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Abstract

We have seen many cases where the factory system emerges and realizes higher productivity in the process of industrialization. However, also seen in history is that other types of production organization have kept expanding and have reached at some high performance. For instance, the putting-out system rather than the factory system has sometimes been chosen in the fabric industry, where the flexibility of production and the variety of products are especially important to respond to the fashion. This type of production organization has prospered even during the industrialization since the 19th century, supported by the development of some modern technologies such as synthetic dyes. This study inquires a case of the silk fabric industry in Kiryu, Gunma Prefecture, Japan. In Kiryu, the traditional silk textile industry developed in the Tokugawa era, and the industry even grew more under the putting-out system during the industrialization in Japan since the late 19th century, because the putting-out system with synthetic dying was the optimal combination to realize the variety of products required in the mass consumption in the industrial society.

Key Words: Governance of trades, Putting-out system, Industrial district, Japanese textile industry, Repeated game.
JEL: L67, L14, N95.

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1 Introduction

1.1 The putting-out system and the factory system

How did the industrialization of the silk fabric industry begin? During the process of industrialization, how did the putting-out system function, and how was it replaced by the factory system? Japanese scholars of economic history seriously considered these questions in the 1950s. Many of their works during this time especially focused on the traditional silk fabric industry, where the putting-out system eventually prevailed. These works relied on Marxian economics,[1] an approach which did not allow analysis of the comparative efficiency among various institutions and organizations within the sector, thus precluding a full assessment of the putting-out system and the factory system, even though Marxian economists had strong interest in the comparative analysis of institutions. Further, these economic history works did not explicitly distinguish the technological choice between handlooms and power looms and the putting-out system and the factory system. As a result, although these works contributed to our understanding of the industry they did not provide a comparative institutional analysis of the putting-out system and the factory system.

Another approach used in understanding the industrialization of the silk fabric industry was the neoclassical economic one. This approach also relied on the idea of single-tracked economic growth based on technological progress. Moreover, the neoclassical approach attributes the economic development in a sector exclusively to the technological progress implying that, again, the production organization within the sector was not considered.

The radicals[2] challenged the assumption of both the traditional Marxist and neoclassical approaches that the factory system was technologically inevitable. Instead, they argued that the factory system was preferred because it was advantaged at controlling and monitoring workers and not necessarily associated with any technological improvement in productivity.

This challenge led to two strings of the literature. One of them explicitly analyzed the efficiency of capitalist organizations, a line of inquiry which eventually responded to the challenge of the radicals. These studies found that, as the radicals asserted, the division of labor and the hierarchical organizations that compose the centralized production organization called the factory system were principally to control workers. However, as Alfred Chandler, Oliver Williamson, and David Landes have pointed out, [3] the capitalist factory system is centered at the efficient control of workers, thus linking organizational form with technology and productivity.

The other line of research replaced the view of the radicals, by trying to reconstruct the history of multiple-tracked economic development. Michael Piore and Charles Sable argued that a decentralized production organization like the putting-out system which consists of accumulated small businesses highly specialized in each process could be

[1] Marx (1988).

[2] Marglin (1974)

[3] Chandler (1977), Williamson (1985), Landes (1969, 1986). Saito and Abe (1987) studied Japanese cotton weaving industry based on the research by Landes (1969).

more efficient than a large scale factory system in "flexibility of production."[4]

1.2 Return to the regional and micro analysis

The traditional approach to the stuffy of industrialization mainly focused on changes in the micro-level of specific industries and emphasized the integral of those changes as the "industrial revolution." This traditional approach was altered by revisionist views of the neoclassical approach to economic history, views which were based on the estimation of macroeconomic performance of nations supported by neoclassical economics. Nakamura (1983), for instance, pointed out that around 1900 the share of the traditional sector in the Japanese economy was much greater than that of the modern sector, the sector thought to be under a Japanese "industrial revolution. This finding led him to assert that Japan's industrialization was incremental rather than revolutionary. In another critique, Crafts (1985) emphasized that the increase in total factor productivity in the modern sector was not remarkable except for the cotton industry during the British industrial revolution.

The main implication of these works is that the modernization and growth of particular industries did not rapidly pervade the national economy, implying a relative slow macroeconomic growth rate at the beginning of modernization. However, as we know ex post, the early stages of industrialization of particular industries did herald important changes in some industries, and while the leading phenomenon cannot simultaneously be observed in the aggregate performance of the national economy, the micro-level analysis employed long ago still provides a good understanding of these early stage developments.

However, the industrialization of the silk textile sector extends beyond the use of large factories with a boiler — the change most focused on by the traditional approach. Hudson (1986) found the "genesis of industrial capital" in the financing of the wool fabric industry by the regional community, and Berg and Hudson (1992) called for reinterpreting "industrial revolution" to include changes of the traditional sector in regional economies. This point of view, in fact, has been shared by the literature on "proto-industrialization" since Mendels (1972), which paid attention to the relation between the changes in regional economies and the international market, rather than to the aggregate economic performance of the nation state, in order to understand the beginning of the industrialization.[5] The study by Tanimoto and Abe (1995) is one example of a Japanese study which associates a changing regional economy with industrialization.

It is therefore necessary to discuss the leading changes in regional economies in order to more fully understand the real process of industrialization. Moreover, it must be recognized that the changes in regional economies leading to the industrial revolution comprise a combination of possible choices of production organizations and technologies, rather than simply as a unique technology solution. Accordingly, the choice of production organization between the decentralized production organization (the putting-out system) and the centralized production (the factory system) must be distinguished from the choice of production technology between handloom and power loom, as was in Saito and Abe (1987). Related to this point, it is important to note that the choice of products

[4] Sable and Zeitlin (1985, 1997). Motivated by Sable and Zeitlin, Tanimoto (1998) studied the putting-out system of Japanese cotton industry, focusing on the labor supply of peasants.

[5] Ogilvie and Cerman (1996).

strongly affects the chosen combination of technology and organization, as Minami, Ishii and Makino (1982) clarified.

In conclusion, the constraints on production should be decomposed, separately identifying technological ones and institutional and organizational ones. The technological constrains define what production is technologically feasible, while institutions and organizations determine efficiency within this feasibility. Even where there exists a technology suitable for the putting-out system, the putting-out system could still be inefficient, for example if the manufacturer (putting-outer) and weavers (subcontractors) cheat each other. In order for trades between the manufacturer and the weavers — who are physically distant — to be realized, there needs to exist a mechanism that governs the trade relationship.[6] Efficient institutions, given technological feasibility, can be explicitly analyzed by game-theoretic microeconomic theory. The descriptive insights of Chandler (1977), Williamson (1985), etc. have been re-interpreted, extended and formally analyzed by game theory and contract theory.[7]

1.3 Institutions and organizations in the silk fabric industry of Kiryu

This study takes the silk fabric industry of Kiryu, Gunma Prefecture (Figure 1) in the 1900s as an interesting case to understand the efficiency of the putting-out system in a changing traditional industry.

Following established definitions in game-theoretic institutional analysis, this study defines an "institution" as a Nash equilibrium strategy (plan of actions) where no player has an incentive to deviate. For instance, if any agent follows the Civil Law, then the Civil Law is an institution. It is also a Nash equilibrium strategy only if no individual deems it advantageous not to follow it in some circumstance. If a strategy is a Nash equilibrium only within a restricted group of agents, not in the whole society, then the strategy and relevant agents compose an organization. Therefore, a firm is an "organization" (since involved are not all people in the society to which the firm belong), and the putting-out system where the manufacturer effectively controls the subcontracting weavers is also an organization.

Since the mid 1880s, the factory system rapidly diffused among the silk reeling, cotton spinning, cotton weaving, and, in some regions, the silk weaving industries. However, in Kiryu, the silk weaving industry did not adopt the factory system during this period, but rather kept the putting-out system. Interestingly, this maintenance of the traditional organization did not imply stagnancy in the silk fabric industry in Kiryu, in fact, the industry production grew with the domestic demand from Tokyo. Regional macro level data reveal that both the traditional weaving and traditional hand silk reeling grew. The putting-out system which organized hand loom weavers continued to dominate. The City of Fukui, Fukui Prefecture, is a contrast to Kiryu as silk weaving factories with power

[6] Governance of trade means designing an incentive mechanism such that a good Nash equilibrium is reached, where honest trades are the best response to both of the buyer and the seller. Lack of governance of trade could lead to a bad Nash equilibrium where cheating each other is the best response to both players such that trades are actually not conducted. Aoki (2001), pp. 60-61.

[7] Milgrom and Roberts (1992).

looms propagated using machine-reeled raw silk (Filature). Fukui mainly produced cheap *Habutae* [a silk fabric with plain weave] which was exported to the U.S.

The silk fabric industry emerged in the mid 18th century in the Town of Kiryu, the State of Kozuke (renamed Gunma Prefecture after the Meiji Restoration) and neighboring area, and developed remarkably after the early 19th century, mainly stimulated by the demand from the Shogunate Capital Yedo (renamed Tokyo).[8]

Raw silk was Japans most important export after Japan adopted international free trade in 1859. Prior to the early 1880s, most of the exported raw silk was hand reeled raw silk produced by peasants in Northern Kanto, Chubu, and Southern Tohoku. Subsequent to the mid 1880s, exports to the U.S. increasingly constituted product from the modern silk reeling industry, which was centered in Nagano Prefecture. This trend expanded greatly after 1900 when railway trunk lines built in East Japan greatly facilitated the movement of raw silk, which was now increasingly brought to supply the modern silk reeling industry. After this period, the only areas in which traditional hand reeling dominated were Kiryu, Maebashi, Ashikaga, and Isezaki, the district where traditional silk fabric industry still grew (Figure 1).[9]

Economic historians have examined the traditional silk fabric industry in Kiryu, but did so in relation to a national transformation to a capitalist economy. The works published in this intellectual strain in the 1950s and 1960s presumed the putting-out system was a backward production organization that should have been replaced by the factory system because these works relied on Marxist single-track stage theory: the putting-out system → the manufactory system → the factory system.[10]

The single-track stage theory underpinning this Marxist view implies that the adoption of the factory system was irreversible. But in fact, at least before power looms were equipped, the putting-out system continued to be viable and adopted.

In each region, the putting-out system and the factory system were chosen given the conditions of the region — a choice not solely based on the newest technology.[11] In the weaving industry of Kiryu, the factory system equipped with hand looms had been chosen to weave the luxury fabrics,[12] while the putting-out system had been used for most other

[8]Kiryu Orimonoshi Hensankai [Editorial Committee for the History of Kiryu weaving], ed., *Kiryu orimonoshi, jokan [The history of Kiryu weaving, vol.1]*, Kiryu, 1935. Ishihara (1993). The Tokugawa Shogunate (Samurais' government) had historically kept its stronghold in the loyalty of the lords in the East of Japan, and Yedo in the East had been the Tokugawa Shogunate Capital (Samurais' capital), while Kyoto in the West of Japan has been the imperial capital. In 1868, during the Meiji Restoration, the imperial government supported by the lords in the West defeated the Tokugawa Shogunate, occupied Yedo, and renamed it Tokyo (that literally means the "eastern capital").

[9]Nakabayashi (2003b), p. 134.

[10]Representative works by the traditional approach are Ichikawa (1959, 1996). A slightly modified perspective was presented by Kimura citeyearKimura:1959a,Kimura:1959b,Kimura:1960,Kimura:1963, which recognized the putting-out system in Kiryu as a "decentralized manufactory." All of these studies, however, considered the putting-out system to be "backward" organization that should have been replaced by the "manufactory" system and the factory system. About Ashikaga, see Kudo (1962), pp. 90-91.

[11]Saito (1984).

[12]Kimura (1959a), pp. 385-399. Kimura (1960), p. 137. Hashino (1997), pp. 15-16. Also in Ashikaga, the luxury fabrics and the export *Habutae* [plain fabric] were woven in the factory system equipped with hand looms (Wasedadaigaku Keizaishigakkai [Society for economic history, Waseda University], ed., *Ashikaga orimonoshi jokan [History of the Kiryu weaving, vol.1]*, Ashikaga, Ashikaga Sen-i Dogyokai [The Textile Association of

fabrics, until the factory system were equipped with power looms for most kinds of fabrics after the late 1910s.[13] Instead of being supplanted, the putting-out system developed and dispersed within Kiryu, especially from the 1860s to the 1900s, when the main products of Kiryu were yarn-dyed silk fabrics[14]. With the spread of production of yarn-dyed silk fabrics, the throwing process, the finishing process, and the designing process, as well as the weaving process came to be put out. Manufacturers decreased the production inside of their workshops and established subcontracting relations with the independent artisans. This example suggests that the technological change induced by the change of products to the yarn-dyed fabrics affected the change in production organization, strong evidence against the single-track stage theory.

2 Formation of the industrial district

2.1 The silk fabric industry of Gunma Prefecture

The production of silk fabrics in Gunma Prefecture, including Kiryu, stagnated in the 1890s, decreased in the early 1900s, and then rapidly increased in the late 1900s. The production of fabrics woven with blends of silk and cotton also increased significantly after 1900.[15]

2.2 Growth of the hand silk reeling industry

The growth of the Kiryu weaving industry depended on the growth of the traditional silk reeling (hand-reeling) in the region. Hand-reeled raw silk had been traded at Maebashi and Omama, but after free trade began in 1859 raw silk started to be exported reducing the supply available to Kiryu.

This reduction in supply was absorbed by increasing production of silk fabrics woven with imported cotton yarn in the short term, and by the increase of producing hand reeled raw silk in the region in the long term.[16] From the 1860s to the early 1870s, the supply of raw silk to Kiryu steadily decreased, so manufacturers in Kiryu adjusted by increasing production of fabrics woven with silk-cotton blends. Since the late 1870s, the production of hand-reeled raw silk increased in Yamada County and the raw silk was supplied to

Ashikaga], pp. 208-300. Kosho((1963, 1972)), Kawamura((1987, 1995))

[13]Tsujimoto (1978), p. 48. Kameda (1989), pp. 561-565. Hashino (1997).

[14]"Yarn dying" means material yarn is dyed before weaving. For the luxury fabrics that were dyed after weaving, the cleaning and finishing processes undertaken after weaving were important, and those processes were conducted inside the manufacturers' workshops. In contrast, in the production of the yarn-dyed fabrics, dying, arranging warps, cleaning yarn, throwing, re-reeling, and other preparation processes were important. Because those processes needed special skills, the craftsmen who specialized in each process were relatively important and were organized as subcontractors by manufacturers. Kimura (1959a, 1959b, 1961), Kawamura (1983, 1991).

[15]Nakabayashi (2003a), pp. 27-28, Tables 1-1, 1-2.

[16]Kawamura (198), p. 74. Kawamura (1983), pp. 171-178. Kawamura (1991), p. 49. Ichikawa (1996), p. 115. Kimura (1989). Kameda (1994). Nakabayashi (2003a), p. 29, Table 1-3.

Kiryu through Omama market.[17] Moreover, the Ryomo Railway connecting Kiryu with Maebashi, a big market for raw silk, was built in the late 1890s, increasing the supply of available raw silk. Even with these changes in supply, quality was maintained. In fact, the hand-reeled raw silk produced in the neighboring area after 1900 was said to be the best for hand-weaving in Kiryu,[18] which meant the regional specialization had been robustly preserved.

2.3 Trades of material

Ro [fine gauze, leno], the representative luxury silk fabric of Kiryu, which was dyed after weaving, was produced by a special raw silk called "Omama Hiraito"[19] produced only in the Town of Omama, Yamada County, and neighboring villages. Peasants produced this very high quality "Hiraito" to order; "Hiraito" was never traded in a market. The continuous relations between manufacturer and specialized producer were vital to a supply of the raw material for the luxury dyed-after-weaving.[20]

Conversely, ordinary hand-reeled raw silk was traded in the Maebashi market and the Omama market. Weaving manufacturers purchased hand-reeled raw silk from peasants in Yamada County and silk merchants in Maebashi through these markets. However, this impersonal market for raw silk was faced with the difficultly in assessing the quality of raw silk. The quality of raw silk differed, with higher qualities garnering higher market prices, but quality could only be identified by the buyer after it was woven into a fabric. This represented a problem for the market as a seller had an incentive to cheat buyers by claiming that his product was of a higher quality than he knew it to be, a bad equilibrium. To prevent such cheating, the Sericultural Association of Omama was established in the Town of Omama in 1900, and the Sericultural Association of Maebashi was established for the City of Maebashi in 1903.[21] In the Omama market, for instance, any raw silk

[17] Yamada County, Gunma Prefecture, "Yamada Gun rinji noji shocasho [Special report on agriculture of Yamada County] (compiled in Gunma Kenshi Hensan Iinkai [Editorial committee of the history of Gunma Prefecture], *Gunma kenshi , Shiryohen 18 [History of Gunma Prefecture, Historical Documents 18]*, Maebashi, Gunma Prefecture, 1978], p. 853.

[18] Yasuzo Kawamoto, Shinshichi Miura, and Kenzaburo Ando, *Meiji 33 nen kaki shugaku ryoko Ryomo chiho hataorigyo chosa hokokusho [Research report of the 1900 summer field work on the Weaving industry of Gunma Prefecture and Tochigi Prefecture]*, Tokyo, Koto Shogyo Gakko [Commercial College], 1901 (compiled in Masato Fujiwara, ed., *Meiji zenki sangyo hattatsu shi shiryo bessatsu, 50-IV, [Historical documents of industrial development in the early Meiji, special volume, 50-IV]*, 1969), p. 223.

[19] "Hiraito" is silk yarn flatly thrown from hand-reeled raw silk threads.

[20] Kawamura (198), p. 61. *Ryomo chiho hataorigyo chosa hokokusho*, p. 224. Gunmaken sanshogyo chosakai [Research committee for sericultural industry, Gunma Prefecture], *Gunmaken orimono genkyo chosasho [Report on the current situation of the weaving industry of Gunma Prefecture]*, Maebashi, the third department of Gunma Prefecture, 1906 (compiled in *Meiji zenki sangyo hattatsushi shiryo, bessatsu, 49-II, III*, 1969), pp. 218-219. Omama Sanshi Dogyo Kumiai [The Sericultural of Omama], *Meiji 34 nendo Omama Sanshi Dogyo Kumiai hokokusho [Annual report of the Sericultural Association of Omama, 1901]*, Omama, Omama Dogyo Kumiai, 1902, p. 4.

[21] Maebashi Kenshi Dogyo Kumiai [The Sericultural Association of Maebashi], Maebashi Nenshi Dogyo Kumiai [The Throwing Association of Maebashi], eds., *Maebashi kenshi dogyo kumiai, Maebashi nenshi dogyo kumiai, enkakushi [History of the Sericultural Association of Maebashi and the Throwing Association of Maebashi]*, 1915 (compiled in *Meiji zenki sangyo hattatsushi shiryo, bessatsu, 52-IV*, 1969), p. 32. Omama Sanshi

supplied to the market had to include the stamp that specified the producer and was randomly inspected by agents of the Association. If inspection discovered an impropriety, the cheater faced punishment by the Association. [22] Yarn-dyed fabrics were woven by ordinary hand-reeled raw silk, not by the special "Hiraito." Hence the increased production of yarn-dyed fabrics in the 1900s under the putting-out system was also supported by this governance of trades in the regional market for raw silk.

3 The putting-out system in the development of the Kiryu silk fabric industry

3.1 Diversified demands in the market

A list of famous silk fabrics of Kiryu written by Yasuhei Sawa, a middleman in Kiryu, in 1873, gives an overview of the traditional products of Kiryu in the 1870s, right before synthetic dyes were introduced from Western countries (Table 1). The line of products varies from the traditional luxury dyed-after-weaving fabrics that includes *Ryumon* [patterned fine gauze], *Sa Aya* [gauze], and *Chirimen* [crepe], to the yarn-dyed [dyed-before-weaving] fabrics that had developed since the mid 19th century, and the fabrics mixedly woven of silk and cotton. The luxury dyed-after-weaving fabrics were woven of "Hiraito" produced in the Village of Omama, Yamada County, while the other yarn-dyed fabrics and the mixedly woven fabrics were woven of ordinary hand-reeled raw silk and cotton yarn. As well as the specialties of Kiryu, some weavers copied specialties that originated from other weaving districts such as Nishijin of Kyoto Prefecture, Yonezawa of Yamagata Prefecture, Chichibu of Saitama Prefecture, and Hachioji of Kanagawa Prefecture. This broad list of products suggests that Kiryu manufacturers had begun efforts to diversify their product.

Thirty years later, after 1900, the production of the yarn-dyed fabrics such as *Kaiki* [lustrine], *Shusu* [satin], and *Shuchin* [satin], and the *Habutae* [plainly woven] increased to a large portion, although the amount of each item greatly changed every year (Tables 2, 3, 4). The destination of the luxury dyed-after-weaving fabrics such as *Ro* [fine gauze, leno] was mainly Kyoto, while the yarn-dyed fabrics such as Shusu and Shuchin were destined for huge cities like Osaka and Tokyo. The yarn-dyed products contained fabrics that were lower quality compared with the dyed-after-weaving fabrics, but the "high-quality" *Shusu* was destined to Tokyo, which suggests that the yarn-dyed fabrics demanded in huge cities were not exclusively coarse products.[23]

Dogyo Kumiai, *Omama Sanshi Dogyo Kumiai teikan [The articles of the Sericultural Association of Omama]*, Omama Sanshi Dogyo Kumiai, 1900.

[22] *Meiji 34 nendo Omama Sanshi Dogyo Kumiai hokokusho*, p. 3.

[23] Out of the total sales of Kiryu in 1886, 55 percent was destined to Tokyo, 17 percent to Osaka, 12 percent to Kyoto, and 4 percent to Nagoya of Aichi Prefecture. *Kiryu orimonoshi, chukan [History of the Kiryu weaving, vol. 2]*, 1938, pp. 553-554. Bout in 1900, "The biggest one of domestic destinations ... is Kyoto-Osaka area, followed by Tokyo. Out of the total domestic sales, 70 percent is to Kyoto-Osaka area and Nagoya, and 30 percent was to Tokyo, ..., the many *Obi Ji* [fabrics for broad sashes for kimonos], *Han Eri Ji* [for decorative collars], Shusu were destined to Osaka, mainly *Ro* and *Chirimen* to Kyoto, and *Shusu, Shchin* and other high-quality fabrics were to Tokyo," *Ryomo chiho kigho chosa hokokusho*, p. 222.

Generally in huge cities, especially in the Tokyo metropolitan region, mass consumers came to demand higher-quality fabrics after the 1890s, and, responding to this trend, the more diversified fashions composed of various materials, textures (combinations of warp and weft), and dyes came to be supplied by weaving districts.[24] Kiryu responded to this change in demand in Osaka and Tokyo by producing more yarn-dyed fabrics such as *Shusu*.

3.2 The technique of dying and the diversified products

The availability and use of power looms is also important to understand the diversification of products. Historians of the fabric industry have devoted most attention to this matter. Among them, Minami et al. (1982) looked at the hypothesis that power looms were hard to apply to weaving the yarn-dyed fabrics such as patterned cloths, striped cloths, and broad sashes, and documented that this accounted for a reason why power looms had not been introduced into Kiryu in the early period.[25] An implication of their impressive result is that technologies for variety of products other than mechanization must be considered since power looms were not suitable to the yarn-dyed fabrics common in Kiryu. Indeed Tamura (2004) pointed out that the synthetic dying, not the power loom, was critically important to realize the variety of fabrics in the traditional weaving industry.[26] If the technologies for variety of products gave more profits than those for cheaper products, it was just natural that they took the former.

Table 5 shows the number of articles related to technique and technology of the fabric industry on *Kiryu no Kogyo [The Fabric Industry of Kiryu]*[27] from 1900-1903. The table makes apparent that the articles related to designs which include dying, designing, and texture dominated. Dying technique was for various colors, designing was for the variety of patterns and colors, and texture was for the diversified and complicated combination of warp and weft that resulted in different looking of the surface of cloths. This fact mentions that manufacturers in Kiryu were greatly interested in techniques and technology for the variety of fabrics among the modern techniques and technologies in the early 1900s. Exactly at that time, dying in Japanese fabric industry had almost finished transition from natural dyes to synthetic dyes such as alizarin and aniline,[28] and various techniques of dying were tried for the variety of designs using these synthetic dyes.

Moreover, the Commercial and Industrial Association of Kiryu [Kiryu Sho Ko Dogyo Kumiai] wanted to have an institute of research and education especially for dying, and in response established the Textile School of the Town of Kiryu [Kiryu cho ritsu Kiryu Orimono Gakko], a school for apprentices. This school was modified to a school classified as a secondary school, was renamed the Kiryu Textile School of Gunma [Gunma ken Kiryu Orimono Gakko] in 1900, and was reorganized the Kiryu Textile School of Gunma Prefecture [Gunma ken ritsu Kiryu Orimono Gakko], funded by Gunma Prefecture. The school was integrated with the Isezaki Dying and Weaving School of Gunma Prefecture

[24] Tamura (2004), pp. 177-210.
[25] Minami et al. (1982), pp. 338-345. Makino (1984), pp. 41-43.
[26] Tamura (2004), pp. 133-175.
[27] Issued by Kiryusha, an industrial body established by weaving and dying manufacturers in 1898.
[28] *Gunma ken orimono genkyo chosasho*, p. 130.

[Gunma ken ritstu Isezaki Sen Shoku Gakko] and to the Textile School of Gunma Prefecture [Gunma ken ritsu Orimono Gakko] in 1905.[29] The Textile School surveyed design samples and dying methods in Western countries and systematically taught them. It also affiliated a Special Program [Bekka] for craftsmen for dying and weaving that supported their study.[30] In addition, the top pages of each issue of *Kiryu no Kogyo* were occupied by a few samples of synthetic dying tried by instructors and students of the school, with explanations on how to emulate the dye procedure.

The samples on the top pages had a model. The Industrial Association of Kiryu, [Kiryu Bussan Dogyo Kumiai] succeeded by the Textile Association of Kiryu [Kiryu Orimono Dogyo Kumiai] subscribed to American and English textile journals since 1898,[31] and *Kiryu no Kogyo* had contents similar to those of *Textile Colorist*, Philadelphia, a center of the modern textile industry that pursued the variety of products, targeting the mass consumption in the industrial society[32]. Diversified designs in the 1900s were not accidents in the traditional industry, but the results of concerted efforts to introduce modern synthetic dying from the Western world.

The diversity of yarn-dyed fabrics produced by the new technologies and techniques of dying and designing also led to rapid changes in production organizations. While most weaving manufacturers dyed their product within their workshops in 1900, it was found that in 1904 that subcontracting independent dyers dominated.[33] Instead of replacing the putting-out system, manufacturers consistently expanded this system in Kiryu — subcontracting both for dyers and weavers.

3.3 Development of the putting-out system

In Yamada County, of which a large portion is the Town of Kiryu, the number of power looms actually decreased in the early 1910s (Table 6*b*), a stark contrast to the trend of the whole Gunma Prefecture.[34] Another impressive feature of Yamada County is that the number of putting-out manufacturers dropped a half from 1905 to 1912 while the number of subcontracting weavers increased during the same time, so that the number of subcontracting weavers per putting-out manufacturer tripled (Tables 6*a*, 6*b*). This expansion of the putting-out sector was accompanied by increased production of diversified yarn-dyed

[29]Gunma ken ritsu Orimono Gakko, *Gunma kenritsu Orimonog Gakko ichiran [Guidebook of the Textile School of Gunma Prefecture]*, Kiryu, Gunma Kenritsu Orimono Gakko, 1910, pp. 2-3. *Kiryu orimono shi, gekan [History of the Kiryu weaving, vol. 3]*, 1940, pp. 135-157.

[30]*Gunma ken orimono genkyo chosasho*, p. 130.

[31]They are now held by the department of engineering library, Gunma University, which succeeded the Textile School.

[32]Scranton (1983, 1989).

[33]In 1900: "Dying is conducted by the special method of each weaving manufacturer so that there is not an independent dyer." *Ryomo chiho hataorigyo chosa hokokusho*, p. 228. In 1904: Putting-out [of dying] was not conducted in Kiryu before, but these days the weaving industry has become much more complicated compared with that in old days, hence each weaving manufacturer cannot afford to worry about dying, and improvement in dying has become necessary, therefore independent specialized dyers have emerged." *Gunma ken orimono genkyo chosasho*, p. 88. There were 7 independent dyers, 4 of whom owned boilers for heating (*Gunma ken orimono genkyo chosasho*, pp. 88-89.

[34]In whole Gunma Prefecture, the number of factories equipped with power looms steadily increased through the 1900s to the early 1910s. Nakabayashi (2003a), pp.39-41, Tables 1-9 (a), 1-10 (a).

fabrics for the mass consumption in huge cities. The expanding putting-out was thus neither a relic of the Tokugawa period nor associated with the growth from the Tokugawa period. It was instead a new phenomenon in the early 20th century stimulated by mass consumption, and realized with the progress of synthetic dying to diversify the product, not with the use of power looms.[35]

4 Efficiency of the putting-out system and benefit of agglomeration

4.1 The putting-out system in the Kiryu silk fabric industry

The weaving manufacturer [*Motobataya*] bought material yarn, and either contracted with independent producers to weave the yarn or weaved it in its workshop. There were two kinds of subcontractors: those who just subcontracted weaving [*Chinbataya*], and those who also shared in the profit from the sales of the clothes which they wove [*Shitabataya*]. Subcontracting was not restricted to only weavers — there were also craftsmen/women who subcontracted designing (making patterns), preparing looms, throwing, cleaning, and dying. Spatially, manufacturers concentrated in the Town of Kiryu, while craftsmen/women were both in Kiryu and the neighborhood.[36] Clearly, weaving remained the main subcontracted task.

In 1900, the subcontracting weavers who did not receive a share of the profits [*Chinbataya*] as well as weavers who shared the profits [*Chinbataya*] usually wove on looms that they owned, using reeds and heddles they leased from their contracted manufacturer. These subcontracting weavers mainly worked on yarn-dyed fabrics such as *Shusu* (satin) and *Kaiki* (Lustrine).[37]

[35] "In the Tenpo period [1833-1843], ..., the production of luxury patterned fabrics prospered, thus any weaving manufacturer took the factory system for weaving and put out just a little production to subcontractors, ..., however, as ordinary cloths such as *Chirimen*[crepe] mixedly woven silk and cotton and *Men Nanbu* became more and more popular since then, the products by the factory system became those of the ruralized industry, and the number of subcontracting weavers increased, and moreover, in the early 1880s, exactly when common cloths for *Obi* [broad sashes] such as Men Shusu (cotton satin) came in, the regional textile industry experienced a big change; the demand for the traditional luxury fabrics decreased and the supply of common products got more and more pleased in the market from day to day, therefore the manufacturers even more and more subcontracting weavers." Gunma ken Naimu bu [Department of Interior, Gunma Prefecutre], *Gunma ken orimonogyo enkaku chosasho [History and overview of the weaving industry in Gunma Prefecture]*, Maebashi, Gunma ken Naimu bu, 1904 (compiled in *Meiji zenki sangyo hattatsushi shiryo bessatsu 48-III*, 1969), p. 60.

[36] "Subcontractors includes those of designing (also conducting making patterns), of preparing looms, of weaving, of throwing, and so on. Among them, contracting weavers and throwsters prosper very well, so any small street in Kiryu, you hear the sounds of shuttles. Also, in Nanbu Shinjuku of Kiryu, there are uncountable throwing houses equipped with water wheels along a ditch. As well as them, seen is that ever house with a thatched roof in the neighboring villages has a loom so that weaving is conduced." *Ryomo chiho hataorigyo chosa hokokusho*, p. 225. In Kiryu, there were 4,977 subcontractors in 1904, which included 13 designers, 65 loom preparers, 218 throwsters, 17 dyers, 4,560 weavers, 14 cleaners. *Gunma ken orimono genkyo chosasho*, p. 218.

[37] Large portion of subcontracted weaving is that of Shusu, and that of Kobai Kaiki and Mon Habutae (Plainly patterned) is also subcontracetd. ..., generally, weaving of fabrics that do not need power looms is subcontracted,

The putting-out system began to disperse in the mid 19th century, when yarn-dyed fabrics came to be produced, and after the 1880s, manufacturers rapidly extended the putting-out system in substitution of in-house production (the factory system). As seen above, this shift was especially rapid in the late 1900s, because synthetic dying broadened the variety of yarn-dyed fabrics, and their production could therefore be contracted out efficiently. The putting-out system of Kiryu in the 1900s consisted of small workshops where one of the following tasks was performed: weaving, designing of patterns, throwing, preparing, dying, and cleaning, which were networked by subcontracting.

4.2 Relationship between manufacturers and subcontracting weavers

Two benefits of the putting-out system for the manufacturer have been identified previously: namely that the manufacturer can shift the risk of fluctuating market demand to the subcontractor, and that the manufacturer can utilize cheap slack labors in a peasant family by subcontracting. However, although these sound reasonable, if they are true they should hold regardless of the specific historical conditions of a region. These benefits therefore can not explain why the putting-out system of Kiryu rapidly expanded in the 1900s, nor why expensive yarn-dyed fabrics as well as cheap ones were subcontracted after 1900. Contrastingly, there were also costs of the putting-out system. Opportunistic behaviors of subcontractors — such as embezzlement of material yarn or production of lower than contracted quality — were costs to the manufacturers and discouraged the use of subcontracting by them.[38] Indeed some manufacturers in Kiryu complained about subcontractors' opportunistic behaviors as "dishonest" trades. Against those "dishonest" trades, the Textile Association of Kiryu [Kiryu Orimono Dogyo Kumiai] reached an agreement to collectively punish "dishonest" subcontractors, although the cooperation among the manufacturers did not really work.[39]

Given that manufacturers expanded the putting-out system rather than the factory system in Kiryu, these manufacturers must have somehow mitigated the problem of "dishonest" trades, allowing them to profitably take advantage of the putting-out system. It is important for our inquiry to understand the real relationship between manufacturers and subcontractors, going beyond the comments of some manufacturers in the media and official reports.

To tackle the "dishonest" trades problem, *Kiryu no Kogyo* [The Industry of Kiryu] had kept the "column of subcontractors" that described the name of each subcontractor, the name of manufacturer with whom the subcontractor traded, and the evaluation of the subcontractor by the manufacturer, on every issue since 1903 (Appendix). As shown from those descriptions, a considerable share of manufacturers had a few subcontractors with whom they had conducted business for more than 10, or even 30 years. Moreover, some manufacturers had special subcontracting weavers who specialized in *Shusu* (satin), *Kaiki*

and only reeds and heddles are leased to subcontractors, to make them weave by their own looms. ..., Some time looms are leased. As usually seen in other textile regions, prepared warp with weft is handed." *Ryomo chiho hataorigyo chosa hokokusho*, p. 225.

[38] Landes (1986). Saito and Abe (1987).

[39] *Gunmaken orimonogyo enkaku chosasho*, p. 61. *Kiryu orimonoshi*, vol. 3, 477.

(Lustrine), *Moroito Ori*, or other kinds of fabrics for a long time, and these manufacturers asked their special subcontractors to weave product when they needed special products for the "exhibitions" and "fairs," or when they wanted to have the "best quality" silk woven. In addition, some subcontractors kept long histories of transactions, passing them on to their children, who also were weavers. An important point to observe is that manufacturers who had kept a long history of good relations with special subcontractors also had good relations with new subcontractors.

A continuous relationship between the manufacturer and the subcontractor can be sufficient to avoid "dishonest" trades even when monitoring is imperfect. For this to occur, their relationship must be repeated and long lasting, both parties must want to maximize profits and must care about receiving these profits for the long-term. If these conditions hold, it is possible that the loss of the gains from the relationship deters the subcontractor from "dishonest" trade.[40] If the manufacturer pursues the one-shot profit by opportunistically exploiting the subcontractor, or if the subcontractor pursues the one-shot profit by opportunistically cheating the manufacturer, each would lose the long-term larger benefit that would obtain if trade were honest. This fact gives both sides a strong incentive to keep mutual prosperity.[41] Therefore, there did not exist any problem between the competitive manufacturers who produced high-quality yarn-dyed fabrics and their core subcontractors, as their relationship was long lived. The "dishonest" trades seem to have happened to the manufacturers who avoided long-term trades with subcontractors and did not or could not pay sufficient weaving fees to subcontractors.[42] Complaints about "dishonest" trades from some manufacturers were actually death cries of losing manufacturers.

Related to this point, Matsumura (2002) clarified that the manufacturers failed to collectively act to deter "dishonest" trades by subcontractors. As Matsumura (2002) mentions, the deterrence of "dishonest" trades was possible only by the continuous relation between the competitive manufacturers who successfully developed new products and their subcontractors. In other words, the collective governance of trades among the manufacturers was not effective, while the individualist governance of trades was dominant, which explains the exit of less efficient manufacturers in the early 1900s.

Another point is that many of the core subcontractors of large manufacturers were male, or couples, suggesting that they were specialized full-time weavers, not part-time weavers. Some of them were sufficiently specialized as to own 3-4 looms. The shift from the part-time weaving to the full-time weaving continued into the 1910s.[43]

[40] Fringe benefits in kind are sometimes called "embezzlement" trades, but this naming is misleading. As long as the manufacturer observes the benefit, it is neither opportunistic nor a "dishonest" trade. In many situations, the manufacturers seem to be able to infer if the manufacturers are "honest" of "dishonest." In those situations, "embezzlement" actually does not happen. Although many works such as Landes (1986) have pointed out "embezzlement" in the putting-out system, it is not clear if this was a serious issue.

[41] Under these conditions, conducting "honest" trades could be a subgame perfect equilibrium (s stronger concept of Nash equilibrium).

[42] *Gunma ken orimonogyo enkaku chosasho*, p. 64. *Ryomo chiho hataorigyo chosa hokokusho*, pp. 226-227.

[43] In Kiryu, the subcontracting weavers who have been a part-time weavers are changing to full-time weavers because the income from weaving is increasing by the prosperity of the weaving industry, so that the area where subcontracting weavers live is expanding to whole Yamada County, Nitta County, ..., Sawa County, ..., Tochigi Prefecture, and to Saitama Prefecture." Tokyo Zeimu Kantokukyoku [The Tax Office of Tokyo], *Orimono seisan*

Therefore, core subcontractors were not "dishonest" or part-time subcontractors, as has been assumed in the literature. The competitive manufacturers had long-term relations that were more than 10 years with many full-time subcontractors, each of whom specialized in weaving a few kinds of fabrics. The number of subcontractors per manufacturers was about 20 (Tables 6*a*, 6*b*), and generally each subcontractor had transactions with only a few manufacturers — hence an average manufacturer is thought to have organized a few dozen subcontracting weavers. The putting-out system in Kiryu was thus based on a long-term relationship between a core of full-time specialized weavers and a few manufacturers.

4.3 Flexibility of production and efficiency of agglomeration

Then what were the benefits of the putting-out system for competitive manufacturers? A benefit of the putting-out system was in that "it is not necessary to newly train weavers when the kinds of fabrics are changed," — a flexibility in the kinds of fabrics, as well as a flexibility in the scale of business.[44] Flexibility seems to have been important to competitive manufacturers.

As shown on Table 4, the fluctuations in production of each fabric were considerably large, and the designs of each fabric changed often due to changing fashions. Under such a situation, it was not economical for a manufacturer to train and maintain all skilled weavers within his factory. On the other hand, each weaver specialized in some kinds of fabrics (Appendix).[45] Thus, a manufacturer could realize a varied lineup of fabrics at lower cost by organizing several subcontracting weavers skilled in a few specialties and maintaining them by means of a long-term relationship. Also, subcontracting weavers can reduce the risk associated with fluctuating demand by planning production with each manufacturer and keeping relations with a few manufacturers, not with only one manufacturer. Indeed in Kiryu, subcontracting was generally not exclusive so that each subcontractor was allowed to enter in contracts with other manufacturers. This type of contract was preferred also by manufacturers because "changes" in the fashion were considerable in the industry.[46]

The designs of fabrics are determined by the combination of dying material yarn, throwing, designing, texture, finishing, and so on. If the extension of the putting-out in 1900s meant the development of the production organization that realized flexible diversification of fabrics, the putting-out system should be seen in each of throwing, designing, and finishing. Kameda (2000) and Hashino (2005) find facts consistent with this inference. Sadakichi Goto, the manufacturer they studied, had produced *Obi* (broad sashes) until the end of the 1890s. In the 1900s, however, this manufacturer diminished the production of *Obi*, and increased the production of cloths for kimonos, for which the weaving was put in the charge of subcontractors. Moreover, he extended subcontracting transac-

oyobi torihiki chosa [Survey of the production and transaction of fabrics], 1920 (compiled in *Meiji zenki sangyo hattatsushi shiryo bessatsu 53-IV*, p. 134.

[44] *Gunmaken orimonogyo enkaku chosasho*, p. 61. *Kiryu orimonoshi*, vol. 3, p. 477.

[45] "Each weaver is specialized in a specific kind of fabric by special skill," *Ryomo chiho hataorigyo chosa hokokusho*, p. 228.

[46] *Gunma ken orimono enkaku chosasho*, pp. 64-72.

tions with throwsters, cleaners, and dyers. He also conducted many trades with them in a year, each of on a small scale. These transactions suggest that he chose the putting-out system for a flexibility and variety of fabrics, instead of the factory system.[47] After World War I, when the product market, the labor market, and the production technology all had drastically changed, Goto went back to the factory system, and introduced power looms into his factory.[48]

From 1880 to the 1900s, when production of the yarn-dyed fabrics developed, manufacturers catered to new demands by offering new designs, and flexibly responded to the fashion in the market. A flexible production organization is desirable under these market conditions. The putting-out system at that time was such an organization: it provided geographically concentrated specialized subcontractors with long-term relations with manufacturers who could be contracted based on changing market demands. Skilled full-time craftsmen/women were preferred as core subcontractors to cheap part-time workers by competitive manufacturers there. Further, as manufacturers had to adjust to fluctuations in fashion, the benefit of in-house specialized workers and production became smaller, regardless whether their products were high or low-quality. Thus, manufacturers who were competitive diminished the production in their factories, and organized weavers skilled in specific fabrics as subcontractors. Under competitive pressures (mainly for variety), the manufactures who could not offer novelties exited, and skilled weavers concentrated with the competitive manufacturers. Therefore, the putting-out system worked to exploit the benefits of agglomeration from flexibly organizing each process of the silk fabric industry.

Until the 1910s, power looms could not be used in the weaving of yarn-dyed fabrics with varied designs due to their technological limitations. Given this technological constraint, the putting-out system was chosen as it was the least expensive production organization given the combination of weaving by hand looms and dying using synthetic dyes. The putting-out system was advantageous in Kiryu because of the concentration of skilled workers and the "flexibility of production" by the "flexible specialization"[49]

During the Tokugawa Period, consumers of *Ro* [fine gauze, leno] — the representative luxury fabric of Kiryu — were not the general public. Not until the late 19th century when yarn-synthetically-dyed fabrics with varied designs were offered at reasonable prices did the mass consumption of silk fabrics occur. While the rich bought the luxury *Ro* from long-established boutiques, the new consumers bought articles which matched the fashion and their taste in general department stores. In this transition and expansion, the putting-out system is thought to have efficiently adjusted to the style of consumption.

Keeping this point in mind, we should mention the implication of the "flexibility" of Kiryu in the early 20th century was a little different from that of Lyons in the middle 19th century.[50] The efficiency realized in Lyons was that for haute couture that was consumed by the very rich sensitive to the mode in Paris. The consumers of Kiryu fabrics in the 1890s to the 1900s were the upper part of the mass in huge cities.[51] The modernization of dying and designing with the putting-out system allowed lower prices of the yarn-dyed

[47] Kameda (2000), pp. 44-45. Nakabayashi (2003a), pp. 48-49, Tables 1-11, 1-12.
[48] Hashino (2005).
[49] Piore and Sable (1984).
[50] Cottereau (1997).
[51] Tamura (2004).

fabrics, which created the mass consumption.

5 Concluding remarks

The technological progress in Kiryu existed in synthetic dying and systematic designing from the 1890s to the 1900s. Neither the large factory system nor the putting-out system consisting of organized unskilled part-time weavers was desirable there. Manufacturers organized weavers skilled in some specialties as core subcontractors, and traded with skilled dyers and skilled throwsters who were desirable for the designs targeted. The putting-out system that flexibly organized skilled craftsmen/women in long-term relationships was chosen for the yarn-dyed fabrics given the technology of synthetic dying. In addition, the regional market around Kiryu of material yarn was well-organized, which supported the weaving and dying processes. The production system optimally organized from the upstream to the downstream, enabling the industry to grow with the new demand from the emerging masses in big cities such as Tokyo.

However, the mass consumption of fabrics that producers in Kiryu responded to was not a specific phenomenon of Japan, nor was the benefit of agglomeration in Japan and Europe. For instance, in the 1900s, the fabric industry in New York and New Jersey created the demand of mass consumption by offering varied goods. A considerable part of the production was conducted by the putting-out system that organized women and children of families in the City —called tenement homework.[52] The manufacturing industries in the 20th century industrial societies pursued the same goal, namely, the flexible supply of varied products for mass consumption. The paths to the goal, however, were varied among industries in respective societies. The comparative analysis of them in the micro-level is left as an exciting research agenda.

[52] Hindman (2002), pp. 187-212.

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Figure 1

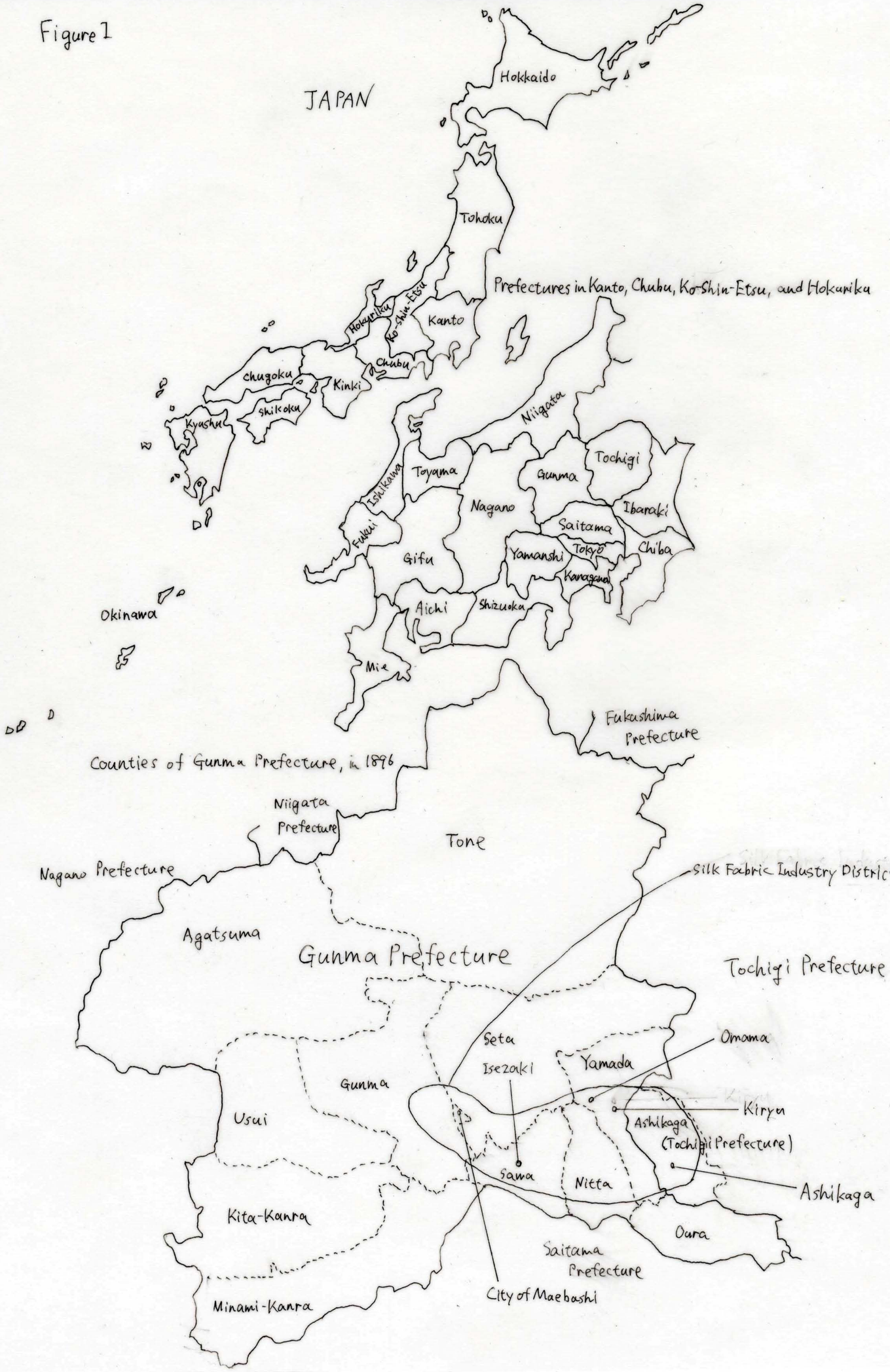
JAPAN
Hokkaido
Tohoku
Prefectures in Kanto, Chubu, Ko-Shin-Etsu, and Hokuriku
Hokuriku
Ko-Shin-Etsu
Kanto
Chubu
Chugoku
Kinki
Shikoku
Kyushu
Okinawa
Niigata
Toyama
Ishikawa
Fukui
Nagano
Gifu
Tochigi
Gunma
Ibaraki
Saitama
Tokyo
Chiba
Yamanshi
Kanagawa
Aichi
Shizuoka
Mie
Fukushima Prefecture
Counties of Gunma Prefecture, in 1896
Niigata Prefecture
Tone
Nagano Prefecture
Silk Fabric Industry District
Agatsuma
Gunma Prefecture
Tochigi Prefecture
Seta
Omama
Isezaki
Yamada
Gunma
Kiryu
Usui
Ashikaga (Tochigi Prefecture)
Sawa
Nitta
Ashikaga
Kita-Kanra
Oura
Saitama Prefecture
City of Maebashi
Minami-Kanra

Table 1 Main fabrics produced in Kiryu, 1873.

Kind of fabric	Feature	Kinds of material	Kinds of material yarn	To be dyed before/after weaving	Production area	Origin area
Habutae	Woven of the warp and weft of the first class raw silk, "for formal kimonos." A first class fabric.	Silk	Raw silk	After	Nishijin/ Kiryu	Nishijin
Ryumon	A patterned fabric woven of the warp and weft of the first class *Hiraito* (flat-thrown silk thread) produced at Omama. A first class fabric.	Silk	*Hiraito* of Omama	After	Kiryu	Kiryu
Tango Chirimen	Crepe woven of the silk warp and the silk or cotton weft.	Silk/ Mixture of silk and cotton	Raw silk/ Cotton yarn	After	Tango/ Kiryu	Tango
Joshu Chirimen	Crepe.	Silk	Raw silk	After	Kiryu	
Kabechiyoro Chirimen	Crepe, good for kimonos for women.	Silk	Raw silk	After	Gifu/ Kiryu	Gifu
Ki Ro	Fine gauze (leno) loosly woven of the *Hiraito* warp and the *Hiraito* weft. For luxury kimonos. Mon Ro. Kasumi Ro. The special fabric of Kiryu.	Silk	*Hiraito* of Omama	After	Kiryu/ Nishijin	Kiryu
Sa Aya	Twilled gauze patterned with gammadion. Woven of *Hraito* of Omama.	Silk	*Hiraito* of Omama	After	Kiryu	Kiryu
Rinzu Sa Aya	Twilled satin patterned with gammadion.	Silk	*Hiraito* of Omama	After	Kryu	Kiryu
Rinzu	Satin woven of the warp and the weft of the first class raw silk.	Silk	Raw silk	After	Nishijin/ Ueda/ Kiryu/	Nishijin
Sha	Gauze loosly woven of the first class *Hiraito* , used for summer coats.	Silk	*Hiraito* of Omama	After	Kiryu	Kiryu
Kameaya Ryumon	Twilled gauze patterned with small gammadion.	Silk	*Hiraito* of Omama	After	Kiryu	Kiryu
Rinzu	Satin produced in Kiryu for a long time.	Silk	Raw silk	After	Nishijin/ Kiryu	
Aya Shibo	Twilled and patterned satin.	Silk	Raw silk	After	Kiryu	Kiryu
Higaki Sa Aya	Twilled gauze patterned with parallelograms.	Silk	Raw silk	After	Kiryu	Kiryu
Mon Sa Aya	Twilled gauze patterned small marks.	Silk	Raw silk	After	Kiryu	Kiryu
Hiro Ryumon	Gauze woven of 6 or 8 weft with one warp. Woven of the fist class *Hiraito* .	Silk	*Hiraito* of Omama	After	Kiryu	Kiryu
Shioze Ryumon	ditto.	Silk	*Hiraito* of Omama	After	Kiryu	Kiryu
Shike Ginu	For hanging scrolls and screens.	Silk	Raw silk	After	Kiryu/ Nishijin	
Funsen Kinu Tsumugi	Woven of spun silk yarn.	Silk	Raw silk	After	Nishijin/ Kiryu	
Hon-yori Shima Chirimen (Omeshi Chirimen)	Crepe woven of raw silk warp and thrown silk weft.	Silk	Raw silk	After	Nishijin/ Kiryu	Nishijin

Higashi Shima Chirimen (Dasso Chirimen)	Crepe woven of imported (machine thrown) cotton yarn warp and silk weft. Recently the fashion in West Japan, so that many weavers prduce it.	Silk	Raw silk	After	Kiryu/ Ashikaga	Kiryu
Kabe Chiyo Ro Jima	Gauze woven of four threads of warp with one tube-thrown thread of weft. There many kinds of plan, patterned, etc. as well as striped ("Shima," "Jima").	Silk	Silk/ Tube-thrown silk	Before	Kiryu	Kiryu
Kabe Ro	Gauze (leno) woven of tube-thrown and single-colored warp and weft. There striped and plain-clored. For summer coats and other luxury cloths.	Silk	Tube-thrown silk	Before	Kiruy	Kiryu
Men Ro	Gauze (leno) woven of silk warp and cotton weft, or cotton warp and cotton weft.	Silk/ Cotton	Raw silk/ Cotton	Before	Kiryu/Ashikaga/ Kawagoe	
Hon Ito Ori	Woven of silk organzine warp and *Hiraito* weft, unstarched. Luxury fabric with luster.	Silk	Raw Silk/ *Hiraito*	After	Yonezawa/ Kiryu	Yonezawa
Fushi Ito Ori	Woven of silk or dupion (spun) silk warp and dupion silk or noshi (spun) silk. A good fabric.	Silk	Raw silk/ Dupion silk/ Noshi silk	After	Yonezawa/ Kiryu/ Hachioji	Yonezawa
Ryumon Hira	Luxury fabric woven of cleaned silk warp and half-degummed silk weft.	Silk	Raw silk	After	Kiryu	Kiryu
Shokan Hira	Woven of cotton warp and linen weft.	Mixture of cotton and linen	Cotton/ Linen	Before	Tokyo/ Hachioji/	
Cha U (Ryu Jo)	The most tightly woven of first class fine silk warp and degummed silk weft.	Silk	Raw silk	After	Nishijin/ Kiryu	
Cha Maru	Woven of a little thiner (than *Cha U*) warp and degummed and colored weft.	Silk	Raw silk	Before	Nishijin/ Kiryu	
Kara Kohaku Jima	Striped taffeta woven of a little thick weft. Patterned with wicl	Silk	Raw silk	Before	Nishijin/ Kiryu	
Tango Jima	Woven of middle-class degummed silk.	Silk	Raw silk	Before	Nishijin/ Kiryu	
Kohaku Jima	Striped taffeta woven of high-class silk threads. Woven of 8, 6, or 4 threads of warp par one thread of weft. A weft thread is composed of a few thin threads of raw silk. Plain, striped, or patterned.	Silk	Raw silk	Before	Nishijin/ Kiryu	
Kohaku Jima Obi Ji	Striped taffeta for broad sashes, woven as Ryu Haku Jima, with organzine threads of warp. Patterned.	Silk	Raw silk	Before	Chikuzen/ Nishijin/ Kiryu/ Hachioji/ Yonezawa/	
Shusu	Plain or patterned satin.	Silk	Raw silk	Before	Nishijin/ Kiryu	
Ko Donsu	Patterened satin damask woven of 5 threads of warp par one thread of weft.	Silk	Raw silk	Before/ After	Nishijin/ Kiryu	

Koyanagi Ji	Patterned satin damask woven of 4 threads of warp par one thread of weft.	Silk	Raw silk	Before/ After	Nishijin/ Kiryu
Futae Donsu	Patterned satin damask.	Silk	Raw silk	Before/ After	Nishijin/ Kiryu
Atsuita	Amber-colored fabric woven of *Hiraito* .	Silk	Raw silk	Before	Nishijin/ Kiryu
Hongoku Ori (Yoriito Ori	Amber-colored.	Silk	Raw silk	Before	Nishijin/ Kiryu
Ito Nishiki	Satin damask patterned by gold or other colored threads.	Silk	Silk/ Gold	Before	Nishijin/ Kiryu
Yamato Nishiki	Satin damask patterned by gold or other colored threads.	Silk	Silk/ Gold yarn	Before	Nishijin/ Kiryu
Mon Ori Kyu sun Obi	Low class broad sash woven of silk warp and cotton weft.	Mixture of silk and cotton	Raw silk/ Machine thrown cotton		
Kantan Ori	Woven of low class organzines. Patterned anc colored.				Nishijin/ Kiryu/
Shima Chirimen Usu Haori Ji (Striped crepe for light coats)	Very light crepe woven of silk warp and silk or cotton weft.	Silk/ Mixture of silk and cotton			
Kinu Chirimen (Crepe)	Patterned crepe woven of single-thread silk and thick tram.	Silk	Raw silk	After	Nagahama/ Tango/ Kiryu

Source : Yasuhei Sawa, "Kokunai kaku san sho orimono ito gumi mei shou ryakki" (Conscise note for names and organizations of fabrics in production areas of Japan), October 1873. Held by the Main Library, University of Tokyo.

Notes : Kiryu belongs to Gunma Prefecture, Nishijin and Tango to Kyoto, Hachioji to Kanagawa (to Tokyo later), Yonezawa to Yamagata, Nagahama to Shiga.

Table 2 Main fabrics produced in Kiryu, 1904-1905.

Name of fabric	Kinds of material	Material yarn
Habutae (Plain weave)	Silk	Raw silk
Mon Habutae (Patterned)	Silk	Raw silk
Aya Habutae (Twilled)	Silk	Raw silk
Shike Ori	Silk	Raw silk/ Dupion silk of Maebashi
Mon Shike Ori	Silk	Raw silk/ Dupion silk of Maebashi
Ro Ori (Gauze (leno))	Silk	Hiraito of Omama
Nanako Ori	Silk	Raw silk
Chirimen Ori (Crepe)	Silk	Hand reeled raw silk of Omama
Ro Chirimen (Crepe gauze (leno))	Silk	*Hiraito* of Omama
Muffler		
Mon Lace (Patterned lace)	Silk	Raw silk
Rinzu Ori (Figured Satin)	Silk	Raw silk
Sa Aya Ji Ori (Twilled gauze)	Silk	Raw silk
Kanko Chirimen Ori (Crepe)	Mixture of silk and cotton	Raw silk/ Cotton yarn
Men Yoko Shusu (Satin with cotton weft)	Mixture of silk and cotton	Raw silk/ Cotton yarn
Neri Orimono (Fabric woven degumed raw silk)	Silk	Raw silk
Ito Ori	Silk	Raw silk
Ichi Raku Ito Ori	Silk	Raw silk
Futsu Ito Ori	Silk	Raw silk
Kohaku Ori (Taffeta)	Silk	Raw silk
Futsu Kohaku Ori (ReversibleLoosely woven taffeta	Silk	Raw silk
Omeshi Chirimen (Crepe)	Silk	Raw silk
Futsu Omeshi (Reversible figured crepe)	Silk	Raw silk
Kanko Shusu (Satin)	Mixture of silk and cotton	Raw silk/ Cotton yarn
Atsuita Ori	Silk	Raw silk
Shuchin Obi Ji (Satin for broad sashes)	Silk	Raw silk
Shima Ro (Striped gauze)	Silk	Raw silk
Fushi Ito Ori	Silk	Dupion silk
Kabe Ito Ori	Silk	Dupion silk
Donsu Ura Ji (Satin damask)	Silk	Dupion silk
Men Shuchin (Satin woven of silk and cotton)	Mixture of silk and cotton	Raw silk/ Cotton yarn
Yamabuki Ori	Mixture of silk and cotton	Raw silk/ Cotton yarn
Men Men Shusu (Cotton satin)	Cotton	Cotton yarn
Men Men Shuchin (Cotton satin)	Cotton	Cotton yarn
Aya Ito Ori	Cotton	Cotton yarn
Usu Kohaku Ori (Taffeta)	Silk	Raw silk
Taffeta	Silk	Raw silk
Mon Taffeta (Patterned taffeta)	Silk	Raw silk
Mon Donsu Ori (Patterned damask)	Silk	Raw silk
Aya Ginu (Twilled silk)	Silk	Raw silk
Kaiki (Lustrine)	Silk	Raw silk
Shusu Sode Ura (Satin)	Silk	Raw silk
Kobai Kaiki (Lustrine)	Mixture of silk and cotton	Raw silk/ Cotton yarn
Krami Ori Ire Kobai Kaiki (Lustrine)	Mixture of silk and cotton	Raw silk/ Cotton yarn

Source : Gunmaken Naimubu (Department of the interior, Gunma Prefecture), *Gunmaken orimonogyo genkyo chosasho* (Report on the current situataion of the weaving industry in Gunma prefecture), Gunmaken Naimubu, 1904, pp. 39-67.

Table 3 Production of fabrics in Town of Kiryu (Yamada County).

Year	Peace goods							*Obi* (Broad sashes tied over a kimono)	
	Silk				Mixture of silk and cotton			Silk	Mixture of silk and cotton
	1,000 m^2	1,000 yards	1,000kg	1,000 pieces	1,000 m^2	1,000 yard	1,000 pieces	1,000 pieces	1,000 pieces
1892	963				90			40	623
1893	2,223		7.61		119			52	742
1894	1,679		8.35		156			65	921
1895	991				208			56	1,787
1896	826				170			112	1,067
1897	848				174			113	1,578
1898	959				298			107	1,564
1899	566	5,166			109	9,257		87	1,515
1900	653	7,125			90	4,905		102	1,353
1901	1,479				1,775			59	686
1902	1,259				1,172			51	706
1903	604				479			26	732
1904	205	5,268			49	1,188		28	891
1905	988				745			28	353
1906	1,768				605		618	67	377
1907	1,756				1,248			96	988
1908	1,316	5,293			434			100	1,383
1909	2,332	313			414			63	1,153
1910	1,297		0.60	53	709			56	1,392
1911	1,242	2,721	0.50	0	1,004			142	1,429
1912	1,448	3,326	0.73	27	411		24	112	1,253

Source : *Gunma Ken tokeisho* (Statistics of Gunma Prefecture).

Notes : Quantity of fabric is shown by "tan" in the source. On this table, "tan" is converted into "m^2" by 1 tan = 2.56 m^2.
The numbers since 1901 show the production in Yamada County which includes Town of Kiryu, whereas the most production of Yamada County was from Kiryu.

Table 4 Production of silk fabric in Town of Kiryu (Yamada County since 1901): dicomposed to kinds of fabrics.

Year	Woven of Omama *Hiraito*			*Habutae* (Plain)		*Kaiki* (Lustrine)		*Chirimen* (Crepe)	*Hakama Ji*	*Ito Ori*	*Fushi Ito Ori*	*Shike Ginu*	*Rinzu* (Figured Satin)	*Shusu* (Satin)	Others	Total		
	Ro (Gauze) *a*	Others *b*	Subtotal *c=a+b*															
	m^2	m^2	m^2	m^2	1,000 Yards	m^2	1,000 Yards	m^2	m^2	m^2	m^2	m^2	m^2	m^2	m^2	1,000 Yards	m^2	1,000 Yards
1892	8,522	832	9,354	825,262		20,480		38,451	0	5,632	0	0	0	0	63,565		962,744	
1893	60,178	5,133	65,311	2,059,648		24,550		23,045	2,196	11,159	476	8,207	0	0	28,751		2,223,345	
1894	114,278	8,463	122,742	963,776		321,608		16,745	6,920	15,634	676	182,477	5,635	0	42,545		1,678,756	
1895	336,586	15,250	351,836	223,598		244,283		49,421	9,935	22,467	1,533	46,886	5,412	0	35,607		990,979	
1896	165,453	3,994	169,446	162,458		217,958		36,736	14,464	75,520	12,800	31,130	55,296	0	50,373		826,181	
1897	133,862	3,968	137,830	178,790		233,728		40,858	8,192	72,960	16,640	29,440	59,392	0	70,272		848,102	
1898	127,027	3,750	130,778	187,149		312,576		36,014	3,072	90,880	16,128	34,560	0	0	147,866		959,022	
1899	122,138	0	122,138		1,395		3,532	36,014	6,016	132,454	15,040	143,759	28,288	0	82,644	240	566,354	5,166
1900	107,671	0	107,671		3,741		3,384	33,516	5,345	66,017	10,752	0	1,843	1,597	426,368	0	653,110	7,125
1901	238,520	0	238,520	808,115		83,389		31,526	12,928	72,371	13,312	0	2,125	6,400	209,818		1,478,505	
1902	210,755	0	210,755	595,251		91,136		23,281	4,124	51,149	14,715	0	4,198	3,750	260,838		1,259,197	

Source : *Gunma ken tokei sho* (Statistics of Gunma Prefecture), Gunma Prefecture.

Notes : *Hiraito* is a flat-thrown silk thread. "Others" of "Woven of Omama *Hiraito* " contain *Sha* (gauze), *Ryumon* , *Kame Aya Ori* (patterned with hexagons), and *Kame Mon Ori* (patterned with hexagons). Handkerchieves are not included in this table.

Table 5 Articles on *Kiryu no kogyo* (The industry of Kiryu) about technologies and techniques for fabric production, 1900-1903.

Year	Samples	Dyeing	Design	Preparing and Finishing	Texture and Weaving	Throwing	Loom	Others
		Number of articles	Number of articles	Number of articles	Number of articles	Number of articles	Number of articles	Number of articles
1900	Dyeing and Texture	17	4	1	2	1	0	1
1901	Dyeing and Texture	17	4	4	1	0	0	7
1902	Dyeing and Texture	33	5	3	3	1	0	1
1903	Dyeing and Texture	19	0	3	0	0	0	0
Total		86	13	11	6	2	0	9

Source: *Kiryu no kogyo* (The manufacturing of Kiryu) , no. 16-19, 22, 29-58, 61-62, Jan-Apr, July, 1900, Feb-Dec, 1901, Jan-Dec, 1902, Jan-Jul, Oct-Nov, 1903. *Orimono kogyo* (The fabric industry) (succeeding *Kiryu no kogyo*), no. 63, Dec, 1903.
Notes: "Samples" are a few samples of dyed threads and scraps to show the effects of new synthetic dyes and new patterns of "texture" on the top page of every issue. "Texture" mentions a combination of the warp and the weft to make a specific pattern on the surfice of the fabric. "Others" include articles about other techniques and reports about foreign fabric industry.

Table 6*a* Production organization of the silk fabrci industry in Yamada County, Gunma Prefecture.

Year	Number of Independent Weaving houses	Number of Weaving houses subcontracting	Total	Number of looms		Number of operatives Weaving operatives		Supporting operatives	
				Power	Hand	Male	Female	Male	Female
1901	724	3,796	4,520	455	6,558	1,050	7,258		
1902	714	3,691	4,405	168	6,307	1,026	7,132		
1903	704	4,331	5,035	181	6,429	2,070	10,984	810	1,227
1904	468	2,751	3,219	167	5,629	903	1,946	1,884	7,928

Source : *Gunma Ken tokeisho* (Statistics of Gunma Prefecture).

Table 6*b* Production Organization of the silk fabric industry in Yamada County, Gunma Prefecture.

Year	Factory industry					Cottage industry					Manufacturers farming out weaving					Weavers subcontracting				
	Number of factories	Number of looms		Number of operatives		Number of cottages	Number of looms		Number of operatives		Number of manufacturers	Number of looms		Number of operatives		Namber of wevers	Number of looms		Number of operatives	
		Power	Hand	Male	Female		Power	Hand	Male	Female		Power	Hand	Male	Female		Power	Hand	Male	Female
1905	39	152	438	58	648	302	0	898	37	1,078	199	0	417	13	529	3,540	0	4,202	65	4,630
1906	35	152	388	70	897	394	0	1,245	91	1,297	109	*0*	293	26	382	3,663	0	4,161	217	5,002
1907	33	173	418	59	876	418	0	1,367	95	1,447	139	0	388	37	468	4,034	0	5,650	263	5,562
1908	32	330	432	60	872	390	0	1,298	81	1,382	124	0	343	40	418	4,070	0	5,594	301	5,473
1909	41	356	503	54	1,005	423	5	1,369	64	1,463	97	0	280	24	446	4,155	0	5,439	293	5,433
1910	73	420	625	63	1,195	385	0	1,291	60	1,384	104	0	322	32	405	4,560	0	5,950	324	5,892
1911	66	163	569	46	754	375	12	1,399	51	1,377	70	0	0	0	0	4,713	0	6,176	279	6,029
1912	59	204	555	33	816	377	12	1,357	35	1,341	99	0	76	21	76	5,337	0	7,347	287	7,144

Source : *Gunma Ken tokeisho* (Statistics of Gunma Prefecture).

Appendix Weavers under putting-out contract, shown on the issues in 1903 of *Kiryu no kogyo* (Manufacturing of Kiryu).

Manufacturers farming out weaving		Subcontractors		Kind of fabric	Description and evaluation of the subcontractor told by the manufacturer
Name	Location	Name (Female/Male)	Location		
Yosokichi Aida	Minato	Kichigoro Ohsawa (M) and another.	Hishi 1, Umeda 1.	*Kaiki*	"Weaving excellently, they have been dedicated to his job for sevral years."
Shojiro Asakura	Kiryu	Shinkichi Takei (M) and 9 others	Kiryu 2, Hirosawa 4, Kasagake 4		"They have steadilly worked for a few years, with good skill."
Zensuke Iwasawa	Kiryu	Naka Suto (F)	Godo	*Chirimen* (Crepe)	"She has dedicatedly worked for as long as 20 years." "I've had her weave fabrics for exhibitions."
		Nui Ozaki (F)	Sakaino		"She worked as an apprentice twenty years ago, and since then until now, she've been sincerely working, with excellently weaving."
		Tsune Hirata (F)	Kiryu		"She has applied herself to weaving good fabrics."
		Iku Yamada (F), and another.	Morita 1, Yamamae1.		"Sincerely and nicely weaving."
Kakutaro Ueno	Kiryu	Giichiro Ohkawa (M), and 3 others.	Kiryu 1, Hishi 3.	*Shusu* (Satin)	"With very good skill, they have been steadilly dedicated to weaving for 5-6 years."
Teisuke Ebara	Kiryu	Torajiro Arai (M), and another.	Sakaino	*Kohaku* (Taffeta)	"They have steadilly worked for as subcontractors of the manufacturer for more than 20 years with his excellent skill."
		Sadakichi Moriguchi (M)	Kiryu		"He has steadilly worked for as a subcontractor of the manufacturer for more than 20 years with his excellent skill."
		Den Arai (F)	Kiryu		"She has steadilly worked as a subcontractor of the manufacturer for more than 10 years."
		Kikujiro Higashi (M, throwster), and 5 others.	Kiryu (throwsters) 3, Sakaino 3.		"They have worked for 5-6 years with fairlly good skill."

Eihachi Osawa	Kiryu	Kijuro Shinobe (M), and 2 others.	Kiryu 1, Yamamae 2.	*Shusu* (Satin)/ other fabrics for *Kimono*	"They have steadilly and devotedly subcontracted weaving from the manufacturer for more than 30 years."
		Kinjiro Shimada (M)	Yamamae		"They have also been dedicated ... with good skill for 20 years."
		Ainosuke Yanagisawa (M)	Omama		"They have also been dedicated with good skill."
		Kumekichi Kobayashi (M), and another	Kiryu 1, Kasagake 1.		"They have steadilly subcontracted weaving from the manufacturer."
		Koreshichi Suwa (M), and 2 others.	Kiryu 3.		"They have subcontracted weaving from the manufacturer for about 1 year." "They are promissing subcontractors."
Buhei Oshima	Kiryu	Sakujiro Unno (M), and another.	Kiryu 2.	*Cho Shusu* (Satin)	"They have subcontracted for as long as 14-15years with sincerity." "Themanufacturer ask them when he needs silk fabrics with the best quality."
		Tsune Unno (F)	Kiryu		"She has subcontracted weaving from the manufacturer, and her products are fairlly good."
		Nami Inoue(F), and 2 others.	Kiryu 3.	*Shusu* (Satin)	"They are dedicated to their job."
		Kazusaburo Yoshida	Kiryu		"Ordinary attitude and ordinary skill."
Yoshihei Oshima	Ashikaga	Shikasaburo Yanagita (M), and 6 others.	Morita 2, Nirakawa 5.	*Chichibu*	"They have been devoted to weaving *Chichibu* . They are the best subcontractors of the
		Shinichiro Totsuka (M)	Nirakawa		"He is promissing whereas he has worked only 1
Gennojo Okada	Yabakawa	Maki Okawa (F), and another.	Yabakawa 2.	Cotton *Hakata*	"They have sincerely subcontracted weaving for 14-15 years with good skill."
		Kumajuro Nishida (M)	Yabakawa		"He has sincerely subcontracted weaving from the manufacturer for more than 10 years."
		Kane Sugiyama (F), and another.	Yabakawa 2.		"They have sincerely worked on weaving for more than 5 years."

		"A" and 2 others (anonymous).	Yabakawa 3.		"They tatek the lead in dishonest trades where they who often embezzle the weft." "The manufacturer has payed in advance, but they don't really finish
Kiikuro Kato	Kiryu	Jihei Maehara (M), and 2 others.	Kiryu 2, Umeda 1.	*Shusu* (Satin)	"They have dedicatedly worked for more than 20 years to satisfy the manufacturer."
Shoichi Kato	Kiryu	Kinzo Nagahashi (M), and 2 others.	Kiryu 2, Umeda 1.	*Shusu* (Satin)	"They have worked on weaving *Shusu* … for more than 30 years, having steadilly been devoted to producing excellent fabrics."
		Jihei Maehara (M), and another.	Umeda 2		"Having sincirely been devoted to their jobs for more than 25 years."
		Togoro Kojima (M)	Kiryu		"He has weaved very good fabrics for more than 20 years."
		Kensaburo Kanai (M)	Kiryu		"Having steadilly working for more than 15 years."
		Sentaro Otsuka (M)	Umeada		"He has sincerely worked on weaving good fabrics."
Eiichiro Kitagawa	Kiryu	Risaburo Noda (M), and 4 others.	Aioi 3, Kasagake 1, Hirosawa 1.	*Moroitoori* / *Yoshinoori* / *Ayaitoori* / *Shimaroori* (Striped fine gauze)	"They have devoted to weaving Moroitoori, Yoshinoori, Ayaitoori, Shimaroori for 5-6 years" "with excellent skill."
		Tsunee Hiruma (M), and 2 others.	Aioi3.	*Moroitoori/ Yoshinoori/ Ayaitoori/ Shimaroori*	"They have woven out sevral kinds of fabrics for 3-4 years" "sincerelly and with good skill."
Matagoro Kurihara	Kiryu	Keitaro Fujieda (M)	Kiryu	*Kankoshusu* (Satin)	"The steadiest."
		Yoshitaro Deguchi (M)	Kiryu		"His attitude and skill are good."
		B(anonymous)	Kiryu	*Kankosyusu*	"He consumes [embezzles] the weft very much."
		C(anonymous)	Kiryu	*Kankosyusu*	"He sometimes pawn the [manufacturer's] weft."

Banshichi Saito	Yabakawa	Yoshihei Nishida (M), and another	Yabakawa 2.	Cotton *Hakata*	"They have steadilly and devotedly subcontracted weaving from the nafuacturer" "with good skill."
Tokuhei Suzuki	Kiryu	Seijuro Nakamura (M), and 2 others.	Kiryu 3.	*Shusu* (Satin)	"One of the best technicians." "The manufacturers order products for exhibitions and fairs from them."
		Masao Hirota (M)	Hirosawa	*Shusu*	"He has devoted to weavbing *Shusu* for 20 years" "very steadilly."
		Shinzaburo Suzuki (M)	Kiryu		"Just excellent, whereas he has subcontracted from the manufacturer only for one year and little longer."
Zenzo Sumiyoshi	Kiryu	Shinichiro Horie (M), and another.	Nirakawa 2.	*Shusu* (Satin)	"Steadilly."
Chukichi Tajima	Kiryu	Nuijiro Kojima (M)	Umeda		"He has dedicatedly and steadilly subcontracted weaving from the manufacturer for 12 years since 1892, with 3-4 looms he owns."
		Yoshizo Inagawa (M), and another.	Kiryu 2.		"He has dedicatedly subctonracted weaving from the manufacturer, also with 3-4 looms he owns, and his weaving good."
		Chokichi Shimizu (M), and another.	Kiryu 1, Sakaino 1.		"They have sincerely worked for 7-8 years."
Yuzaburo Tamura	Kiryu	Matakichi Okawa (M)	Umeda	*Itoori*	"Very steadilly."
		Teijiro Hagiwara (M), and 2 others.	Umeda 3.	*Itoori*	"Their attitude and skill are fair."
Itaro Tosaka	Kiryu	Ryokichi Sakurai (M), and 2 others.	Hirosawa	*Shusu* (Satin)	"All they have steadilly worked for more than 10 years and their products are especially excellent."
		Otokichi Morita (M), and 6 others.	Kasagake 3, Hirosawa 4.		"They have sincerely worked for more than 10 years and their products are good."
Nobejuro Tomioka	Kiryu	Rintaro Shimoyama (M), and 3 others.	Kiryu 2, Kasagake 2.		"They have dedicatedly subonctracted weaving from the manufacturer for 10 years" "with excellent skill, and especially sincere, so that they are the best among his subcontractors."

		Sotaro Suto (M), and another.	Kiryu 1, Sakaino 1.	*Kaiki*	ditto.
		D (anonymous)	Kawachi		"A so-called boom weaver." "During the boom, weight of fabric is often surprisingly small [he often embezzels threads], while fairly honest during the depression like these days."
Mojuro Hashimoto	Kiryu	Toyo Akagawa (F), and another.	Kiryu 2.	*Shusu* (Satin)	"They have subcontracted weaving from the manufacturer for about 4 years," "they are honest and their prodeucts are excellent."
		Shohachi Yoshida (M)	Kiryu		"Whereas he has worked as a subcontractor of the manufacturer for just 1 year, he is honest and his skill is good."
Kyusuke Harase	Kiryu	Unokichi Takahashi (M)	Umeda	*Shusu* (Satin)	"He has sincerelly worked for as long as 8 years so that the manufacturer has been satisfied."
Takejiro Hoshino	Kiryu	Rin Kurihara (F), and 2 others.	Kiryu 3.	*Mon Kaiki* / *Kobai Kaiki*	"They have steadilly and dedicatedly worked for 7-8 years with very good skill, so that, and they are steady and fabrics for exhibitions and fairs are woven
		Tatsukichi Hoshino (M), and another.	Kiryu 1, Kawauchi 1.		"They came to work for the manufacturer recently, and their products are very good."
Yasuzo Hosoya	Kiryu	Saijiro Ishikawa (M)	Kiryu		"He has constantly and sincerelly worked on wevaing good products so that he is the best subcontractor."
		Otokichi Okawa (M), and another.	Kiryu 2.	*Shusu* (Satin)	"They are very honest and their skill is excellent," "having worked for more than 8 years."
Denjiro Maehara	Kiryu	Heikichi Kogure (M)	Morita		"He has consistently worked on weaving fo as long as 20 years."
		Fumiya Nabeshima (M), and 2 others.	Kiryu 3.		"They work well and satisfy the manufacturer."
		Kyusaku Mukouda (M)	Umeda		"He has worked well."
		Isonojo Okawa (M)	Kiryu		"No so bad."

Genichiro Masao	Kiryu	Asajiro Umesawa (M)	Morita		"He has sincerelly worked on weaving for more than 20 years," "and his output is large and its quality is
		Kumagoro Sonoda (M)	Morita	*Shusu* (Satin)	"He has steadilly worked on weaving for more than 20 years and his products are excellent."
Teikichi Masuda	Kiryu	Seijuro Suwa (M), and 3 others.	Kiryu 1, Shimanogo 2, Higashi 1.	*Shusu* (Satin)	"They have subcontracted weaving from the manufacturer with excellent skill, and fabrics for exhibitions and fairs have been woven by them."
		Ichitaro Seki (M), and another.	Kiryu 1, Shimanogo 1.		"They are honest and have woven excellent fabrics … for 8-9 years."
		Chojiro Toyama (M)	Hishi		"He and all his family have subcontracted weaving from the manufacturer with 3 looms."
Fusataro Matsumoto	Kiryu	Miki Futawatari (F)	Kiryu		"She has the most steadilly subcontracted weaving from the manufacturer" "with good skill."
		Fusa Tadokoro (F), and another.	Kiryu 1, Omata 1.		"They have sincerelly subcontracted weaving from the manufacturer for as long as more than 8 years with good skill."
		Katsujiro Suda (M), and another.	Omata 2.		"They have very honestly and devotedly worked on weaving *Shusu* ," "so that the manufacturer places his hope on them."
		Iwakichi Tamura (M), and 2 others.	Kiryu 1, Umeda 1, Omata 1.	*Shusu* (Satin)	"They are relatively devoted."
Masakichi Maruki	Kiryu	Tsunetaro Mukouda (M)	Umeda	*Kaiki*	"He has applied himself to subcontracts from the manufacturer for more than 10 years."
		Tadashi Osawa (M), and 2 others.	Umeda 2, Kasagake 1.		"They have been hones for 5 years since they came to subcontract and their skill is excellent."
		Yonekichi Morishita (M)	Umeda	*Kaiki*	"He has honestly applied himself to weaving *Kaiki* for 4 years."
		Shichihei Ishijima (M), and 3 others.	Umeda 4.		"They have steadilly worked for about 3 years."

Yonekichi Mogi	Kiryu	Sai Kanenko (F)	Umeda	*Shusu* (Satin)	"She has sincerelly applied herself to weaving for more than 30 years, and all of fabrics for exhibitions and fairs so far have been woven by her."
		Kichigoro Kaneko (M), and 2 others.	Umeda 3.		"They have steadilly applied themselves for 16-17 years with weaving excellent products."
		Soshichi Maehara (M)	Umeda		"He has steadilly worked for more than 16 years with good skill."
		Dai Morishita (F)	Kiryu		"She has consistently and sincerelly applied herself, and her products so good that all of fabrics for exhibitions are woven by her these days."
		Denzo Kakinuma (M)	Kiryu		"He has worked for more than 13 years with weaving good fabrics."
		Kichijiro Shimizu (M), and 2 others.	Umeda 3.	*Shusu*	"They have honestly worked on weaving … for 6 years," "they are very hones if ther skill cannot be said to be excellent."
		Sakichi Takakusagi (M)	Umeda	*Shusu*	"His skill is very good and he is steady," "with having woven good very good fabrics for 10 years."
		Genjiro Maehara (M), and his wife (F).	Umeda		"They have devotedly and consistently applied themseves to weaving, and it should be appreciated that they still sincerelly work although they are
		Fusataro Osawa (M)	Kiryu		"His skill is very good, he is honest, and he has applied himeself to weaving for 2 years."
Matsutaro Motojima	Kiryu	Mitsusaburo Aramaki (M), and another.	Kiryu 1, Hishi 1.	*Shusu* (Satin)	"Their skill is good and they are sincere" "with having subcontracted weaving from the manufacturer for 3-4 years."
		Keijiro Osawa (M), and 3 others.	Kiryu 1, Umeda 3.		"He is very sincere wheares he has worked for less than 2 years." "Also his skill is good."
Shohei Wada	Kiryu	Fusa Miyamura (F), and 4 others.	Kiryu 5.		"They have devotedly subcontracted weaving from the manufacturer" "for 6 years since he started his

		E (anonymous)	Kiryu	"Not so good," "as he/she sometimes pawns the weft and fabrics woven sometimes dissapear [are stolen]."
Anonymous	Kiryu	F (anonymous)	Umeda	"He/she conducts various kinds of dishonest transactions."

Source : *Kiryu no Kogyo* (Manufacturing of Kiryu), no. 53-58, 61-63. 1903.
Notes : All manufacturers are male. "Description" is about one (of subcontractors) whose name is shown. Subcontractors are weavers if without a special mention. Yamada County, Gunma Prefecture: Town of Kiryu, Town of Omama, Village of Umeda, Hirosawa, Nirakawa, Yabakawa, Aioi, Kawauchi. Nitta County, Gunma Prefecture: Village of Kasagake, Godo, Sakaino, Shimanogo. Sawa County, Gunma Prefecture: Village of Higashi. Ashikaga County, Tochigi Prefecture: Village of Hishi, Morita, Yamamae, Omata.