THE INDUSTRIALIZATION OF JAPAN: A GEOGRAPHICAL ANALYSIS

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The industrialization of Japan is said to have taken place from the beginning of this century, that is to say, about 130–140 years later than the industrial revolution of England and 20–30 years later than that of Germany, the United States and other western countries.

About 30 years before entering the industrialization process, the political powers were transferred to the new Imperial Government from the Tokugawa Shogunate by the Meiji Restoration of 1868. As the Meiji Restoration was a political and economic revolution, many social controls abolished and the people were given freedom to choose their occupations and areas of residence. The establishment of the centralized Meiji Government was followed soon by the unification of monetary currency systems, collection of land taxes in currency, and the establishment of national bank systems. The boom of railway construction at the end of the eighties helped to provide for an expanding markets. In addition, the large demands of the Sino-Japanese War (1894–95) stimulated industries of every kind. Thus, the industrialization of Japan started fully in the beginning of the present century.

There are many authors of modern economic history of Japan who have written on the Japanese industrialization. However, these studies treat Japan as a whole, and do not discuss the areal differentiation within Japan during the process of the industrialization. The author intends to describe the outline of the industrialization phenomena of Japan from the geographical viewpoint in this article, particularly for the first half of it.

Changes in Population

1. Increase and redistribution of population

The population of Japan, during the latter half of the Tokugawa Period, covering about a century and a quarter, remained stationary somewhere near 30 million.[1] The reasons for this apparent stability are due to the social

[1] Eijirô Honjô, *Poulation and Population Problems*. 1930, Tokyo. (in Japanese)

and economic conditions of the feudalistic society and also Japan's isolation during this period. Since the production of food was the most important national and social problem, any further development of such crops as tobacco, cotton and rape-seeds was prohibited by the government and new industries were discouraged. Japan at this period of history had to produce enough food to support its 30 million people. Cities were few in number and most of the people were engaged in agriculture.

Her population density in 1872 was 114 per sq. km.,[2] while England and Wales during the industrial revolution and Germany at the beginning of the industrialization had population densities of 48 per sq. km. for the former in 1801 and 81 for the latter in 1880. This shows that Japan already had a dense population before industrialization compared with western countries, especially, since the proportion of arable land is small in Japan, the density in terms of arable land is very great. The population was fed and supported by its own agriculture. Japan was a typical agricultural country in the monsoon lands, and quite different from the occidental nations.

The population of Japan, which remained stationary during the Tokugawa Period, saw a steady and significant increase after the Meiji Restoration to the present. This is a new cycle in the population growth curve. In 1872, soon after the Restoration, there were only 33 million people, while the latest census of 1955 showed that this number had increased to 85 million. The population increased 2.6 times in little more than 80 years.[3]

With the high density of population before industrialization, the rice cultivation in monsoon Asia tends always to the intensification of labour and the partitioning into small areas with high farm-rent. But owing to the high percentage of agricultural population even after industrialization, and accelerated by the increasing demand for food, there exists constant food pressures to the nation unless she has rich territories as producers of food and consumers of manufactured goods.

Regional distribution of population and that of food production coincides in an agricultural country or in a country during the stage in which agricultural production has primary importance. That is to say, in a country or at a stage before industrialization, the relationship between two factors

[2] In this article, Japan Proper (Honshu, Kyushu and Shikoku) is discussed, excluding Hokkaido and Okinawa Prefecture. The former is a territory newly colonized after the Meiji Restoration, while the latter is a group of distant and small, though densely populated, islands (Loochoo Islands) in the southwestern sea.

[3] This increase must be laid chiefly to the high birth-rates, especially in the first three decades of the Meiji Period. The birth-rate was 25‰ in the eighties, 30‰ in the nineties and 35‰ in the beginning of the present century, but took a turn downwards in 1925 and after. This is markedly contrasted to the continuation of the high birth-rate extending about one hundred years in England. But the population of Japan continued to increase because of the decline of death-rates through the progress of sanitary conditions and the rise of living standards.

in question must be close. But since there was considerable transportation of foods, mainly rice, in Japan even in the Shogunate Period, the correlation between the two was not fully parallel. In the diagram showing the relationships in 1872–73, there are some agricultural prefectures such as Tochigi, Kumagaya (now Gumma and a part of Saitama), and Chiba on the one side, and a few prefectures having large cities such as Osaka, Tokyo and Hiroshima on the other. In the 1929–30 distribution group, there are several industrial prefectures with large populations and little cultivated land. With the exception of these industrial prefectures, they show the same general

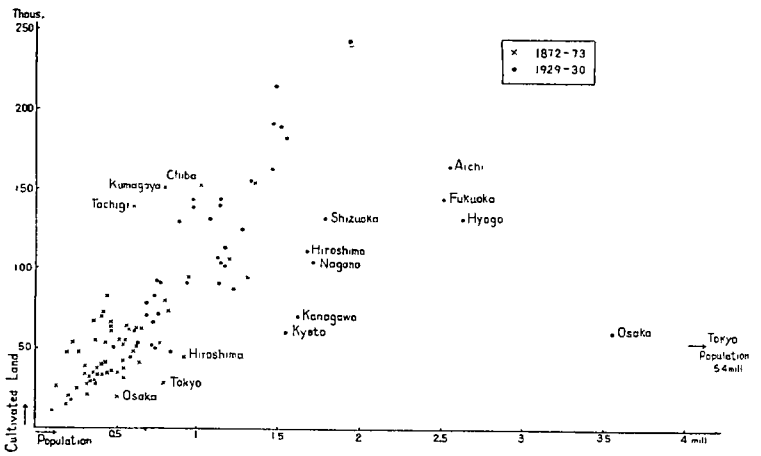


Fig. 1. Correlation between population and cultivated land by prefectures, 1872–73 and 1929–30.

correlation between population and cultivated land as before industrialization. Their relationship of the pre- and post-industrialization are generally the same, but increased and intensified. The acreages per capita for each prefecture varied widely in 1872–73, 0.3 *tan*[4] to 2.3 *tan*, but changed to 0.1 *tan* to 1.5 *tan* in 1929–30. This is one of the characteristics of densely populated Asia where the agricultural population comprises about half of the total working population even after the industrialization.

The rapid increase of population growth has not occured evenly throughout the country, but redistribution of population into specialized regions took place[5] which is shown in Table 1 and Fig. 2. The rural population increased greatly in 1878–88, the second decade of Meiji, shown by the numbers of districts, while there were a few districts of increase and many districts which stayed stationary or decreased during period 1898–1913, following the beginning of the industrialization.

[4] 1 *tan*=0.245 acres.

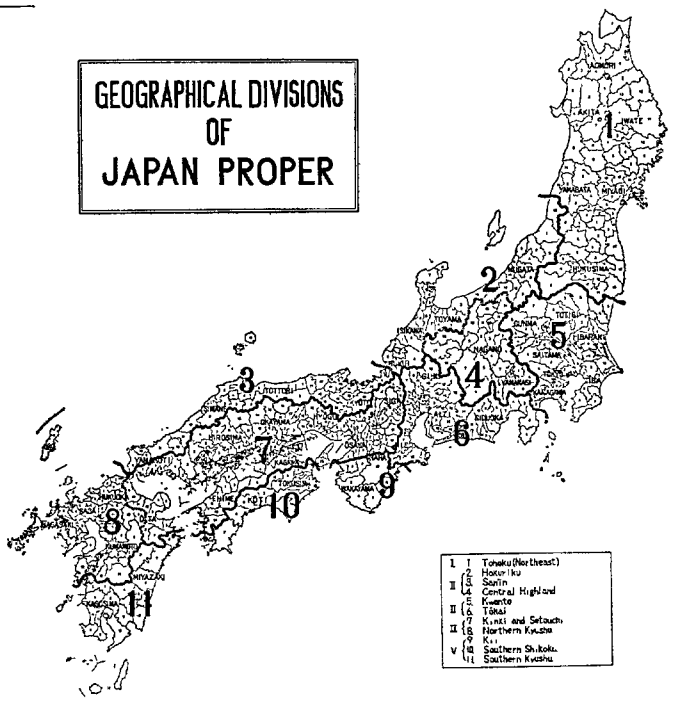
[5] Paul Mantoux also shows distribution maps of population in England by counties in 1700, 1750, 1801 and 1901. (*The industrial revolution in the eighteenth century*. London, 1948.)

Table 1. Number of districts (*gun*) by the change of rural population

	Extreme increase	Remarkable increase	Increase	Stationary or decrease	Annual rate of increase throughout Japan
1878–1888	108	119	85	28	7.9‰
1888–1898	34	53	381	72	9.9
1898–1913	19	16	408	97	13.1

(1) Excluding population of cities and towns having 10,000 inhabitants or more.
(2) "Extreme increase" means the rate of increase is more than twice that of the average during the period mentioned, "remarkable increase" more than half as much, and "stationary or decrease" less than one-third.

Maps showing the rate of increase of rural population show that there was a large increase before the beginning of industrialization in such regions



The geographical divisions of Japan

Japan Proper is divided into 45 prefectures (*fu* and *ken*) and each prefecture has several cities and districts (*gun*). There were over 500 districts in the Meiji Period. The author divides Japan Proper into five major zones and eleven minor regions. These regions consist of *gun* units, which consider landform, climate and other physical factors as well as cultural and historical ones, and are quite different from the official statistical regions of prefecture units. Each region has, therefore, significant areal characteristics.

as Northeast (1), Kwantô (5), and Central Highlands (4), with a marked decrease after industrialization in those regions of Hokuriku (2), Kinki and San'yô (7) and San'in (3). The former is due to the development of better land utilization in mountain region, but as for the latter, the cultivation of paddy fields in alluvial lands has reached such a high standard of agriculture that little improvement could be made when economic factors were taken into consideration.

2. Shifts of occupation and differentiated urbanization

Along with an increase of population there was a shift in the percentage of the primary and secondary occupations. The ratio of the agricultural population to the total decreased from three-fourths to one half or less,[6] though this decline in percentages is not due to a decline of agriculture as was the case in England. The actual agricultural population has remained unchanged, and moreover, ·agriculture has greatly

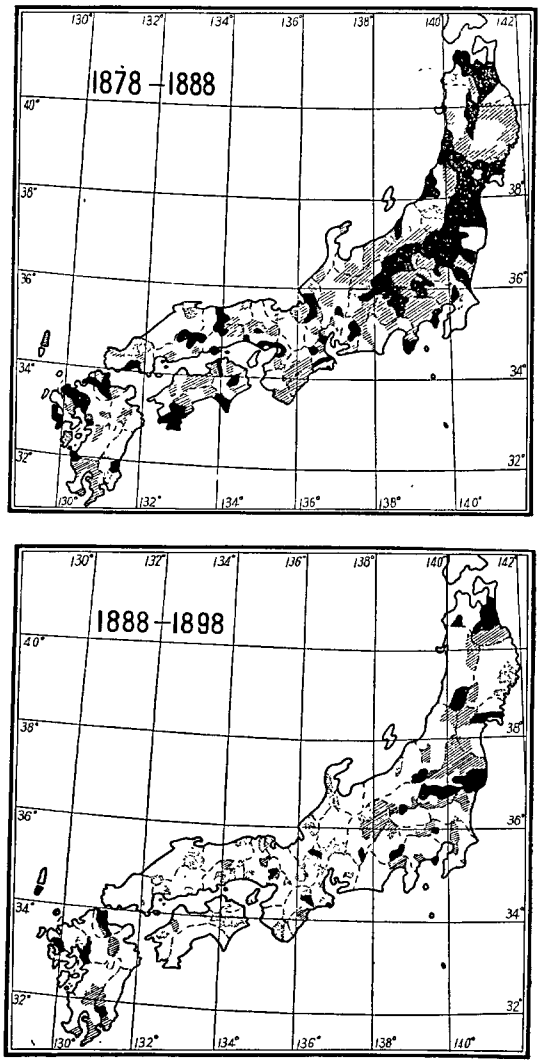
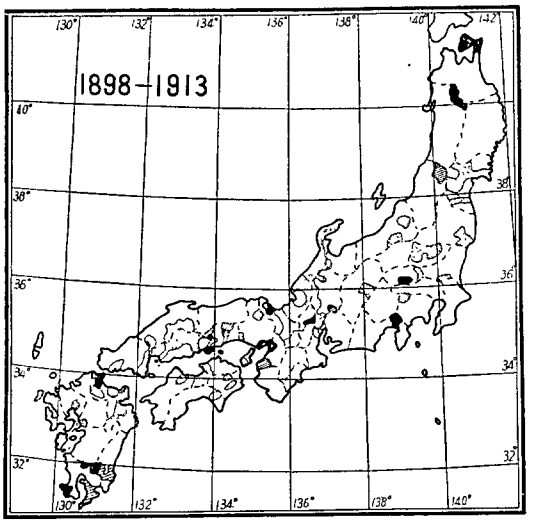


Fig. 2. The changes of rural population, 1878–88, 1888–98 and 1898–1913.

[6] Shift of occupation is reported by census as follows, though occupational classifications of 1872, 1920 and 1950 are not exactly comparable. (000 omitted)

	Agriculture	Commerce	Manufacture	Total workers
1872	14,787 (*78*)	1,329 (7)	719 (*4*)	19,179 (*100*)
1920	14,128 (*53*)	3,188 (*12*)	5,300 (*20*)	26,624 (*100*)
1950	16,132 (*45*)	3,835 (*11*)	5,646 (*16*)	35,575 (*100*)

Prof. Colin Clark pointed out that shares of agricultural population in western countries are 66–70% before industrialization and 22–25% after it, but in Japan 85% before and 50% after.



been developed, for example, the production of rice increased 125% and its acreage 50% between 1877–1936.

At the beginning of the Meiji Period, there were only five cities[7] having a population of over 100,000. They were not industrial cities, but rather administrative or commercial centers. Besides these large cities, there were 94 cities and towns having a population of over 10,000, most of which were castle towns, and several others were stage towns, harbour towns and cathedral towns, with a few handicraft towns.

Since the increase of the population after the Meiji Restoration has been absorbed by the industrial and commercial classes, urbanization took place.

Table 2. Progress of urbanization (1878–1935)

	Number of cities and towns	Urban population in millions	Percentage to the total population
1878	99	3.43	*9.8 %*
1898	166	6.96	*15.8*
1920	232	14.15	*26.1*
1935	243	24.03	*36.6*

1) Excluding Hokkaido and Okinawa Prefecture (Loochoo Islands).
2) Cities and towns of 10,000 or more inhabitants for 1878, 1898 and 1920, but 20,000 or more for 1935.

Enlargement and new births of cities are shown in Table 3. In the central regions of 5–8 (Zone III and IV), cities appeared and grew after this century, but in those regions of 1–4 (Zone I and II) and 9–11 (Zone V) little change took place. The central zone shows a distinguished increase in comparison with the outer and inner zones, not only in the number of cities but also in urban population, as shown in Tables 4 and 5.

[7] Tokyo (formerly Yedo, population 595,905 in 1873) was the capital of the Shogunate, Kyoto (238,663) was the residence of the throne, and Osaka (271,992) was the commercial center of Japan during the Shogunate Period. Rest two, Nagoya and Kanazawa, were typical castle towns.

Table 3. Period when population exceeded 50,000 and 100,000 in the cities (000 omitted)

Zone	Region	1873	1898	1920	1940	
I.	1.	Sendai 52		**Sendai** 135	Aomori 99	Akita 96
					Morioka 90	Hachinohe 73
					Yamagata 69	Koriyama* 57
					Hirosaki 51	
II.	2.	**Kanazawa** 109	Toyama 59	Fukui 57	**Niigata** 151	**Toyama** 128
			Niigata 53		Nagaoka 67	Takaoka 59
					Komatsu 52	
	3.				Matsue 56	
	4.			Nagano 58	**Kofu** 102	
				Kofu 58		
				Matsumoto 54		
III.	5.	**Tokyo** 596	**Yokohama*** 194	Yokosuka* 89	**Kawasaki*** 301	**Yokosuka*** 193
		Yokohama* 65		Utsunomiya 64	Kawaguchi* 97	Chiba* 92
				Maebashi 62	Kiriu* 86	Hitachi* 83
					Hachioji* 75	Takasaki 71
					Mito 66	Choshi* 61
					Urawa* 60	Omiya* 60
					Ichikawa* 58	Odawara 52
					Funabashi* 51	
	6.	**Nagoya** 125		Shizuoka 98	**Shizuoka** 212	**Gifu*** 172
				Hamamatsu 72	**Hamamatsu** 166	**Toyohashi** 143
				Toyohashi 65	**Yokkaichi*** 103	Okazaki 84
				Gifu* 63	Ichinomiya*71	Shimizu* 69
					Tsu 69	Ujiyamada* 55
					Numazu* 53	
IV.	7.	**Osaka** 272	**Kobe*** 216	**Kure*** 159	**Amagasaki*** 258	**Shimonoseki*** 196
		Kyoto 239	**Hiroshima** 122	**Okayama** 111	**Sakai*** 182	**Fuse*** 135
		Hiroshima 77	Okayama 58	Shimonoseki* 79	**Matsuyama** 118	**Nisinomiya*** 112
			Sakai* 50	Matsuyama 65	**Ube*** 112	**Takamatsu** 111
					Himeji 104	**Maizuru*** 104
					Kishiwada 81	Ooita 77
					Otsu 68	Suida* 66
					Beppu* 65	Nara* 61
					Akashi 60	Bofu* 59
					Hukuyama 57	Imabari 56
					Uwajima 52	Iwakuni 51

	8.		**Nagasaki*** 107 Fukuoka 66 Kumamoto 61	**Fukuoka** 159 **Kumamoto** 129 **Yawata*** 111 Sasebo* 99 Moji* 89 Oomuda* 79 Kokura 65 Kurume 62	**Sasebo*** 206 **Oomuda*** 177 Wakamatsu*89 Saga 50	**Kokura** 179 **Moji*** 139 Tobata* 84
V.	9.		Wakayama 64		**Wakayama** 195	
	10.		Tokushima 62	Kochi 74	**Tokushima** 120	**Kochi** 107
	11.		Kagoshima 53	**Kagoshima** 103	Nobeoka 79 Miyakonojo 59	Miyazaki 66

Cities having asterisks are newly born industrial ones, not originated from castle towns and other towns of 10,000 or more inhabitants in the Tokugawa Period.

Table 4. Increase of cities by regions (1878–1935)

	I	II	III	IV	V	Total
1878	1+5	1+7	3+ 1	3+ 9	1+3	9+25
1888	1+2	1+4	3+ 2	4+ 8	1+3	10+19
1898	1+1	1+4	3+ 1	6+ 7	0+4	11+17
1913	1+4	1+5	4+10	9+11	2+2	17+32
1920	1+5	2+5	4+ 7	11+ 8	2+2	20+27
1935	1+7	2+8	8+14	16+15	3+2	30+46

Figures of left show numbers of large city and those of right secondary city. See footnote 8.

Since many cities were primarily castle towns of feudal lords (*daimyo*) in the age of the Tokugawa Shogunate, large cities were located in the regions 1–3 where powerful clans settled and where new industries did not start after the industrialization as described later. On the contrary, there were small clans or territories directly controlled by the Shogunate in the regions 5–6 and the east part of 7, where urbanization was overwhelmingly promoted after the industrialization. Old castle towns in the inner zone (I and II) or the outer zone (V) such as Sendai, Hirosaki, Akita, Takada,

[8] The index of urbanization is taken, in general, as the percentage of urban population to the total. But it is not correct to say that a city or a town having more than some thousands of inhabitants must be urban, regardless of the economic and social development of the nation. In this article, lower limits of city population are raised according to periods, as follows.

	large city	secondary city
1878	50,000	25,000
1898	65,000	35,000
1920	80,000	40,000
1940	100,000	50,000

Since the promoting act of the annexation of local administration bodies was put into operation after 1953, it is difficult to show the urbanization by the official statistics.

Kanazawa, Wakayama, Kôchi, Hagi, etc. had no increase of population before or during the industrialization. But those in the central zone (III and IV), such as Hamamatsu, Toyohashi, Nagoya, Himeji, Okayama, Hiroshima, Fukuoka, etc. have continued to increase their population.[9]

Beside these, there are several cities in the central zone which urbanized very quickly from villages during the industrization. They are new born industrial cities such as Kawasaki, Ichinomiya, Amagasaki, Ube, Tobata, Yawata, etc. and the others are suburban villages of Tokyo and Osaka.

Table 5. Progress of urbanization by zones. (1878–1935)

	I	II	III	IV	V
1878	5.5	5.0	2.6	5.7	5.0
1898	2.4	3.5	4.2 (2.6)	8.3 (6.6)	3.9
1920	5.8	5.9	10.4 (8.4)	16.8 (13.1)	6.8
1935	9.7	9.4	22.4 (17.1)	28.9 (22.6)	13.7

(1) Figures show percentages of urban population to the total of each zone.
(2) Figures in brackets are those excluding Tokyo (III) and Osaka (IV), by the reason of that those two are pan-Japan metropolitan cities.

Table 5 shows that the urbanization figures decreased before the industrization in the inner and outer zones (I, II and V) corresponding with the absolute increase of rural population in 1878–98 as above mentioned.

As the result, the population densities by regions are changed as follows.

Table 6. Changes of population densities by region and zones (per sq. km.) (1878–1935).

Regions & Zones	1878	1898	1920	1935
1	56	74	87	105
2	143	155	154	169
3	121	116	123	132
4	63	86	103	113

[9] A good example of contrast is the population increase of Nagoya and Ichinomiya in Region 6 and Kanazawa and Komatsu in Region 2. Nagoya and Kanazawa were typical castle towns of powerful feudal lords and two out of five large cities having populations of more than 100,000 at the end of the Shogunate Period. Nagoya continued a steady increase of population, while Kanazawa decreased or remained stationary until the end of the primary industrialization, then started to increase after 1920–30, some of this was due to the enlargement of municipal area by city planning and not to the actual urbanization. Ichinomiya and Komatsu are both textile towns of wool and silk, located near Nagoya and Kanazawa respectively.

	1873	1898	1920	1940	1955
Nagoya	125	244	608	1,328	1,337
Kanazawa	109	84	137	201	277
Ichinomiya	7	14	27	71	157
Komatsu	10	13	15	52	72

The same is said for many other cities and towns.

(I & II)	*83*	*97*	*107*	*112*
5	180	258	348	477
6	151	192	233	294
7	185	248	281	364
8	168	207	267	313
(III & IV)	*174*	*233*	*287*	*379*
9	111	107	121	135
10	91	117	120	129
11	69	94	123	143
(V)	*85*	*104*	*121*	*137*

3) Regional differentiation of age and sex components

The rapid increase of population growth, shifting of occupation to manufacturing and commercial industries from agriculture and urbanization were results of the industrialization of Japan as in the western countries.

The age distribution of population are also changed along with the progress of the industrialization, because infant mortality decreased. The population ratios under 14 years to the total (1000) increased from 273 in 1872, to 328 in 1898, 350 in 1913, and to 369 in 1935. These are also shown by regions.

Here is one example showing the difference between Tokyo Prefecture and several other agricultural prefectures. In the former, including industrial area, the most productive ages (20–49 years) were 246 ‰ in 1882, but those of the latter were 207–213 ‰. That is to say, even before industrialization, Tokyo absorbed the productive age groups from the neighbouring agricultural areas. The difference between them became greater in 1920, as shown in Table 7.

Table 7. Distribution by age groups in 1882 and 1920
(Total population=1000) (male only)

	Tokyo Prefecture		Ibaraki Prefecture	
Age groups	1882	1920	1882	1920
1–14 years	143.1	161.7	156.2	185.5
15–24 years	88.8	130.7	86.9	75.8
25–34 years	97.2	92.5	81.9	63.9
35–44 years	75.4	65.8	64.9	57.4
45–59 years	75.6	53.6	72.9	63.0
60 years & older	35.5	23.6	45.5	44.7

Ibaraki Prefecture is one of neighbouring agricultural prefectures of Tokyo. The figures for 1920 in the table show that the youngest age group (15–24 years) increased remarkably among the productive ages in Tokyo and the intermediate age groups (25–44 years) decreased in Ibaraki.

Similarly, for sex ratios, male figures exceed female ones in Tokyo and the converse in Ibaraki. Extreme figures in 1920 were thus: for 100 females, 128.9 males for 15–19 years in Tokyo, and 85.3 for 20–24 years in Ibaraki.

These are the different characters of regions of immigrating and emigrating labour forces for the duration of the industrialization. Agricultural prefectures are said to have become kindergartens and asylums for the aged, on behalf of industrial prefectures.

Differentiated Shift of croppings

1) Diminished industrial crops

For agricultural regions the industrialization of Japan has given not only the demographic change avove mentioned, but also shifts of crops. The best example is cotton which was raised[10] all through Japan except in the snowy and colder regions of the Northeast in the Tokugawa Period, and combined with the spinning and weaving by household industries. The largest prouduction of cotton was found in 1887 through encouragement of the Meiji Government, in order to prevent the imports of cotton products which amounted to 40% of the total imports during the first decade of Meiji. But soon after, it was proved that raw cotton produced in Japan was not fit for power spinning, either in quality or in price. Generally speaking, cotton grow-

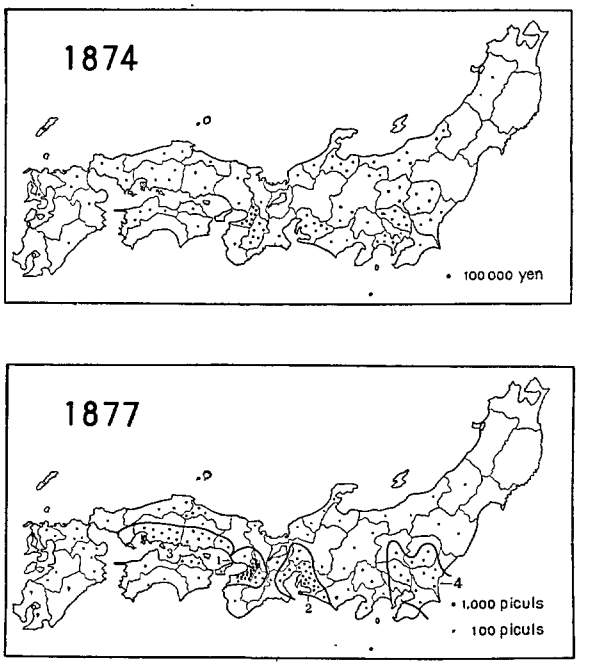


Fig. 3 Major producing areas of raw cotton in 1877 (upper) and cotton cloths in 1874. (lower)

[10] After the researches of Kentarô Shiba, Kenzô Akiyama and Kôshi Ono, cotton cloths were imported from Korea and southern China via Loochoo Islands in the sixteenth century, and then cotton seeds were introduced to Japan in the latter half of the century. Clothing materials of the nation changed from hemp to cotton during the next one hundred years.

ing disappeared from almost all Japanese villages during World War I.[11]

This process is described by many writers of agricultural economics and modern economic history in detail. But if he studies this decreasing production from the geographical points of view, he will find the regional differences according to the local relationship with industrialized areas.

The main producing areas of raw cotton from the Tokugawa Period, until the seventies, were located in the present prefectures of the Central Zone such as Aichi, Osaka, Hiroshima, and Kwanto Plain, accounting for over half of the production of raw cotton in Japan. Cotton industries at the time were done, of course, by hand-driven spinning wheels and looms in villages and towns. Leaders of the Meiji Government, taking a self-sufficiency policy of cotton and cotton goods, established modern power spinning factories in those cotton areas. But failing in the self-sufficiency of raw cotton for power spinning, cotton growing was abolished or lost its importance as products of the farms in the cotton producing areas where new cotton mills were established.

Table 8. Decreasing indices of raw cotton prouduction (1887–1911)
(1887=100)

	1		2		3		
	Osaka	Aichi	Saitama	Chiba	Tottori	Niigata	Japan total
1887	100	100	100	100	100	100	100
1892	71	67	86	88	101	92	73
1897	36	31	74	67	72	79	43
1902	21	9	39	22	47	42	21
1907	7	2	9	13	24	20	8
1911	1	1	3	5	17	14	3

The other regions where new factories were not established remained as cotton growing areas, and the farmers contiuned hand spinning and weaving with their own raw cotton. There are several stages of cotton production,

[11] Home production of raw cotton decreased after 1887 when imports of raw cotton started to increase in order to meet the large demand of power spinning. The amounts of imported raw cotton surpassed that of home production between 1888-90. Since the import duty of raw cotton was abolished in 1896, a struggle of competition between home produce and foreign import was definite. It is quite resemble the abolishment of the corn law of England in 1846.

Production and import of raw cotton (1873-1922)
(in thousand piculs)

	Production	Index	Imports	Index
1873	291	60	22	
1878	312	64	21	
1883	366	75	21	
1887	489	100	72	
1888			157	1.
1890	288	59	344	2.0
1892	275	56	897	5.7
1894	275	56	1,128	7.2
1897	159	33	2,289	14.6
1902	72	15	3,397	21.6
1907	31	6	4,079	25.9
1912	18	4	5,933	37.6
1922	10	2	8,711	55.4

or crop shifting from cotton to other crops, from advanced ones to backward ones. Table 8 shows them, divided into three groups of region.

As the first group[12] was the most advanced area of raw cotton production and had the large cities of Osaka and Nagoya respectively, their decline was the sharpest and raw cotton prouduction diminished earliest. The second group, in the Kwanto Plain, decreased more slowly than the first. The third located in Region 3 was the last.[13]

Cotton growing, spinning and weaving by villagers was abolished throughout Japan, even in the most backward villages, as the industrialization of Japan proceeded on the one hand, and the purchasing power of farmers was increased by the raw silk boom during and after World War I on the other. Thus, self-supporting and household manufacturing of cotton cloths in villages was separated or eliminated from the Japanese agriculture. This is one of general results of the industrialization. Industrial crops such as indigo-plants, rape-seeds, hemp, etc. also declined in the same way during industrialization.

2) Decreased food crops

In considering the changes of land use, rice is the most important crop on the alluvial plains of the densely populated southeastern Asia. Rice crops are always encouraged whenever and wherever irrigation facilities permitted. The Meiji Government was not an exception. Reclamation of paddy fields and intensification of rice cropping were always encouraged and pushed. But rice acreages had reached the limit except in Hokkaido.[14] Since the beginning of Meiji, acreages of paddy fields to the total cropping acreages in Japan Proper has always been unchangeablly 55–57%. That is to say, the percentage of rice land remains the regardless of

[12] The cities of Osaka and Nagoya are located Osaka and Aichi Prefectures respectively. Since these prefectures were noted for cotton growing, with about one-third of the raw cotton raised in these two prefectures until 1887, Kawachi and Mikawa cotton cloths were well known, from early in the middle of the seventeenth century. These were advanced agricultural areas of commercial cropping with industries of cotton weaving, where cotton merchants displayed their controls to cotton farmers.

[13] Next table shows the same.

Percentage shares of the production of raw cotton (1877-1907).

Region	(6) & (7)	Kwanto Plain (5)	San'in (3)	Japan Total
Prefectures	Osaka & Aichi	Ibaraki, Saitama & Chiba	Tottori & Shimane	
1877	34	9	6	(100)
1887	31	13	6	(100)
1897	20	14	17	(100)
1907	7	11	29	(100)

[14] It was said the northern limit of rice cultivation in Japan or in the world was at the strait between Japan Proper and Hokkaido until 1870's. But it extends now to all parts of Hokkaido except the tip of northernmost and the foggy southeast coast, through the breeding of new species and the introduction of new planting methods together with expanding irrigation nets.

industrialization.

Cereals except for rice and barley were changed significantly by the progress of the industrialization. Millet (*Setaria italica*) and barn yard millet (*Panicum frumentaceum*) decreased in acreage during the 1880–1920 period by one half (from 51.2% to 26.3%) and by one-third (from 21.2% to 9.0%) respectively. Demand for better food has influenced the shifting of crops showing the differential status by regions like raw cotton growing above described.

Even early in the beginning of Meiji, barn yard millet was not produced in the more progressive areas of agriculture near Kyoto and Osaka, and in other area of alluvial plains because of rice and commercial products and dense population. The main producing areas in 1870, having 63% in production and 60% in acreage, were the Central Highland (4), Kwanto Plain (5) and the Northeast (1) where dry fields or shifting cultivation predominated.

Barn yard millet in Japan excluding Hokkaido decreased to 77% in acreage and 62% in production during 1870–1955. Decreasing rates were different by region. Both the acreage and the production decreased to two-thirds of 1870 at the beginning of the industrialization in the Kwanto Plain and the Central Highland, while it was in the middle of the industrialization in 1910 in the Northeast region.

At present, every prefecture producing barn yard millet has decreased to one-tenth in acreage, except Iwate and Aomori Prefectures in the Northeast where 60–70% of 1870 figures remain and the relative importance is high, occupying 64% in acreage and 66% in production to the total of Japan.[15] It can de said that barn yard millet in the Northeast region is a symbol of the backward areas and produced by the imperfect competition.

3) Increased agricultural products

Contrary to the decrease of industrial and food crops above described, there are some crops which increased or have been newly introuduced. Various kinds of fruits and vegetables, pyrethrum, peppermint, etc. are such locally specialized products, while rice and mulberry plantation are increasingly wide-spread throughout the country. The cropping of rice do not show great regional differentiation as mentioned, except in Hokkaido, although mulberry has been introuduced into regions in accordance with the decrease of cotton and other industrial and inferior food crops.

Sericulture was carried on everywhere during the Shogunate Period, but

[15] There must be enumerated several other physical and social factors for producing barn yard millet in Iwate and Aomori Prefectures. They are chiefly produced in the Kitakami plateau and other mountainous lands where the irrigation facilities are limited. The physical factors combine with inferior climatic conditions and stock farming, and backward social systems of peasantry prevail. It is the broadest area in Japan where people take barn yard millet as a staple food with stalks as forages of live stocks to-day. But recently, the national development scheme of the Kitakami and Kunohe Areas is settled and the dairy farming has been introduced in the villages.

it flourished immediately after the opening of treaty ports to foreign trade in 1859. Exports of raw silk and silk worm-egg cards[16] reached boom status. It encouraged sericulture in Yamanashi and Gumma Prefectures at first, and then Nagano and Fukushima Prefectures where transportation facilities to Yokohama are favorable. In these prefectures, there are broad areas of diluvial uplands and alluvial fans where irrigation was difficult and dry fields prevailed. Mulberry plantations were introduced to those lands, taking the place of the declining crops.

These plantations spread over the country favoured by the introduction of summer and autumnal breeding of silk-worms at the end of the nineteenth century. This new system worked well because it did not coincide with the busy season of the paddy fields, and the monthly labour distribution was favorable to a second or third breeding in a year.

Thus, mulberry plantations increased in acreage from 219,000 *cho* in 1889 to the top of 714,000 *cho* (cocoon production 6,653,000 piculs) in 1930.[17] The increase took place mainly in the central part of Japan, extending to the northeast where the sericulture was prosperous before the industrialization, and also it was significant that it expanded to the southwestern part after industrialization.

The regional differentiation is not distinguished as in the case of raw cotton. Four prefectures of east central Japan, Nagano and Yamanashi in the eastern part of Region 4 and Gumma and Saitama in the western part of Region 5, contain about half of the total mulberry plantation and cocoon production. Peripheral prefectures such as Fukushima, Yamagata, Gifu, etc. are followed by the nucleous zone, and in every other prefectures also, mulberry is cultivated and cocoons are produced to some degree. Mulberry areas and reeling factories can some distance apart at present whereas they used to be together before the accomodation of drying cocoons was completed.

Formation of Industrial Areas

1) Customary or traditional industry

[16] In France and Italy, two leading countries of sericulture in Europe, diceases of silk worms prevailed after 1840 and the production of cocoons decreased to one-fifth. The serious shortage of silk materials was filled by Japanese silk worm-egg cards. Exports of the cards were said to amount to two or three million sheets in 1868. But L. Pasteul, French bactriologist, found germs of the silk-worm dicease in 1867 and the export boom of the Japanese egg-cards stopped. However, mulberry trees planted during the boom grew densely. This growth resulted from the sericulture plus the increased demands of raw silk exporters.

[17] 1 *cho*=2.45 acres=0.99 ha

Mulberry plantation decreased after the beginning of World War II. The lowest production of cocoons was recorded in 1947 as 891,000 piculs (arceage, 176,000 *cho*). The reason was, of course, the convertion to food crops, but after the war the largest demand for raw silk from the United States did not recover to the pre-war level owing to the development of chemical fabrics and the high price of raw silk of Japan. Though acreages after the war have not recovered so much, 182,000 *cho* in 1954, the production of cocoon increased intensively to 1,672,000 piculs.

The increase of cities or their urbanization is due to the establishments of modern industries. Many kinds of handicrafts were prosperous in cities, towns and villages from the Shogunate Period. Some were done in manufacturing plants having 30-50 employees, but many of them were domestic workshops worked by families and apprentices.

Confectionery is a typical one of such small industries. Since cakes and sweets was chiefly home made by citizens and villagers, total number of confectioneries in the country was 70,183 in 1889, of which 64,570 had no emplyees, 4,542 had one or two, and only 79 had ten or more.[18] But in the castle towns of feudal lords, especially in the large ones, or where the tea ceremony was popular such as Kanazawa, Nagoya, Matsue, etc., confectioneries developed through demand of the feudal lords and citizens of the upper classes. These confectioneries were the beginnings of factory production in the Meiji Period. The demand for breads and biscuits as war supplies in the Sino-Japanes War (1894-95) and the Russo-Japanese War (1904-05) accelerated the demand for European confections. The taste for these confection spread to the common people after the two wars.

It may be said confectioneries of factory systems were prevailed throughout Japan during World War I.[19] Markets of confection such as caramels and biscuits were widened to the whole country by the raised standard of living in the rural districts. Among these increased and mechanized factories, over half of either the total number of factories or production were in those prefectures which include the large cities of Tokyo, Osaka, Nagoya, Kobe, and later Yokohama as shown in Table 9.[20] That is to say, several of the largest confectioneries in the Central Zone with the magnifient capital controled the greater parts of internal markets

We can point out some other examples of the same kind, where indus-

[18] Gisaburo Kobayashi, *Thirty years of confectionery*. 1936. Tokyo. (in Japanese)

[19] There were 6 confectioneries of the factory system in 1894, 11 in 1897, 19 in 1902, 38 in 1904, and 43 in 1907. Those prefectures without confection factories were 16 (out of 46) in 1909, 10 in 1914, and 2 in 1921. When the confectionery prevailed, the conversion from hands to machine power was performed in the order of steam, gas, oil and electricity as follows.

	1904	1907	1914	1924	1936
Handicraft factory	26	423	426	214	427
Power driven factory	14	61	138	532	1402
by steam engines	11	54 #	74	119	45
by gas engines	2	8	15	} 36	10
by oil engines		4	4		
by water wheels	1	1	1		
by electric motors		9	95	1195 #	4016 #

numbers of engines or motors

[20] Two facts should be noticed. Firstly, in 1904, Ishikawa and Yamaguchi Prefectures had 2 factories, though not shown on the table. It means large confectioneries during the feudal age transformed for factory production preceeding those of the later industrialized areas. Secondly, during and after World War I, Kanagawa Prefecture (including cities of Yokohama and Kawasaki) made rapid progress as industrialized areas and Kyoto Prefecture falled behind.

Table 9. Concentration of confection factories (1904–36)

Prefectures	1904		1907	1909		1914		1921	1936	
	f	*l*	*f*	*f*	*y*	*f*	*l*	*y*	*f*	*y*
Tokyo	12	339	18	174	3.05	135	2122	19.69	390	25.31
Osaka	17	313	10	68	1.57	131	1052	14.06	292	22.63
Aichi	1	29	2	49	.31	81	582	3.87	214	12.56
Kyoto	1	40	3	40	.40	40	342	1.34	60	2.05
Hyôgo	1	12		19	.23	25	247	3.12	71	7.46
Kanagawa	1	18		2	.02	17	148	2.69	72	23.09
Japan total	38	938	43	484	6.69	564	5594	65.95	1683	119.29
Percentages occupied by above prefectures	*89*	*80*	*72*	*73*	*83*	*76*	*80*	*63*	*65*	*78*

f=number of factories, employing 10 or more labourers before 1907, and 5 or more after 1909.
l=number of labourers.
y=amount of production in million yen.

tries of customary or traditional types were mechanized throughout Japan, and then they were monopolized by a few factories, located in the industrialized or urbanized regions under large capitalistic management. Industries of manufacturing Japanese socks (*tabi*), Japanese wine (*saké*) and soy (*shôyu*) are good examples.[21]

2) Textile industry

The largest industry of Japan is the textile industry, either in numbers of factories or of labourers at each period from Meiji to the present. The industrialization of the western countries had been completed when the treaty ports were opened in 1859 and large quantities of occidental products manufactured by factory system and mass production poured into Japan. The cotton industry was the first to be transformed to European systems by the industrialization, because the technical and mechanical process of the cotton industry was simple compared with other industries. Labour components in the production of the industry was large and could be supplied amply from densely populated villages, especially in the Inner and Outer Zones of Japan, where the increments of population could not be absorbed either in agriculture or in other local industries.. As for the location of the new cotton industry, Osaka and several other cities in the Central Zone are important, because of the convenience of imported raw materials together with the historical backgrounds for cotton farming and manufacturing of cotton cloths since the Shogunate Period.

[21] These are not only due to capitalistic growth of the industries, but also to the changes or the loss of local tastes and choice of rural inhabitants.

The silk reeling and weaving industries developed in another way. The production of raw silk and silk was protected by feudal lords of every provinces in the age of the Shogunate, because of financial purposes, and was encouraged by the export boom after the opening of treaty ports. The silk reeling industry was the first of the factory and manufacturing systems to use power machines. In 1885 there were 661 factories[22] or workshops in Japan, out of which 484 were silk reeling establishments. But three-fourths of them were operated by water wheels as and the rest were hand powered. The capital per factory was only 3,000 yen. This is in great contrast with cotton industry. All of the cotton spinning factories of the time were operated by steam engines and amount of capital per factory was 300,000 yen, although less than 50 in number.

The reeling industry of raw silk was mechanized at first for export raw silk. But in spite of its inferior quality, unsuitable for export, hand reeled raw silk was not stop for a long time,[23] as it was a side job in the rural districts and its products satisfied both internal and domestic demands. Consequently, it was operated on a small scale when compared with machine reeling ones.[24]

The main areas of raw silk production were east of Lake Biwa or the eastern half of Japan, which produced three-fourths of the total, and the present four prefectures of Nagano, Yamanashi, Saitama and Gumma which produced half of the total in 1870-80's, as well as at the present time. Since cash income by the sericulture became indispensable to all farmers, the production areas were enlarged as shown in the maps, with most of the production in these nucleus prefectures. Before the industrialization machine reeling factories were concentrated in the central prefectures of sericultural districts, and accounted for 59% of the production while 66% of hand reeling ones were in the northeast periphery of the former, Gumma and Fukushima Prefectures which converted to machine reeling during the industrialization. Capitalistic enterprises like Gunze and Katakura

[22] Out of these 661 factories, 364 factories (55%) were operated by water wheels. It was one decade before the steam engines took first place for industrial power, and electricity replaced them two or three decades later. See the case of confectioneries above described.

[23] Hand reeling raw silk was surpassed in production by machine reeling one as late as 1907, but the production for export by machine reeling was 34,675 bales as early as 1890, while that of hand reeling was 17,850 bales.

[24] Both in number of reeling establishments and production in 1911, percentages of hand reeling factories to the total are small as shown below.

	Number of reeling establishments		Production in thousand piculs	
	total	by factory	total	by factory
Machine reeling	5,105	*47.6%*	149.8	*97.2%*
Hand reeling	323,280	*2.9%*	51.5	*18.5%*

Factory means reeling establishments having 10 or more workers.

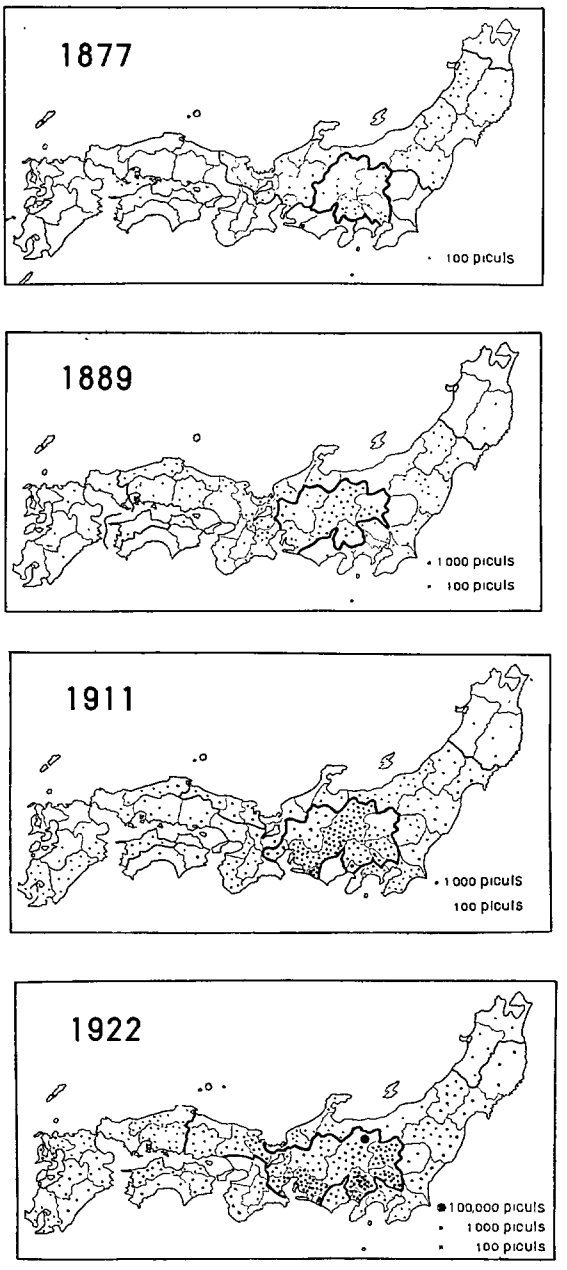


Fig. 4 The major areas of the silk reeling industry, 1877, 1889, 1911, and 1922.

established large factories where sericulture was prosperous and supplied silk worm-egg cards to the sericulturists.

The silk reeling industry together with the sericulture of Japan continued its ups and downs according to the cycle of demands in the United States until the shortage of food became serious in the 1940's.

3) Iron and steel industry

Next to the textile industry, the iron and steel industry is the most important in the industrialization.[25] It is usual in the recently industrialized or backward countries that the textile industry is modernized first and the metallurgical one is not modernized until capitalistic growth is completed, or checked as in the case of colonial countries.

Although Japanese swords and the other arms were famous from early times, the amounts of iron and steel for daily necessaries were not large. The quantity of iron and steel consumed in Japan at the end of the Shogunate Period, was estimated at about 10,000 tons by annual production of iron sands. After the Meiji Restoration, endeavour · to

keep the political independence were necessary in those days of imperialism, also necessary was the protection of home markets from imported goods. Since Japan also had imperialistic ambitions on the Asian countries, self-sufficiency in arms through establishment of munitions industries was the keen desire of the Meiji Government, as well as the mechanization of consuming industries. Thus, the iron and steel industries were industrialized, but it was as late as after the Sino-Japanese War when the governmental iron and steel works were established at Yawata in Fukuoka Prefecture, and Kure in Hiroshima Prefecturs.[26]

Othere than daily necessary goods, there were no distinct areas of metal and metallurgical industries until the beginning of World War I. The Japanese industrialization of the strategical production fields was intensified after the Sino-Japanese disputes of 1930's, when the formation of industrial zones and regional differentiation became distinct, which will be discussed later in detail.

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[25] Some writer defines the industrialization "as a process in which changes of a series of strategical production functions are taking place" and "those strategical production function are mostly connected with capital-goods industries." (P.K. Chang, Agriculture and Industrialization. Lond. 1949. p. 66 f.) But it may be said the modernized transformation of the consumption-goods industries such as textile industries is also defined as the industialization if the industrial productivity takes the major parts of all enterprises in a region or a country. In this concept, the author takes the beginning of the present century as the starting point of the industrialization of Japan.

[26] Though pig iron was prooduced in the quantity of 140,000 tons in 1907, 2.5 times of the first year production in the Yawata Iron and Steel Works, home demand for steel was 410,000 tons made it necessary to depend upon imports.