominance of the industry, failed to achieve commercial success, and failed to establish technological standards that could guide the industry towards international competitiveness. This trajectory suggests that while the 'regime change' of 1867-8 was critical in developing sites conducive to effective transfers of technological knowledge, it was not in itself a sufficient condition. The key question is therefore what were the main factors that contributed to the existence of a regime in Kansai from the mid-1880s that was more conducive to the growth of mechanized cotton spinning than those that had prevailed in Tokyo or other regions over the preceding twenty years. I will argue that

technical expertise was the element that made a major difference, unlocking other resources that were essential for commercial success. This issue will be addressed by looking at the technological experience of some of less successful early ventures and comparing them with the first successful companies. All the companies considered here were linked by the fact that they eventually all became part of the Greater Japan Spinning Company (Dainihon Bōseki), one of the ‘big three’ that dominated Japan’s pre-Pacific War cotton industry. The analysis will explore how technical knowledge was generated, how the companies accessed that knowledge, and what kinds of technological decisions were made.

The first part of the paper looks briefly at the experiences of the Kagoshima and Sakai spinning mills, two of the first endeavours to introduce mechanized cotton spinning to Japan. It outlines the acquisition and application of new technology in the mills, focusing in particular on the individuals who planned and implemented it. It will be suggested that these mills exhibited certain problems that also characterized their successors in the 1870s and early 1880s. There were serious problems in using the new technology efficiently; facilities were too small to allow for economies of scale, and the technical knowhow to install and operate the machinery effectively were lacking. Managerial incompetence and political intervention also contributed to the fluctuating fortunes of many mills.

The remainder of the paper focuses on three companies whose appearance was stimulated by the success of the Ōsaka Cotton Spinning Company after 1885 – the Hirano, Amagasaki and Settsu companies –

and the engineer who was closely identified with the technological developments that were integral to their success. The name of Kikuchi Kyōzō (1859-1942) was synonymous with the rise of the cotton industry in pre-war Japan, but his career in the 1880s-1890s also offers us a window on how early Meiji Japan was able to promote the diffusion and application of technical knowledge. Kikuchi was educated at the Imperial College of Engineering (*Kōbu Daigakkō*) in Tokyo, a government established institution of higher education that became a major channel for technology transfer from the West. The importance of the College, which was founded in 1873 and later became part of Tokyo's Imperial University, has been noted by several scholars,⁴ but mostly in the context of its contribution to the construction of infrastructure, heavy industry or technical education more broadly. There was no specialized course on textile engineering, but the significance of the College was as the site of acquisition of basic technical knowledge. College students who became textile engineers received a general mechanical engineering training to which they subsequently had to add specialized textile knowledge. In the early years that specialized knowledge was normally acquired at a different site, in most cases overseas, usually in Britain. The education offered at the College, which marked an early indigenization of technical training, is the subject of the second part of the paper.

⁴ E.g. James R. Bartholomew, *The Formation of Science in Japan: Building a Research Tradition* (New Haven & London: Yale University Press, 1989); Olive Checkland, *Britain's Encounter with Meiji Japan* (Basingstoke: Macmillan, 1989); Ian Inkster, *Japanese Industrialisation* (London: Routledge, 2001).

Knowledge of mechanical engineering was a scarce commodity in early Meiji Japan. The technical expertise behind the first commercially successful mechanized cotton mills in Kansai was effectively provided by just three engineers – Yamanobe Takeo, Saitō Tsunezō and Kikuchi Kyōzō. Both Saitō and Kikuchi came from the College of Engineering in Tokyo. All three honed their textile-specific skills overseas, and returned to play a key role in the transition of the Kansai industry. The business historian Morikawa Hidemasa has suggested elsewhere that the provision of scarce skills in the form of trained engineers ultimately enabled the effective mobilization of local capital and knowhow,⁵ and focussing on the three mills with which Kikuchi was involved allows us to see how the provision of a new, more international regime of knowledge provision and diffusion was able to facilitate the building of a new Kansai regime in which existing resources of capital and commercial expertise could be combined with the new technology. This regime permitted the sharing of scarce skills, although it was slow to award the engineers the recognition that they believed they merited. The building of the new regime as shown through the history of the Hirano, Amagasaki and Settsu Mills is dealt with in the final part of the paper.

⁵ 'The Education of Engineers in Modern Japan: an Historical Perspective', paper presented at Anglo-Japanese Business History Conference, London School of Economics, 1992(?).

The Kagoshima and Sakai spinning mills

Three mills are normally identified as the earliest attempts to introduce mechanized cotton spinning to Japan – the Kagoshima and Sakai mills, and the mill founded by the Tokyo cotton merchant Kashima Manpei in 1872. The first of these, the Kagoshima Spinning Mill, was in large part the legacy of Shimazu Nariakira, who had been the *daimyō* of Satsuma domain in the 1850s. Located at the southern tip of Kyūshū island, far distant from the cotton centre of Kansai, Kagoshima was not an obvious site for industrial leadership in cotton spinning, but Nariakira, like many other *daimyō*, was a firm believer in the value of domain mercantilist policies. Even before the start of trade with the West he had been concerned at the depressed state of Satsuma's cotton industry and the influx of cheap cotton goods (mostly from Kansai), and had taken steps to promote the cultivation and manufacture of cotton, not least in the interests of domain finances. He had sponsored the building of a 'manufacture' (manufactory) in which traditional spinning and weaving techniques had been brought together under one roof, as well as the construction of water-powered weaving sheds. By the mid 1860s the largest weaving shed, in what is now Kagoshima City, employed about forty workers, three or four to every loom. The majority of workers were men, reportedly those whom physique rendered less suitable to regular agricultural labour. The looms were Japanese made; early thoughts of using imported looms were rejected because of shortages of the high quality thread that such looms would have required and the fear of depriving of work the farmers' daughters who had conventionally spun the

thread. It became increasingly clear, though, that domestic handicraft producers could not compete with the quality of imported thread. Foreign spinning machinery was seen as the only answer, and on his death in 1858 Nariakira's will stated that his successor was to establish a cotton spinning mill using Western techniques and machinery.⁶

In 1865 a group of Satsuma domain officials and students were dispatched on a tour of study and investigation to Europe and the United States.⁷ One of the group, Niinō Gyōbu, was allocated the specific task of looking closely at the British cotton industry; his instructions included ordering spinning machinery to be installed in the new factory, and employing British engineers to supervise the installation of the machinery and its initial operation. On arrival in Europe in mid-1865 Niinō and his assistant, Godai Tomoatsu,⁸ immediately set to work, but neither man possessed the technical expertise to make informed judgements regarding the suitability of machinery for their project. The two therefore had little choice but to place themselves in the hands of others. Like almost all their countrymen who followed them to Britain, they approached Platt Brothers in Lancashire. Platts drew up for them a comprehensive plan for a spinning and weaving facility and arranged to supply all the machinery, either its own or from other Lancashire firms. The delegates accepted the Platt designs, and concluded an agreement early in 1866.

⁶ Kinugawa, Taiichi, *Honpō Menshi Bōsekigyō Shi* vol.1 (Ōsaka: Nihon Mengyō Kurabu, 1937), p.46ff. Kinugawa's book is the main secondary source on the Kagoshima and Sakai mills, and has been used here except where stated otherwise.

⁷ For information on this and other missions see Andrew Cobbing, *The Japanese Discovery of Victorian Britain* (Richmond, Surrey: Japan Library, 1998).

⁸ Later a leading Meiji businessman with a range of business interests and closely associated with the development of Ōsaka as a commercial and financial centre.

The total cost was £10,000.⁹ Platts was also entrusted with finding engineers to go to Japan to install the machinery and supervise its initial operation. Accounts suggest that the group consisted of a manager and five or six specialist engineers.¹⁰ The machines were shipped into Nagasaki early in 1867 and thence transported to Kagoshima. An installation engineer accompanied the machinery, and the other engineers arrived shortly after. The building to house the mill had already been started, and by June of 1867 all the machinery had been installed and was ready to run.

Within a year the British engineers had returned home and the mill, which employed around 200 workers from the locality, was being run by Satsuma managers.

The mill faced problems from the start in achieving commercial success. Firstly, Kagoshima was, of course, a long way from the existing centre of the cotton trade. This not only impacted on the price of its inputs (domestically produced raw cotton from Hiroshima and Kansai), but also its ability to sell its product through experienced traders who knew the market. Secondly, the scale of the mill was very small compared to that of Western producers. The production machinery consisted of three mule frames of 600 spindles each, and six throstle frames of 308 spindles each, a total of 3648.¹¹ Moreover, the rapid departure of the British technical

⁹ Godai, Ryūsaku (ed.), *Godai Tomoatsu Den* (repr. Tokyo: ?, 1936), p.37.

¹⁰ Kinugawa suggests that there was a manager and six engineers, but some other writers suggest there may have been fewer than this (eg. Gendai Nihon Sangyō Hattatsu Shi Kenkyūkai (ed.), *Gendai Nihon Sangyō Hattatsu Shi* vol.11 *Sen'i (jō)* (Tokyo: Gendai Nihon Sangyō Hattatsu Shi Kenkyūkai, 1964), p.64).

¹¹ Shashi Hensan linkai, *Nichibō 75-nen Shi* (Ōsaka: Nichibō Kabushiki Kaisha, 1966), p.10.

experts left the mill in the hands of those who lacked adequate skills to run the operation efficiently, so even that limited amount of machinery was not being run at maximum capacity. For this and other reasons the labour:capital ratio was well below the optimal. Whereas the British manufacturers recommended 82 workers per 5,200 spindles, the Kagoshima Mill was using over double that number to work under 4,000. The structure of managerial decision-making was also confused. Apart from two branches of the Shimazu family, both prefectural and national governments after the Restoration took an interest in the operation of the mill.

The Kagoshima mill was never a serious commercial proposition. It staggered on, the beneficiary of subsidies and support from local and central government, until its eventual demise in 1897. In the spirit of the recycling of old machinery that has been identified by writers such as Chandavarkar in the case of India,¹² some of its original components were then utilized by another local textile company. Despite its lack of profits the mill was nevertheless in some ways a success. It had been conceived as a model mill with the objective of achieving technology transfer, and provided valuable practical experience of the difficulties of implanting the new technology. The Satsuma authorities attempted to address the locational problem by the establishment of a second mill at Sakai near Ōsaka, which started operations in 1871. Its capacity of around 4,000 spindles (four sets of mule frames) made it marginally larger than

¹² *Ibid.*; Raj Chandavarkar, 'Industrialisation in India before 1947', *Modern Asian Studies* 1985.

Kagoshima, but the scale was still small.¹³ Godai Tomoatsu, who had been involved with the purchase of machinery for the Kagoshima mill, helped with the management. Workers from Kagoshima were assigned to instruct the employees of the new factory.¹⁴ Knowledge gained at the first mill was already being diffused to a second, helped by the existence of common ownership and control. The Kansai location was not sufficient, however, to allow the Sakai mill to make much progress. Operational difficulties led to its being bought up by the Finance Ministry as early as May 1872. After being sold to the private sector in 1878 it went through a number of permutations, most of them unprofitable, before being taken over by Kishiwada, a large and successful mill, in 1903.¹⁵

The third of the three mills was the Kashima Mill in Tokyo. It was far smaller than even the Kagoshima and Sakai mills, with only 576 spindles. It ran on 28 h.p. of waterpower, and employed 52 workers. By 1874 these three operative mills together totalled little more than 8,000 spindles. None was making a profit, and it was clear that follower firms would need more help to set mechanized spinning on a commercial path. The prospects for the indigenous cotton industry looked bleak. The evenness and consistent quality of imported yarn made it more attractive to handloom weavers than its domestic handspun competitor. Domestically produced raw cotton was becoming increasingly uncompetitive on international

¹³ Kōzaburō Katō, 'Yamanobe Takeo and the Modern Cotton spinning Industry in the Meiji Period', in Erich Pauer (ed.), *Papers on the History of Industry and Technology of Japan*, vol.II, *From the Meiji Period to Postwar Japan* (Marburg: Förderverein Marburger Japan-Reihe, 1995), p.5

¹⁴ Kinugawa, *Honpō Menshi Bōsekigyō Shi* vol.1, pp.145-196.

¹⁵ Shashi Hensan linkai, *Nichibō 75-nen Shi*, p.10.

markets. Rising prices in the 1870s provided a further incentive to cheaper imports and compounded balance of payments problems. The implications of rising cotton goods imports was of major concern to the central government, and in the late 1870s the authorities attempted to counteract this trend by the direct route of importing machinery and selling it interest free to private companies with a view to encouraging self-sufficiency in cotton yarn. Ten companies scattered across the country received 2,000 spindles each, barely half the capacity of the struggling Kagoshima and Sakai mills. Significantly, when the government purchased spinning machinery from Europe to resell it to private mills, only one of the beneficiaries was in the Kansai area,¹⁶ indicating a possible reluctance to build on existing strengths in the area. The boost was insufficient to address the issue of scale, nor did it deal with the issue of technical expertise. It did little to promote a breakthrough. Where the government was to help, however, was through its promotion of technical training, as will be shown in the next section.

¹⁶ Tōyōbō Kabushiki Gaisha Henshūshitsu, *Tōyōbō Hyakunen Shi* (2 vols., Ōsaka: Tōyōbō, 1986), vol.1, p.11.

The College of Engineering¹⁷

The Meiji government's new Ministry of Industry, established in 1870, took the initiative in founding a college of engineering, announcing in 1872 the establishment of the Engineering Bureau (Kōgakuryō). The Ministry of Industry had a vested interest in technical training, both as part of an industrialization project, and as the operator of production facilities owned by the government. This college was to be the first institution of advanced technical education in Japan. Its first principal was Henry Dyer,¹⁸ a youthful Glasgow engineer recruited through the good offices of Hugh Matheson (of the trading company Jardine and Matheson), who was acting as the Ministry's agent in Britain. On arrival in Tokyo in 1873 Dyer became responsible for the development of the college and the academic content of its curriculum. Overall control remained in the hands of Yamao Yōzō, who had studied science and engineering in Britain, including a stint at Anderson's College in Glasgow, where Dyer had also taken classes, and who as Vice-Minister of Industry had been an ardent supporter of the need to promote technical education.

Under Dyer's leadership the college offered a two-year preparatory course in which students took a range of subjects followed by a four year

¹⁷ The main work on the development of the College of Engineering is Kyū Kōbu Daigakkō Shiryō Hensankai, *Kyū Kōbu Daigakkō Shiryō* (Tokyo: Toranomonkai, 1931). Except where stated this is my source of information on the College. Morikawa discusses the engineering education offered at the College in 'The Education of Engineers in Modern Japan'. Some of the material is taken from my brief paper, 'British Training for Japanese Engineers: The Case of Kikuchi Kyōzō (1859-1942)', in Hugh Cortazzi & Gordon Daniels (eds.), *Britain and Japan 1859-1991: Themes and Personalities* (London & New York: Routledge, 1991).

¹⁸ Except where stated information on Henry Dyer is from Nobuhiro Miyoshi, *Henry Dyer, Pioneer of Engineering Education in Japan* (Folkestone, Kent: Global Oriental, 2004).

specialist course. Renamed the [Imperial] College of Engineering (Kōbu Daigakkō) in 1877, the College was in 1886 amalgamated into the newly founded Tokyo Imperial University. The first graduates completed their courses in 1879, and by the time of the merger in 1886 some 211 students had been through the system.¹⁹ Over the same period the faculty changed from being almost entirely Western (mostly British) to being largely Japanese. The numbers involved were, of course, relatively small, but the contribution made to the country's economic development by many of the graduates far exceeded their numerical significance. The cotton textile industry will be used to demonstrate this, but in order to appreciate the broader significance of the technical training offered by the college we need to think both about the content of the education that was received and the subsequent careers of college graduates.

At the time of the founding of the college there were few further technology institutions across the globe that offered instruction in all branches of applied science under the same roof. By the second half of the 19th century engineering in the more industrialized economies had become more fragmented into specialist fields, and more based on scientific principles than hitherto, but training institutions had not necessarily adapted in line with this change. Dyer modelled his 2+4 course on those of a college in Zürich, while drawing also on his own Glasgow-based experience. The objective was to ensure a common basis of scientific knowledge combined with advanced expertise in a particular field of engineering. The first two years were common to all students, with

¹⁹ Kyū Kōbu Daigakkō Shiryō Hensankai, *Kyū Kōbu Daigakkō Shiryō*, p.352.

the one exception that students took more advanced courses in their selected specialization. Courses included basic science, mathematics and English. Seven specializations were offered: mechanical engineering, civil engineering, telegraphy, chemistry, architecture, mining engineering and metallurgy. Later on naval architecture (marine engineering) was added. It was acknowledged by the course designers that Japan's technological base (at least in terms of Western knowhow) was limited, and that the two year general course might under certain circumstances be insufficient. The earliest regulations stated that 'Until the scientific progress of the people is achieved the term of the preparatory course may, at the discretion of the authorities and depending upon a student's work, be extended to three or four years, and this extension will not be included in the normal 6 year term of study'.²⁰ This provision would, however, appear to have been rarely used.

The emphasis in the specialist 4 year courses was both scientific and practical. Dyer believed that students should receive 'an introduction to theory and practice and their mutual relations', and that they 'should be trained in the habits of observation and original thought'.²¹ During the first two years of the specialist course students spent half their time in the classroom and the remainder on practical work. The emphasis in the final two years was overwhelmingly in the application of the knowledge that they had acquired, with the objective of being able to move rapidly into responsible roles in employment. Over the final three years of their studies

²⁰ Kyū Kōbu Daigakkō Shiryō Hensankai, *Kyū Kōbu Daigakkō Shiryō*, p.200.

²¹ Henry Dyer, *Dai Nippon – the Britain of the East* (London: Blackie, 1904), p.5.

they also spent the summer vacations in work placements, usually in mines or factories controlled by the Ministry of Industry. This access gave students at the college a considerable advantage over their counterparts in other educational establishments. The practical emphasis appears to have declined somewhat when the college later came under the aegis of the Education Ministry, but up to the mid-1880s many college students had the opportunity of frequent exposure to the workplaces where their skills would be applied. Students specializing in mining practiced drilling and blasting, metallurgy students discovered copper smelting and mechanical engineering students designed and constructed looms. In this practical emphasis, Dyer was later to claim that the college was truly a leader in global engineering education. He could also make the case that 'the Japanese engineers who are now running the most important concerns in Japan were trained in the College and can dispense altogether with foreign aid'.²²

After graduation a college student was contracted to work for the Ministry of Industry for a period of seven years, an arrangement limited by the ministry's abolition in 1885. Analysis of the subsequent careers of graduates show that many spent most of their time in the private sector, but that some also spent many years in government service. A number replaced their teachers as part of the process of 'Japanisation' of engineering education. It is not possible to get a comprehensive list of students' careers for the whole period of the college's operation, but a sample of 84 graduates surveyed in 1897 indicated that 23 (27%) were

²² *Ibid.*, p.7.

employed in the railway business, 19 (22%) had some textile connection, and 10 were in shipbuilding. Nine were employed in educational establishments of various kinds, and the remainder were to be found in mining, metallurgical production and light engineering.²³ The prominence of graduates in railways and textiles at this time (1897) is unsurprising. The 1890s was witnessing a railway boom, and most rail companies employed at least one engineering college graduate. Both silk and cotton production were expanding at a rapid rate as well. As two of the largest sectors of the Japanese economy, and leaders in the introduction of factory production and modern infrastructure, their need for technical expertise was considerable. This concentration of engineers in textiles was not, however, characteristic of the previous decade, during which modern cotton spinning was making its transition from the small scale, unprofitable mills of the kind started at Kagoshima to larger scale, commercially viable ones, a time when pioneering enterprises had to contend with an acute shortage of engineering skills. It is in the context of that scarcity that the role of Kikuchi and his two colleagues became so important. Their careers and activities demonstrate well the context within which reliable and useful knowledge was communicated and applied to the advantage of a major industry.

²³ Stafford Ransome, 'The Training of Engineers in Japan', *The Engineer* 27 Nov. 1897 & 3 Dec. 1897. A full list of names of graduates 1879-1885 is given in Ōuchi, Tsutomu & Tsuchiya, Takao (eds.), *Meiji Zenki Zaisei Keizai Shiryō Shūsei* vol.17, *Kōbushō Enkaku Hōkoku* (Tokyo: Meiji Bunken Shiryō Kankōkai, 1964), but no information is offered on their subsequent careers. A similar list is given in Kyū Kōbu Daigakkō Shiryō Hensankai, *Kyū Kōbu Daigakkō Shiryō*, pp.349-352, along with the students' class of degree. This breakdown is also given in Morikawa's paper, along with a similar breakdown for the years 1886-1905 for engineering graduates in the Tokyo University Faculty of Engineering after the amalgamation ('Education of Engineers in Modern Japan').

Engineers in the Early Cotton Industry

The Ōsaka region remained in the 1870s the most significant concentration of manufacturing in Japan,²⁴ but only in the 1880s did the Kansai region fully reassert its old position as the cotton centre of Japan. To understand the continuities and changes that marked the years of the early Meiji period, many scholars have looked to the history of individual cotton companies, in particular the Ōsaka Cotton Spinning Company, which was the first of the large mechanized companies to be associated with commercial success, and which is credited as making the breakthrough that initiated the rise of the industry. The Ōsaka Cotton Spinning Company was the brainchild of the legendary entrepreneur, Shibusawa Eiichi, whose interest in cotton production is reputed to have come from the fact that his Daiichi Bank handled the bills for imported cotton from Yokohama for the Kansai area.²⁵ Shibusawa managed to interest a group of local wealth holders and members of the nobility from both Kantō and Kansai in providing the capital required to set up a mechanized cotton spinning mill of 10,000 spindles, a scale far in excess of anything attempted previously. The project was conceived as a union of the two geographical areas, but the decision to locate the first mill in Kansai rather than Kantō, and the name given to the company, was a key factor in mobilizing Kansai support for what was essentially a Kantō project. The decision to locate in Ōsaka was also based on practical

²⁴ Amano, Masatoshi, 'Sangyō Kōzō to Chiiki Keizai', in Nishikawa Shunsaku, Odaka Kōnosuke & Saitō Osamu (eds.), *Nihon Keizai no 200 Nen* (Tokyo: Nihon Hyōronsha, 1996), p.197.

²⁵ Information on the establishment of the Ōsaka company is from Tōyōbō, *Tōyōbō Hyakunen Shi*, vol.1, p.14ff.

considerations, including the proximity to water sources (the mill was initially intended to be run on water power), the probability of finding workers more easily, and the fact that Ōsaka, as the traditional centre of the cotton industry, was a reservoir of appropriate commercial and marketing skills. The founders negotiated with the Ōsaka government authorities the procurement of a riverside site unencumbered by housing with easy access for inputs and output. At the company's start, in 1883, the Kansai area accounted for 56 out of the total of 95 shareholders in the company, but this group accounted for less than one third of the total value of shares, their average holding being relatively small. At inception, notwithstanding its location, the Ōsaka Company was clearly overwhelmingly the product of Kantō initiative and Kantō capital.

Over the course of the next few years, the prosperity of the company grew. By 1889 it employed nearly 3,000 workers, marketed its thread across the country and its name had become a byword for quality goods among cotton spinning interests. It kept its operating costs relatively low compared to many other firms, and was able to maintain a profit and pay out the large dividends which it needed to sustain further expansion. By increasing production capacity and recognizing the importance of economies of scale, the Ōsaka company had successfully tackled one of the main impediments to the success of earlier companies. The company's success also helped to confirm that Kansai continued to be the most favourable location for the revival of the cotton industry. While availability of local raw materials, and proximity to the cotton market, were major incentives to siting early mechanized mills there, it was also widely

recognized that Ōsaka possessed crucial infrastructural and other advantages conducive to the prosperity of mechanized cotton spinning. The government-sponsored survey *Kōgyō Iken* (*Opinion on Industry*) of 1884 identified Kansai and Sanyō (the area west of Ōsaka along the Inland Sea) as the best locations for cotton production on grounds as diverse as transport and communications networks, the price of coal, marketing and purchasing expertise, and availability of labour. A later Western observer noted that the early development of cotton in the area was helped by its proximity to sea transport, and the fact that Ōsaka possessed softer water than its possible rival Nagoya, which was advantageous for bleaching and printing processes.²⁶ Particularly important, perhaps, was *Kōgyō Iken*'s identification of Ōsaka as somewhere where finance was likely to be available, and in this context it is instructive to note that the Tokyo-Ōsaka balance within shareholdings in the Ōsaka company changed rapidly. By the end of 1889 Ōsaka merchants constituted 62% of company shareholders, and Tokyo residents only 10%, identifying the company much more closely with the business interests of the Kansai area.

The initial success of the company seemed more conspicuous in the context of what was perceived as the general backwardness of the cotton industry and its position as a flourishing private concern in a field dominated by weak, government-sponsored ones.²⁷ For some commentators the Ōsaka company seemed to be the exception that

²⁶ Pearse, *Cotton Industry of Japan and China*, p.31.

²⁷ See eg. J.H.Longford, 'Report on Native Manufactures of Cotton Goods in Japan', *British Parliamentary Papers* vol.LXXXIII, no.49, 1887, pp.8-9.

proved the rule, but it became both an inspiration and a role model for others. Where the Ōsaka company led, others followed, and in the years 1885-1887 alone nine new companies were founded, each with capacity at least equivalent to that of the Ōsaka mill. The process accelerated in subsequent years. Whereas in 1881 Japan had only 7 mechanized mills with a total of 16,204 spindles, by 1889 there were 28 mills with 215,190 spindles, and by 1899 83 mills with nearly 1.2m. spindles.²⁸ The growth of productive capacity was accompanied by a marked shift in momentum in the industry towards Kansai. As of 1889 8 of the 16 operative or proposed 10,000+ spindle mills were in the Ōsaka area, 2 each in Aichi (Nagoya) and Tokyo, and the remainder in Hyōgo, Mie, Okayama (all in the Kansai-Sanyō region) and Fukuoka in northern Kyūshū.²⁹ Production also rapidly began to move towards higher value-added products. Between 1889 and 1901 the average count of yarn produced by Japanese mills moved from c.15-17 (coarser) to c.28-31 (finer).³⁰

As noted earlier, a key factor in the commercial viability of the Ōsaka company was its recognition of the importance of economies of scale. What the company had also managed to do, however, was to address the lack of technical knowhow that had bedevilled the early mechanized mills. The company's engineer, Yamanobe Takeo, was crucial to its breakthrough. Yamanobe was the first of the three engineers on whom the industry depended in the 1880s. He had studied

²⁸ Pearse, *Cotton Industry of Japan and China*, pp.18-19.

²⁹ Takamura, Naosuke, *Nihon Bōsekigyō Shi Josetsu* (2 vols., Tokyo: Hanawa Shobō, 1971), vol.1, p.116.

³⁰ Shashi Hensan linkai, *Nichibō 75-nen Shi*, pp.34-5.

engineering at King's College in London, and acquired practical experience through spending time in Lancashire, including an eight month stint at a mill in Blackburn belonging to one William Edward Briggs. It was Yamanobe who took the seminal decision to go mainly for ring spindles rather than mules. He was responsible not only for the larger scale of operation of the new mill, and its use of steam rather than water power, but also the emphasis on maximizing the use of the expensive capital equipment. The mill from the start operated for 24 hours a day, a risky business given the initial usage of kerosene lamps, but addressed by Yamanobe with a rapid shift to electricity.³¹ Most importantly, Yamanobe's period of study in England had given him both the theoretical and practical engineering knowledge to understand the principles on which the machinery operated, and how to address the day to day problems that arose. For the other two engineers, Saitō and Kikuchi, the theoretical base was provided in Japan, although the practical experience still had to be obtained overseas. Saitō graduated from the College of Engineering with a second class degree in 1882, and eventually became managing director of the famous Mie Mill, subsequently enjoying a long managerial career in the cotton industry. With the careers of these men the site of acquisition and application of technical knowhow changed from Tokyo, with its government dominance, to Kansai, where development relied on the private sector. The new technical knowledge enabled the new mechanized production to capitalize on the business and personal networks, and the commercial expertise already existing within the locality.

³¹ Katō, 'Yamanobe Takeo and the Modern Cotton Spinning Industry', pp.9-12.

Kikuchi Kyōzō³² and the Follower Companies

Born in 1859 in Ehime (northern Shikoku), Kikuchi had studied English for two years prior to attending the college, and had originally aimed to pursue a career in marine engineering after graduation. Lured by an offer of double the salary, he left his first employment at the government's naval dockyard to work at the Mint in Ōsaka, but shortly after having taken up employment there that he was approached to act as chief engineer in a proposed new cotton spinning mill to be established at Hirano. Despite his first class degree in mechanical engineering, Kikuchi was blunt enough to admit that he knew nothing whatsoever about modern cotton spinning technology. He made it a condition of acceptance that the new company would pay for him to study the requisite technology in Britain. For a year from the autumn of 1887 he was away from Japan. His tasks were to study cotton spinning technology and order equipment for the new facility. Like Yamanobe, he spent much of his time in Lancashire, attending technical night school and working in the daytime at a factory in Middleton. He arranged for the purchase of 10 (mostly ring) spinning frames from

³² Kikuchi's name is familiar to Japanese economic historians, but there has been little detailed study of him. The main source in Japanese is Nitta Naozō (ed.), *Kikuchi Kyōzō Ō Den* (Ōsaka: Kikuchi Kyōzō Ō Denki Hensan Jimusho, 1948). Information is also provided in Nichibō, *Nichibō 70-nen Shi*. In English see my 'British Training for Japanese Engineers'. There is also brief mentions in Tsunehiko Yui, 'The Development, Organisation and International Competitiveness of Industrial Enterprises in Japan, 1880-1915', paper presented at the Business History Conference, Atlanta GA, March 1988; Hidemasa Morikawa & Tsunehiko Yui (eds.), 'Significance and Development of Middle Management in Japan', in Nakagawa & Yui (eds.), *Organisation and Management* (Tokyo: Japan Business History Institute, 1983); Tetsuya Kuwahara, 'Business Strategy of Japanese Cotton Spinners: Overseas Operations, 1890-1931', in Akio Ōkōchi & Shinichi Yonekawa (eds.), *The Textile Industry and its Business Climate* (Tokyo: University of Tokyo Press, 1982).

Platt Brothers for the Hirano Company.³³ After returning he was installed as chief engineer and general operating manager of the new Hirano mill.

All the three key textile engineers of this period were young, and Kikuchi was still well short of his thirtieth birthday. The responsibilities were enormous, but were to become even greater. Members of the local elite in Amagasaki, near to Ōsaka, had cooperated with Ōsaka financiers to found a new company, whose ambitious long term objective was to establish a 50,000 spindle operation. In June 1889 the founding committee of the Amagasaki project resolved to approach Kikuchi to act as chief engineer. Rather than Kikuchi's leaving one company for another, the outcome of this situation in which the demand for technical expertise clearly outstripped the supply was that the Hirano management agreed to share Kikuchi's services with a potential competitor. In return the Amagasaki company paid Hirano ¥2,000 in part reimbursement for the expenditure incurred in Kikuchi's training abroad.³⁴ A year later yet another new mill, the Settsu mill, obtained a share in Kikuchi's expertise. A formal pledge was concluded between the three companies in 1890, which stated that each of the three companies had an equal right to Kikuchi's services. Kikuchi was now supervising three companies with a total spindleage of 42,000.³⁵ During the early 1890s Kikuchi divided his time between the three locations, which posed considerable logistical problems. With

³³ Shashi Hensan linkai, *Nichibō 75-nen Shi*, p.31.

³⁴ *Ibid.*, p.27.

³⁵ *Nichibō, Nichibō 70-nen Shi*, p.32. The text of the agreement is in Nitta, *Kikuchi Kyōzō Ō Den*, p.152. Settsu also agreed to reimburse the other two companies for part of Kikuchi's overseas training expenses, and it seems likely that Hirano ended up doing quite well out of this deal.

transport infrastructure still limited, the engineer was often to be seen riding hotfoot from Hirano, in the southeast of Ōsaka, to Amagasaki in the northwest, on the edge of Hyōgo Prefecture, to share his working day between them. Later, after disagreements with management led to resignation from Hirano, Kikuchi would regularly spend the hours from 7 a.m. to noon at Settsu, and the rest of the working day at Amagasaki. He even added to his portfolio during the 1890s, becoming adviser to two more mills.³⁶ Increasingly he added managerial to technical functions, becoming a director of Amagasaki in 1893, and of Settsu in 1897.

If we look more closely at Kikuchi's approach to technology, it becomes apparent how these early engineers set the cotton spinning industry on a trajectory that was to serve it well over the next half century. Kikuchi confirmed the widespread use of ring spindles, pioneered by the Ōsaka Company with the objective of capitalizing on available sources of unskilled labour, and recognized that larger capacity was the key to scale economies and international competitiveness. There are two other respects, however, in which the longer term technological trajectory was shaped by these early technical decisions: technological congruence between companies and a dynamic of constant change into higher value-added production. The regime of diffusion of best practice had been started by the Kagoshima and Sakai mills around the time of the Restoration, but it underwent a step change with the rise of the Ōsaka company. Yamanobe and the other engineers learnt from the mistakes

³⁶ The Asahi was set up by a man called Imanishi, from Kikuchi's home village, and Kikuchi later became a director. Nihon Bōseki (Japan Spinning) in the northern city of Fukushima appointed him adviser in 1892 (*ibid.*, pp.170, 173).

made by earlier companies, but also made their own expertise available to others. Kikuchi's triple employment was a more formal way of ensuring that companies were able to learn from each other. This small group of men ensured that machinery was consistently purchased from the same small number of suppliers and utilized in specific ways. When the Settsu Mill was established in 1891 it followed Kikuchi's advice and made use of exactly the same spinning technology as that which Kikuchi was already operating at the Amagasaki Mill. Installation of the machinery was supervised by an English installation engineer who had already performed the same service for three other Japanese mills.³⁷ The process of company mergers that took place from the turn of the century was greatly facilitated by a large element of standardized technology, the widespread acceptance of certain 'best practice' technologies, and, increasingly, a common management context. Aided by such institutions as the Spinners' Federation, founded in 1902, by the end of the Meiji period the large scale cotton spinning industry had achieved a remarkable degree of technological uniformity.

Just as important was the role of these early mills in setting the industry on the path to higher value-added production. By the early 1890s the Amagasaki company had already constructed a second mill which at 15,000 spindles was not only bigger than the first, but was also largely dedicated to the production of finer counts of yarn. The production of this

³⁷ Nitta, *Kikuchi Kyōzō Ō Den*, p.132; Shashi Hensan linkai, *Nichibō 75-nen Shi*, pp.128-30. The foreign installation engineer was a man called Thomas Walter Dransfield. Installation of the steam engines was supervised by a Japanese engineer from the Ōsaka Mint.

finer yarn, which had to compete with imported yarn, caused huge problems. Kikuchi had gone for English machinery, but a competitive result could only be secured using high quality American cotton. The search for a solution initiated the development of the sophisticated cotton mixing techniques that were one of the keys to the international success of the industry in the interwar years.³⁸ Further efforts were put very early on into greater understanding of other technical problems associated with higher value-added products, such as twisting techniques and gassed thread.³⁹ At the Settsu company the number 2 mill actually produced lower counts than the first mill, but two principles remained important: the recognition that both the domestic and other Asian markets were going to continue for the time being to constitute mass demand for lower quality products in which Western producers would not compete, and the decision to differentiate production specialization between different factories within the same company. Indeed, what is conspicuous about the decisions made regarding technology transfer at this time is the willingness to import what was considered to be the most appropriate technology for the purpose, even where it might be more expensive. From twisting and spinning machines, through to boilers, steam engines, balers, electric generators and sprinkler systems, the rate and range of technology imports during these years was remarkable.⁴⁰ While by the interwar years

³⁸ Kazushi Ohkawa, Gustav Ranis & Gary Saxonhouse, *Comparative Technology Choice in Development: the Indian and Japanese Cotton Textile Industries* (Basingstoke, Hants: Macmillan, 1988), ch.3.

³⁹ Shashi Hensan linkai, *Nichibō 75-nen Shi*, pp.36-39.

⁴⁰ See *Ibid.*, pp.32-39 for details. Kikuchi purchased a sprinkler system for the Amagasaki no.2 mill from an English firm as it was impossible to get insurance from companies with any foreign capital involvement without one.

the emphasis on indigenous technology was much greater, the recognition of a need for 'permanent revolution' in the application of useful knowledge was something that was much older, and certainly manifested in the decisions of Kikuchi and his contemporaries.⁴¹

The importance of this period was not limited to technological choice, however. The factors behind the founding of these mills, and the way in which they negotiated and cooperated in the sharing of Kikuchi's services, can tell us something about the way in which access to the new technological expertise unlocked resources that had been fostered by the earlier development of cotton cultivation, manufacturing and commerce in the Kansai area. Prime among these was capital. Unlike the Ōsaka company, the Hirano, Settsu and Amagasaki mills were from the start funded almost exclusively from the Ōsaka region. Kansai as a whole accounted for a sizeable part of the rash of new companies founded across the nation in the 1880s-1890s, although the average capitalization of all Kansai companies was much less than those in Tokyo.⁴² Much of this growth was accounted for by textiles, in which capitalization was often very large. A considerable proportion of investors in the three companies considered here had longstanding associations with the traditional cotton industry, but others had a broader range of interests. Many had accumulated wealth in other activities, such as sake brewing, sugar

⁴¹ Morris-Suzuki (*Technological Transformation of Japan*) argues for considerable continuities in the Japanese approach towards technology from the pre-industrial period.

⁴² Tanimoto, Masayuki, & Abe, Takeshi, 'Kōgyō Bokkō to Kindai Keiei – Zairai Keiei', in Miyamoto, Matarō, & Abe, Takeshi (eds.), *Keiei Kakushin to Kōgyōka*, vol.2 of *Nihon Keiei Shi* (Tokyo: Iwanami Shoten, 1995).

production and general commerce and exchange. Each of the companies had a relatively large number of shareholders, meaning lower average holdings, but within this the lead in founding the company was invariably taken by a very small group, or even an individual, who would have much larger shareholdings. The Amagasaki company initially had 387 shareholders, almost all of them from the Kansai area, and the eight largest shareholders each held 400 shares, worth ¥10,000.⁴³ These men were leading wealth holders of the Kansai region, whose business interests spanned a range of activities. Bringing old Ōsaka money on board was critical in the founding of the Amagasaki, whose first president was a leading Ōsaka financier, Hirooka Shingorō. The survival of the Hirano company when faced by an early crisis was ensured by money from its second president, Kanazawa Jinbei, a leading figure of the Ōsaka business world with strong interests in commercial shipping. Mobilising capital was never easy. Evidence suggests that many investors were not interested in cotton spinning as a long term venture, but desired short term profits to an extent that compelled companies to pay out large dividends to sustain further expansion. Business fluctuations also presented problems for many of the early companies, which had difficulties in getting promises translated into paid-up capital. Kanazawa only stepped in to help the Hirano company while Kikuchi was in London, when internal disputes over failure to pay up capital threatened the total collapse of the project.⁴⁴

⁴³ Shashi Hensan linkai, *Nichibō 75-nen Shi*, pp.19-23.

⁴⁴ Kinugawa, *Honpō Menshi Bōseki Shi* vol.4, pp.77-78.

However, the success of the Ōsaka company had broken the existing image of mechanized cotton spinning as unprofitable (*mōkaranai mono*). In doing so it encouraged individuals identified with the traditional cotton industry to take an interest in the founding of mechanized mills, something that helped to ensure a continuity from traditional wealth accumulation activities through to the new operations of the early 20th century. Hirano Heibei of Settsu and Kanazawa Jinbei of Hirano brought previously accumulated capital into cotton spinning, and both remained among Ōsaka's most wealthy men in the late 1890s.⁴⁵ The relationship between investment and management was complex. Some founders tried to be 'hands on', while others, like Kanazawa and many others in spinning, were content to rely on the services of professional managers and engineers.⁴⁶ This ability to raise local capital, and to tap existing local expertise, was unlocked by the technological breakthrough into larger scale production.

Secondly, and particularly important in mobilizing capital in an era when mechanisms for raising capital on the open market had yet to be fully developed, was the ability of the new regime to depend on established and new links between individuals, families and organizations. While much capital was provided by individuals, banks also became important. The strong personal ties between the originators of the Amagasaki Company and banks in the Kansai area were of crucial

⁴⁵ Tatsuki, Mariko, 'Kōgyōka to Shōsha – Kaiun – Kinyū', p.146, and Miyamoto, Matarō & Abe, Takeshi, 'Meiji no Shisanka to Kaisha Seido', pp.260-1, both in Miyamoto & Abe (eds.), *Keiei Kakushin to Kōgyōka*.

⁴⁶ Tanimoto & Abe consider the typology of the investment/entrepreneurial relationship in 'Kōgyō Bokkō to Kindai Keiei'.

significance. Personal networks and relationships within the Kansai area were significant in luring Kikuchi into the cotton industry in the first place, and in enabling the three companies to cooperate in the use of his time and expertise. He was first introduced to the planners of the Hirano mill by a former fellow student at the College of Engineering, a man called Yoshimura Chōsaku, who was engaged in bridge construction in the city. Yoshimura's relatives were among the founders of the Hirano company. The initial sharing of Kikuchi's services between the Hirano and Amagasaki mills became possible following personal negotiations between the two presidents, following which Kanazawa of Hirano ordered Kikuchi to enter into the arrangement. There were strong family connections between Hirano Heibei, founding president of Settsu, the Kanazawa family of the Hirano mill, and this yielded a private agreement to share Kikuchi.⁴⁷ Kanazawa, president of Hirano, was also on the board of Settsu. Again and again the personal and family networks re-appear. Competition clearly continued. The three companies negotiated long and hard over the refunding of Hirano's expenditure on Kikuchi's trip to Europe, and increasingly appeared to use Kikuchi as a pawn in that competition. We cannot know how far the other two companies exploited Kikuchi's deteriorating relationship with the Hirano management during the early 1890s. Rumours certainly circulated that he devoted more time than had been agreed to the Amagasaki Company.⁴⁸ Nevertheless, a perceived

⁴⁷ Kinugawa, *Honpō Menshi Bōseki Shi* vol.4, p.135.

⁴⁸ *Ibid.*, pp.86, 134.

common interest, supported by relational and existing business ties, also provided a foundation for a measure of collaboration.

This perceived common interest helped to reconfirm the separate identity of the Ōsaka business world, as investors and businessmen saw the locating of the modern cotton spinning industry in Ōsaka as not merely a matter of convenience, but also a matter of pride and identity. A major factor in the founding of the Hirano Mill appears to have been the desire in 1885 of local worthies to help workers in the local handicraft cotton industry who were suffering from food shortages. The Governor of Ōsaka district was an active participant in securing this local interest, and in securing the official approval that was required for the founding of all new mills. He was also a key player in the negotiations that resulted in the new Hirano and Settsu mills availing themselves of the services of engineers employed by the Ōsaka Arsenal, the best known of whom was a man called Imada Kiyonoshin, a member of the first graduating cohort at the College of Engineering in 1879. At a time when it was estimated that there were no more than five or six trained engineers in the whole of Kansai, this was a significant advantage.⁴⁹ Both Saitō Tsunezō and Kikuchi himself had joined the private textile sector from government service.

Commitment to the economic growth of Kansai as a region was a priority for many of these businessmen, and Kikuchi, the outsider with the essential technical knowledge, did his best to identify with this goal. He was an active participant in confirming an Ōsaka business identity discrete

⁴⁹ Nitta, *Kikuchi Kyōzō Ō Den*, pp.75, 104; Kinugawa, *Honpō Menshi Bōseki Shi* vol.4, p.259; Kyū Kōbu Daigakkō Shiryō Hensankai, *Kyū Kōbu Daigakkō Shiryō*, p.349.

from that of Kantō, although, as might be expected for all Meiji businessmen, this was often cloaked in the language of subordination to the national interest.⁵⁰ Kikuchi claimed that he did not find it easy to settle down in Kansai, but his commitment to working with Ōsaka interests was unequivocal. He worked hard to secure for the companies with which he was associated the same benefits that had been granted to the Tokyo-initiated Ōsaka Company, for example the same discount from Mitsui Bussan on imported spinning machinery.⁵¹ However, he found some of his employers unappreciative of the role of the engineer in general, and of himself in particular. Although his status as chief engineer and head of operations made him responsible for running the mills that employed him, and at Hirano the president, Kanazawa, visited only once a month, his position in the hierarchy was lower than those of both shareholders and managers.⁵² Like his counterpart at Ōsaka Spinning, Yamanobe Takeo, he had the highest salary, but not the highest status in the company.⁵³ Kikuchi was particularly upset that at Hirano the president's adopted brother, Kanazawa Jinsaku, who was his operational deputy, leapfrogged him to become a director.⁵⁴ Kikuchi took the view that Ōsaka people in general regarded engineers as necessary only for machinery installation, that they were ignorant of the need for ongoing technical expertise, and so

⁵⁰ There is a substantial literature on the rhetoric and motivations of Japanese entrepreneurs in the late 19th century, starting with the work of Gustav Ranis ('The Community Centred Entrepreneur in Japanese Development', *Explorations in Entrepreneurial History* VII, Dec.1955) and Johannes Hirschmeier (*The Origins of Entrepreneurship in Meiji Japan* (Cambridge MA: Harvard University Press, 1964)).

⁵¹ Nitta, *Kikuchi Kyōzō Ō Den*, p.117.

⁵² *Ibid.*, pp.102, 106.

⁵³ Tōyōbō Kabushiki Gaisha Henshūshitsu, *Tōyōbō Hyakunen Shi* vol.1, p.30.

⁵⁴ Nitta, *Kikuchi Kyōzō Ō Den*, p.116; Kinugawa, *Honpō Menshi Bōseki Shi* vol.4, p.136.

failed to appreciate those who possessed it, deferring instead to the commercial acumen which had become so highly valued.⁵⁵

Despite this Kikuchi chose not to abandon his work in Ōsaka, but to adapt to what he found. He sought to improve the image of the engineer by presenting himself as less academic and technical, to appeal to what he saw as the inclinations of Ōsaka people by taking an interest in the commercial aspects of the operations with which he was involved. He genuinely believed that there was a need to fuse technical skill with management.⁵⁶ He sought to achieve trust by paying attention to detail, a concession to the supposed thriftiness of local residents, and proved highly reluctant to make any play of his knowledge of English or of his university education. His efforts were over time recognized by his contemporaries, who increasingly eagerly sought his services and his advice, and recruited him to local representative organizations such as the Chamber of Commerce in 1892.⁵⁷ Indeed, it was claimed that he was so successful in his assumed role of the Ōsaka businessman that his fellow Tokyo graduates were inclined to look down upon him for wearing shabby clothing and travelling third class on the train.⁵⁸ In a retrospective published in an Ōsaka daily paper in December 1940, Kikuchi commented on this era as follows:

‘The Ōsaka people didn’t like technical experts, and I felt uncomfortable about being cold shouldered in relation to everything. I therefore did some thinking about how a technical expert could be

⁵⁵ Nitta, *Kikuchi Kyōzō Ō Den*, pp.107, 157.

⁵⁶ *Ibid.*, pp.107-8, 157-9.

⁵⁷ *Ibid.*, p.163.

⁵⁸ *Ibid.*, p.160; Kinugawa, *Honpō Menshi Bōseki Shi* vol.4, p.136.

taken seriously and become a director, and came to the conclusion that since Ōsaka people were extremely frugal and utilitarian it was going to be difficult for me to gain the trust of the capitalists unless I too paid attention to points of detail and made thrift my priority. From then on I would wear rough clothing on a daily basis, and travel by third class too and from my destination when travelling and on the train, giving no indication whatsoever that I was a technical expert who had graduated from a university. By this means my estimation among the directors gradually improved, but the converse of this was that I became less popular among my peers, who referred to me as a “mean, servile fellow”. However, I paid no attention to this, but just pressed on with my economies, avoiding profligate expenditure wherever I could, and was nominated as a director of Amagasaki Spinning in January 1893. This led to a worsening of my relations with Kanazawa Jinbei, president of Hirano Spinning. Kanazawa had always been somewhat temperamental, and he strongly believed that a technical expert should not become a senior company executive, so he objected to my becoming a director of Amagasaki, and this led to my resignation from Hirano.⁵⁹

Resonances of such parsimony are found elsewhere in the Kansai spinning sector, and helped to give it a distinct identity. Mutō Sanji, the founder of the famous Kanebō Company, recalled in his memoirs that when he toured some of the Kansai cotton mills in the early 1890s he was astonished by the contrast between the showy Kanebō mill that had been established in the Tokyo area and the situation at the Amagasaki Company, where the main office was located in a small shack, the chief executive possessed a cobbled together table and a wooden chair, and all the office work was done by only seven people, including the president.⁶⁰ When

⁵⁹ Quoted in Shashi Hensan linkai, *Nichibō 75-nen Shi*, p.32.

⁶⁰ For a short account of Mutō see Irimajiri, Yoshinaga, *Mutō Sanji* (Tokyo: Yoshikawa Kōbunkan, 1987).

Kanebō set up a new mill in the Kansai area Mutō was advised by his deputy to tone down his garish Tokyo tastes and to become more sobre in things like office design.⁶¹

Conclusion

From the 1890s Kikuchi's fortunes, and those of the companies with which he was associated, went from strength to strength. With the takeover of Hirano by Settsu in 1902 the three mills were again under Kikuchi's operational control. By 1915 Kikuchi was president of both the Amagasaki and Settsu companies, and in this capacity he presided over their merger in 1918 to form the Greater Japan Spinning Company (Dainihon Bōseki), one of the so-called 'Big Three' of the pre-war industry. Among the companies subsequently absorbed by this giant was the Kishiwada Company, which had in 1903 taken over the Sakai Company that had been spawned by the Kagoshima enterprise.⁶²

Whatever hindsight might suggest the emergence of successful mechanized cotton spinning in the Ōsaka region was not easily achieved. The engineering knowhow that helped to make the difference was only as good as the individuals who possessed it. There was a gap between practice and even the best formal education, and Kikuchi's biographer refers to this as a time of 'groping in the dark' (*anchū mosaku*).⁶³ One unanswered question is why, given the scarcity of the technical expertise

⁶¹ Noted in Shashi Hensan linkai, *Nichibō 75-nen Shi*, p.44.

⁶² *Ibid.*, p.591.

⁶³ Nitta, *Kikuchi Kyōzō Ō Den*, pp.112-113.

that Kikuchi and his counterparts possessed, they did not use their rarity value more as a bargaining chip to enhance more rapidly their positions within the industry. This was a time when workmen with more traditional skills were highly likely to move from one employer to another.⁶⁴ And yet they collaborated in the sharing of skills as a practical solution to a specific problem, namely the dearth of technical expertise. In doing so they set the longer term technological trajectory that supported the success of the industry, facilitated the spate of company mergers that characterized the industry from the turn of the century, and led to its domination by a few very large concerns. The infusion of scarce technological expertise was also able to mobilize a local elite, and the capital and expertise that it possessed, in a way that not only promoted the cotton industry, but ensured the continuing prominence of local wealth holders and traditional merchants in modern business.⁶⁵ Technology was the 'missing link' that was the key to the successful transition to mechanized production that allowed this industry to spearhead the industrialization process. The successful managerial careers of these early trained engineers also established a level of respect for technical expertise that was to remain important in Japan throughout the 20th century.

⁶⁴ See eg. Andrew Gordon, *The Evolution of Labor Relations in Japan: Heavy Industry, 1853-1955* (Cambridge MA: Council on East Asian Studies, Harvard University Press, 1985), ch.1.

⁶⁵ This continuity has been highlighted in eg. Miyamoto & Abe, 'Meiji no Shisanka to Kaisha Seido'.