

Regional Changes of Flat Knitting Industry in Japan

著者	NAITO Hiroco
雑誌名	The science reports of the Tohoku University. 7th series, Geography
巻 号	16
ページ	1
発行年	117-131
URL	1967-03
	http://hdl.handle.net/10097/44891

Regional Changes of Flat Knitting Industry in Japan

Hiroo NAITO

1. Introduction

Flat knitting is a type of knitting, in which are produced outer garments such as sweaters, cardigans and so on, underwear and gloves using flat knitting machines. In 1963, factories with 9 workers or less accounted for 74.1% of all factories in flat knitting industry. If we call manufacturing industry in which factories with 9 workers or less predominate a small-scale industry, flat knitting industry is one of typical small-scale industries in Japan.

Some small-scale industries are concentrated in specific areas forming a kind of industrial areas and flat knitting industry is one of such small-scale industries. In such an industrial area, there is a close correlation between the character of the area and that of the industry in the area. Accordingly, we can understand the area through the analysis of the industry. In this paper, characters of flat knitting areas are discussed in their relation to the changing aspects of flat knitting industry in the areas.

2. General aspects of flat knitting industry

1) Distribution of flat knitting areas

Flat knitting machines are the essential equipments of production in this industry. In this paper, the author uses city, town and village (*shi*, *machi* and *mura*) as units of industrial areas and measures the scale of the development in the area by number of machines.

Flat knitting machines are classified into two types according to the length of needle bed. To the first type belong large flat knitting machines with needle beds more than 16 inches long, producing outer garments and underwear. Flat knitting machines with needle beds 16 inches or less, producing gloves and accessories of outer garments belong to the second type.

Majority of the machines are set in such large cities as Tokyo, Osaka and Nagoya. Other areas except these three cities make smaller industrial areas of flat knitting. There are groups of flat knitting areas as are shown in distribution maps (Fig. 2 and 3). The author refers to these groups as flat knitting regions. It is

evident from population size that Tokyo, Osaka and Nagoya make industrial regions by themselves and they are distinguished even among these regions.

In Figure 1, number of flat knitting machines is shown as that of large flat knitting machines, in which two small flat knitting machines are converted as one large flat knitting machine. The ground of this calculation is explained in the chapter 4. Hereafter, the number of flat knitting machines means that of large flat knitting machines after this method of calculation.

2) Development of flat knitting industry

Factories, workers and shipment value of flat knitted goods increased in the period from 1955 to 1963 (Fig. 4). Flat knitting industry is one of the branches

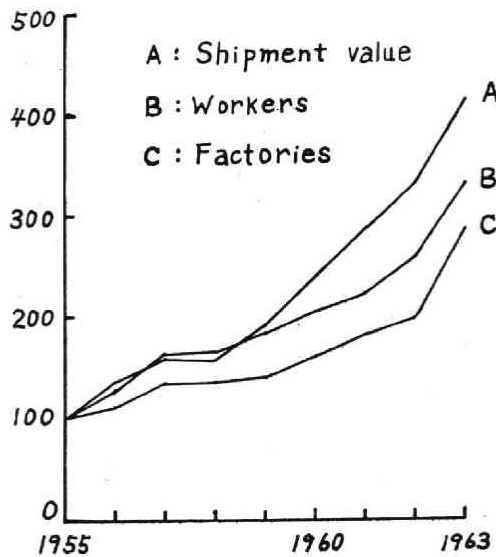


Fig. 4 Changes of factories, workers and shipment value in flat knitting industry. *Census of Manufactures.*

of textile industry which highly developed in recent times. The shipment value of flat knitted goods increased about four times during 1955 to 1963, while the shipment value of textile goods as a whole was only doubled in the same period.

Increase rate of production was not equal in different flat knitting areas (Table 8). It is necessary to analyze the structure of flat knitting industry and areal conditions in order to know why such areal difference of production was brought about.

3) Subcontract production and lease contract of flat knitting machines

Subcontract is a sort of production system in which a manufacturer processes

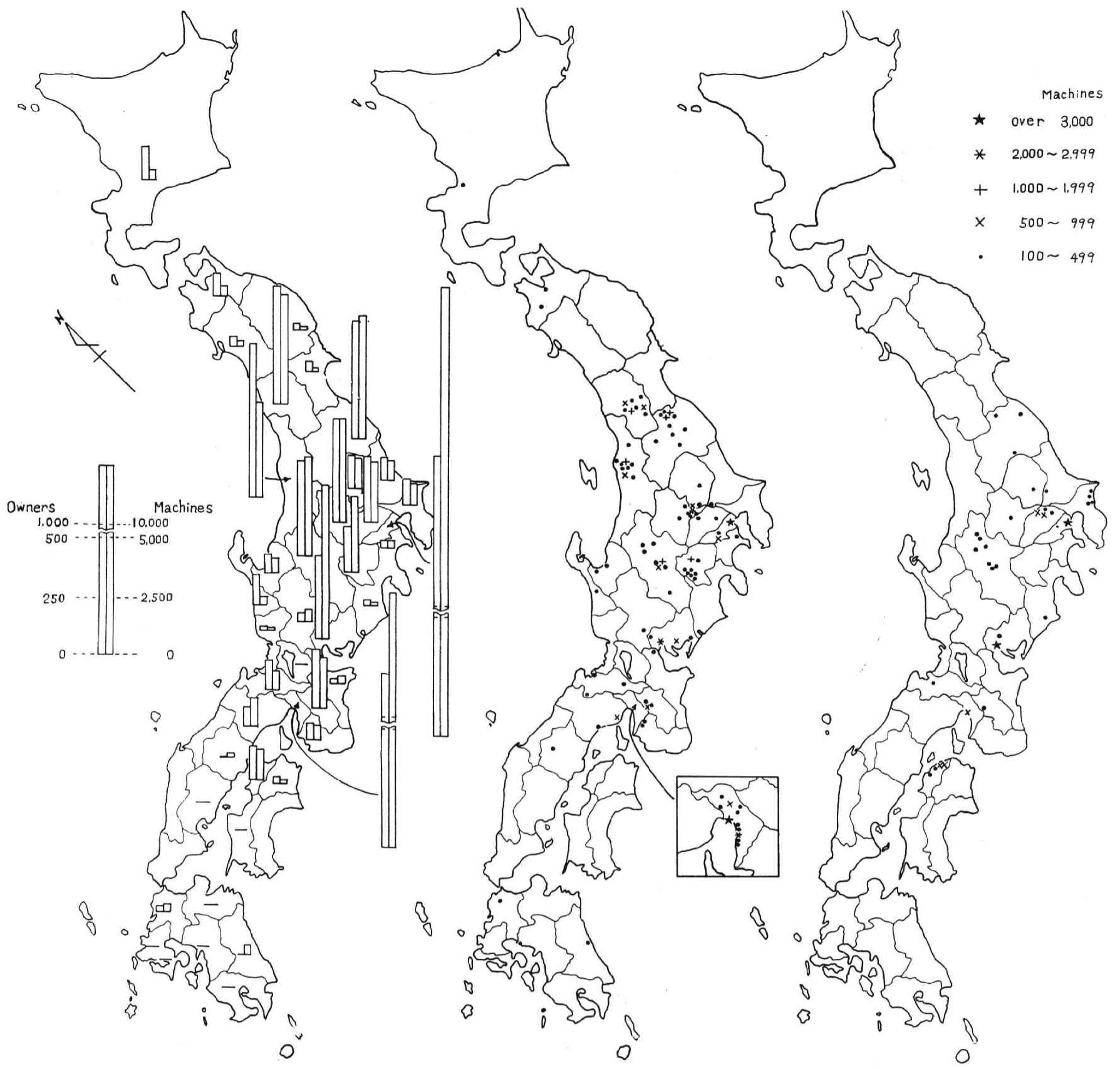


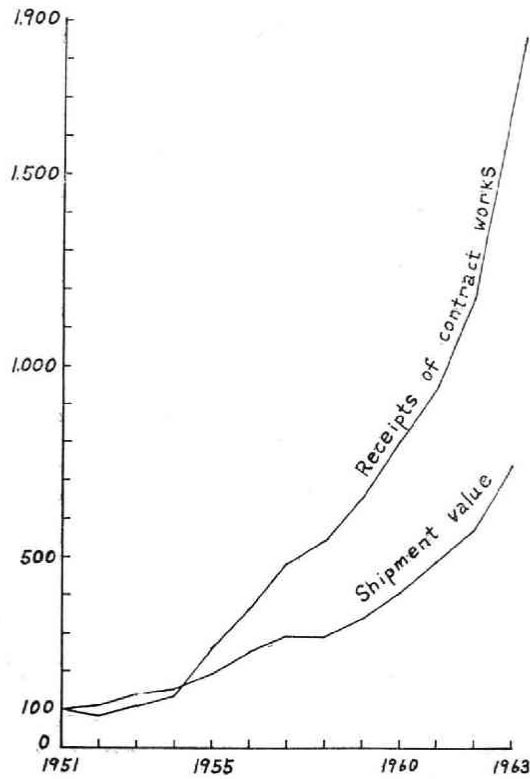
Fig. 1 Distribution of flat knitting machines and machine owners by prefecture, as of August, 1965. *The Flat knitting Machine Register.*

Fig. 2 Distribution of large flat knitting machines by city, town and village as of August, 1965. *The Flat Knitting Machine Register.*

Fig. 3 Distribution of small flat knitting machines by city, town and village as of August, 1965. *The Flat Knitting Machine Register.*

Table 1 Manufacturers by number of workers. *Ministry of International Trade and Industry (1964): Report of Knitting Industry in Japan, Table 3-1, 8, 15 and 22.*

	workers	Non-subcontractors		Partly subcontractors		Subcontractors		Total	
			%		%		%		%
Flat knitting industry	~ 3	131	4.3	124	4.0	2,817	91.7	3,072	100.0
	4~ 10	469	17.0	242	8.8	2,051	74.2	2,762	100.0
	11~ 20	472	37.0	181	14.2	621	48.4	1,274	100.0
	21~ 50	408	50.0	184	29.9	124	20.1	616	100.0
	51~100	101	64.7	48	30.8	7	4.5	156	100.0
	101~300	37	60.6	20	32.8	4	6.6	61	100.0
	301~	2	33.3	4	66.7			6	100.0
Total	1,520	19.1	803	10.1	5,624	70.8	7,947	100.0	
Total of knitting industry		3,313	22.9	2,004	13.9	8,080	63.2	14,442	100.0

Fig. 5 Changes of receipts of contract works and shipment value in knitting industry. *Census of Manufactures.*

raw materials supplied by other enterprise. We call the former a subcontractor and the latter a master enterprise. Wages are paid to the subcontractor by the master enterprise. Subcontract production prevails in flat knitting industry. Percentage of subcontractors is higher in flat knitting industry than in knitting industry (Table 1). Many of the subcontractors belong to the small class according to the number of workers. Flat knitting industry is composed of two classes, that is to say, small number of master manufacturers and independent manufacturers, and large number of subcontractors. Management of subcontractors is unstable because it depends upon supply of raw material by the master enterprise. We can measure subcontract production by receipts of contract works in Census of Manufactures. The subcontract system is more and more widespread in knitting industry (Fig. 5).

Some owners lease all or a part of machines to other manufacturers. We call such form of contract the lease contract of machines. This lease contract of machines is closely related with subcontract production. Most machine lessees are subcontractors at the same time. But subcontractors are not always lessees. The lessees are supplied not only with raw material but also with machines by master manufacturers. Subcontractors' dependence on master manufacturers is much more intensified when they are supplied with machines.

III Structure of flat knitting industry in Tokyo and Osaka

1) Distribution of machines

Tokyo and Osaka are the first and the second largest areas of flat knitting industry in Japan. Percentage of the two cities to national total is 35.8% in the number of machines and 27.7% in the number of machine owners (Table 2).

Table 2 Scale of Tokyo and Osaka Flat Knitting Areas. *The Flat Knitting Machine Register.*

	Owned machines		Machine owners	
	Percentage to national total	Percentage to prefecture	Percentage to national total	Percentage to prefecture
Tokyo	24.8	94.0	18.9	93.1
Osaka	11.0	63.9	8.8	59.6

Great many machines are owned by manufacturers in the eastern part of Tokyo, especially in Sumida Ward and in the northern part of Osaka (Fig. 6). Distribution pattern of owners is largely the same as that of machines (Fig. 7).

Flat knitting machines are classified into two categories. One is those which

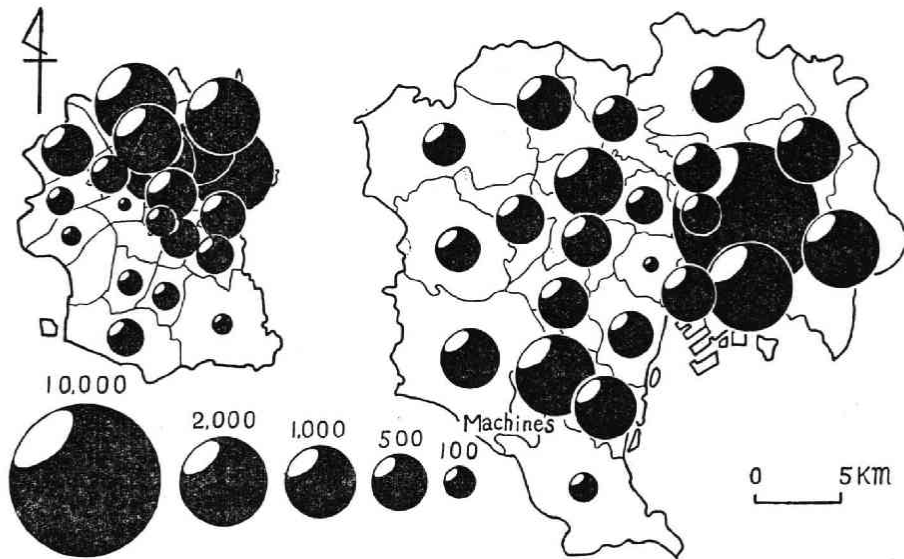


Fig. 6 Distributon of owned machines in Tokyo (right) and Osaka (left), as of August, 1965. *The Flat knitting Machine Register.*

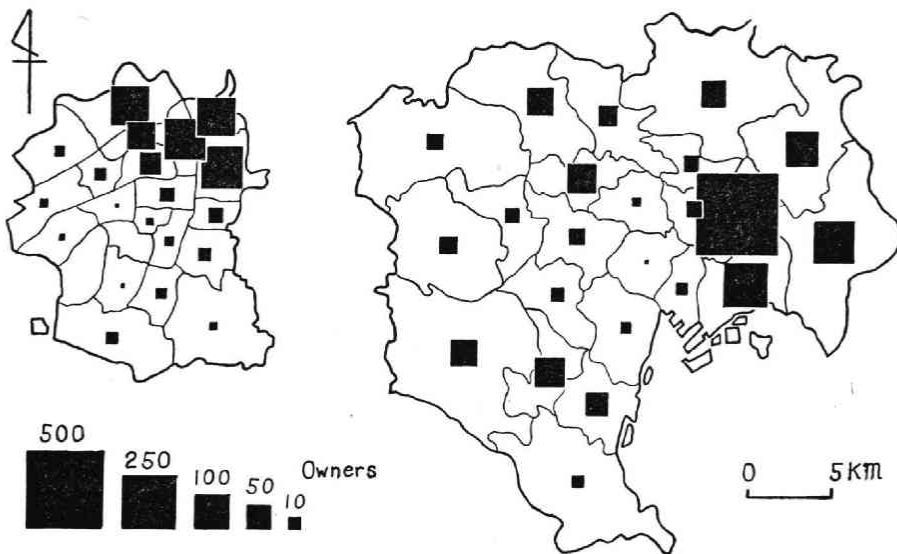


Fig. 7 Distribution of owners in Tokyo and Osaka. Tokyo: November, 1965, Osaka: May, 1966. *The Flat Knitting Machine Register.*

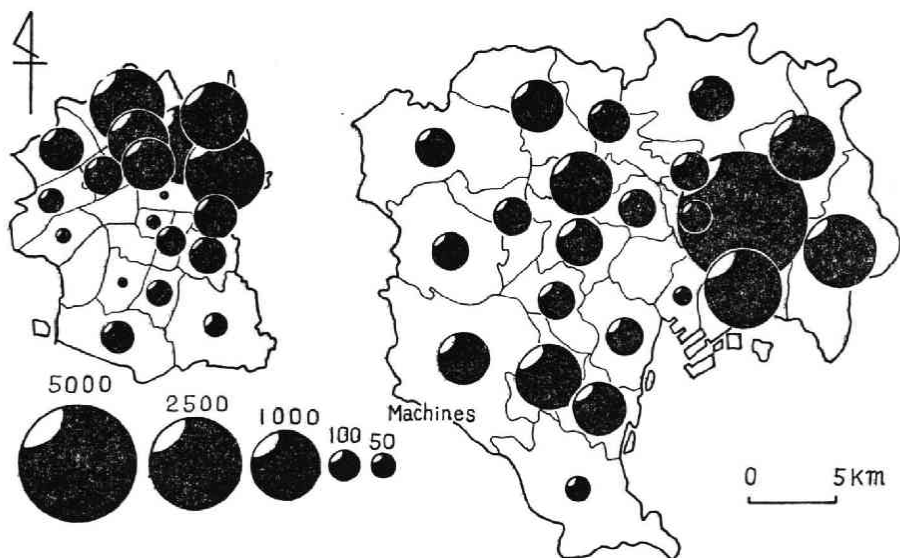


Fig. 8 Distribution of machines installed in owner's factories. Tokyo: November, 1965, Osaka: May, 1966. *The Flat Knitting Machine Register.*

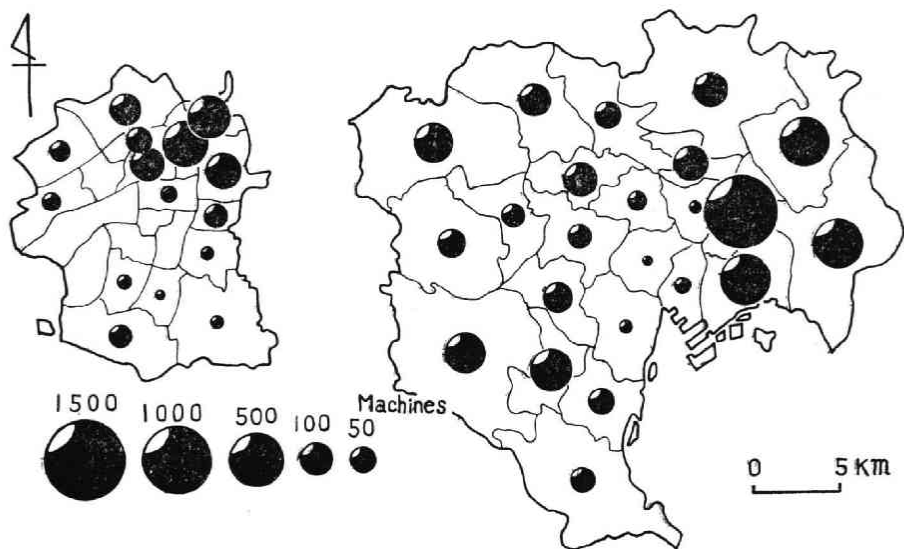


Fig. 9 Distribution of leased machines in Tokyo and Osaka. Tokyo: November, 1965, Osaka: May, 1966. *The Flat Knitting Machine Register.*

Table 3 Distribution of flat knitting machines owned by manufacturers in Tokyo and Osaka. *The Flat Knitting Machine Register.*

	Machines installed in owner's factory	Leased machines in the city area	Leased machines in areas outside the city area	Total
Tokyo	15,453 71.0%	3,761 17.3%	2,553 11.7%	21,767 100.0%
Osaka	6,945 73.1	998 10.5	1,558 16.4	9,501 100.0

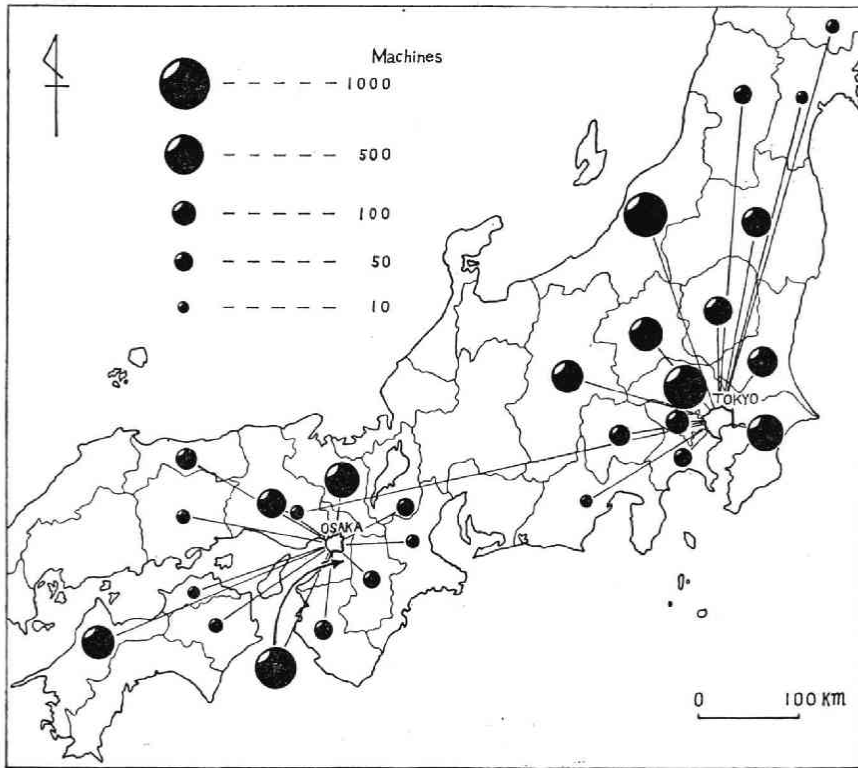


Fig. 10 Distribution of leased machines in areas outside Tokyo and Osaka. Tokyo: November, 1965, Osaka: May, 1966. *The Flat Knitting Machine Register.*

owners install in their own factories and the other is those which owners lease to other manufacturers (Fig. 8 and 9). About 30% of machines is leased and these leased machines are distributed not only in the city areas but also in areas outside the two cities. In the case of Osaka, majority of leased machines are distributed in areas other than the city itself (Table 3). Figure 10 shows influence zones of Tokyo and Osaka flat knitting areas.

Table 4 Machine owners by number of owned machines and by

		Tokyo							
Leased machines	Owned machines	0	1~4	5~9	10~19	20~29	30~49	50~99	100~
		1~4	380	51					
	5~9	340	55	40					
	10~19	218	73	31	38				
	20~29	58	20	31	13	11			
	30~49	25	15	8	25	13	9		
	50~99	8	2	6	11	10	11	13	
	100~						1	6	9
	Total	1,029	216	116	87	34	21	19	9
		67.2%	14.1%	7.6%	5.7%	2.2%	1.4%	1.2%	0.6%
			43.0%	23.1%	17.3%	6.8%	4.2%	3.8%	1.8%

2) Management size

Manufacturers of flat knitting industry fundamentally consist of two categories. One is machine owners and the other is machine lessees. Of course there are manufacturers who hold the two categories concurrently. Table 4, 5 and 6 show the number of owners. But these tables exclude manufacturers who own no machines and are engaged in production only with leased machines. Now, let us analyze owners in Table 4, 5 and 6 by number of machines, by number of leased machines and by number of lessees whom the owners lease.

(1) More than half of owners own only 9 machines or less and owners of 50 machines or more are less than 5%.

(2) There is a clear difference between Tokyo and Osaka concerning the percentage of owners who lease no machine. Tokyo is 67.2% but Osaka is 81.9%. These small-scale owners are either manufacturers who operate only their own machines or manufacturers who operate both their own machines and leased machines.

(3) Machine lessors hold 32.8% in Tokyo and 18.1% in Osaka. Majority of them lease 9 machines or less.

(4) A lessor in Tokyo leases their machines to 2.7 lessees and a lessor in Osaka leases to 2.5 lessees on the average. The largest number of lessees per lessor is 21 in Tokyo and 10 in Osaka (Table 5).

(5) Owners are classified into three groups according to the extent of dependence on lease contract.

number of leased machines. *The Flat Knitting Machine Register.*

Total	Osaka									Total
	0	1~4	5~9	10~19	20~29	30~49	50~99	100~		
431 28.2 [%]	159	11								170 24.2 [%]
435 28.4	195	9	12							216 30.7
360 23.5	157	15	3	15						190 27.0
133 8.7	47	6	2	1	6					62 8.8
95 6.2	13	1	6	6	1	13				40 5.7
61 4.0	5		1	1	1	4	6			18 2.6
16 1.0				1			2	4		7 1.0
1,531 100.0	576	42	24	24	7	18	8	4		703 100.0
100.0	81.9 [%]	6.0	3.4	3.4	1.0	2.6	1.1	0.6		100.0
100.0		33.1 [%]	18.9	18.9	5.5	14.2	6.3	3.1		100.0

Table 5 Machine lessors in Tokyo and Osaka by number of machine lessees. *The Flat Knitting Machine Register.*

Lessees	Tokyo		Osaka	
1	236	48.0 [%]	71	56.8 [%]
2	93	18.9	19	15.2
3	50	10.2	5	4.0
4	32	6.5	9	7.2
5	17	3.5	6	4.8
6	16	3.3	4	3.2
7	13	2.6	5	4.0
8	4	0.8	1	0.8
9	11	2.3	4	3.2
10~	19	3.9	1	0.8
Total	491	100.0	125	100.0

The first group consists of the owners who do not depend upon the lease contract at all, because they install all machines in their own factories. To the second group belong the owners who lease a part of machines to subcontractors. But they install the rest in their own factories. The third group is composed of the owners who lease most of machines to subcontractors and thus heavily depend upon the lease contract.⁽¹⁾

As the number of owned machines becomes larger, percentage of owners who belong to the second and third groups increase (Table 6). In other words, the more

(1) The author regards owners whose scale of owned machines is the same as their scale of leased machines in Table 4, as owners who belong to the third group in Table 6.

Table 6 Machine owners by number of owned machines and by group according to the extent of dependence on lease contract. *The Flat Knitting Machine Register.*

Owned machines \ Group	Tokyo				Osaka			
	I	II	III	Total	I	II	III	Total
1~ 4	380 88.2		51 11.8	431 100.0	159 93.5		11 6.5	170 100.0
5~ 9	340 78.2	55 12.6	40 9.2	435 100.0	195 90.2	9 4.2	12 5.6	216 100.0
10~19	218 60.5	104 28.9	38 10.6	360 100.0	157 82.6	18 9.5	15 7.9	190 100.0
20~29	58 43.6	64 48.1	11 8.3	133 100.0	47 75.8	9 14.5	6 9.7	62 100.0
30~49	25 26.3	61 64.2	9 9.5	95 100.0	13 32.5	14 35.0	13 32.5	40 100.0
50~99	8 13.1	40 65.6	13 21.3	61 100.0	5 27.8	7 38.9	6 33.3	18 100.0
100~		7 43.8	9 56.2	16 100.0		3 42.9	4 57.1	7 100.0
Total	1,029 67.2	331 21.6	171 11.2	1,531 100.0	576 81.9	60 8.5	67 9.6	703 100.0

the manufacturers own machines, the more they depend upon lease contract. Most of small-scale owners can not afford to lease their machines to others.

There are great many small-scale owners. Majority of these owners are subcontractors whose management is under unstable conditions. In addition to these small-scale owners, we must pay attention to manufacturers who own no machine. Their management is more unstable than the small-scale owners.

4. Changes in flat knitting areas

1) Relative decline of larger areas

Since April 1, 1962, new installment of flat knitting machines has been forbidden in order to prevent overproduction by order of the Minister of International Trade and Industry. If a manufacturer wants to buy a machine newly, he must acquire a licence of it from another. Concerning the licence, two small knitting machines are converted into one large flat knitting machine. This transfer of the licence does not always mean that the machine is transferred, but manufacturers cannot install machines without licences. Therefore, we can regard transfer of the licence as that of the machine.

In the period from April 1, 1962 to December 31, 1965, many machines were moved out from Tokyo and Osaka to other areas. Number of machines in the two cities decreased because more machines moved out than those which moved in. This is especially true in the case of Osaka (Table 7). Figure 11 shows a sort of influence zones of the two cities as well as Figure 10.

Table 7 Transfer of flat knitting machines from and into Tokyo and Osaka, from April 1, 1962 to December 31, 1965. *The Flat Knitting Machine Register.*

Origin \ Destination	Tokyo			Origin \ Destination	Osaka		
	Tokyo	Other areas	Total		Osaka	Other areas	Total
Tokyo	1,855	643	2,498	Osaka	712	1,489	2,201
Other areas	497	...	497	Other areas	252	...	252
Total	2,352	643	2,995	Total	964	1,489	2,453

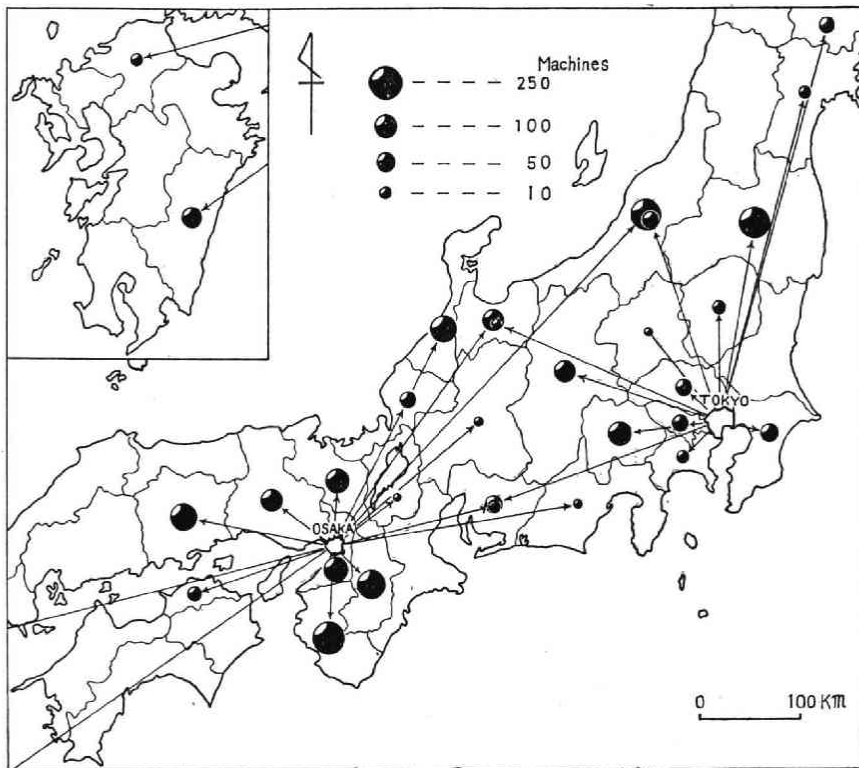


Fig. 11 Distribution of machines moved out from Tokyo and Osaka from April 1, 1962 to December 31, 1965. *The Flat Knitting Machine Register.*

Nevertheless, shipment value of flat knitted goods in Tokyo and Osaka Prefectures increased in the period from 1955 to 1963 (Fig. 12). This is because productive capacity of machines was enlarged by technical improvement and also because the working ratio of the machines was increased, supported by increased demand in

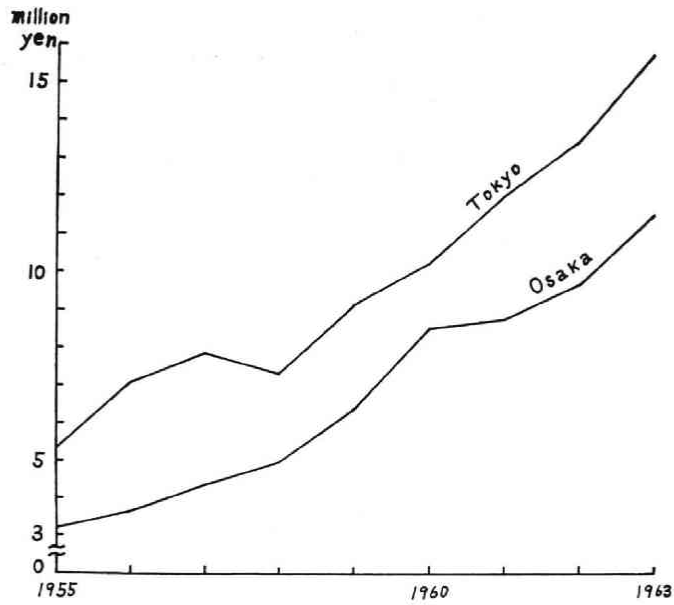


Fig. 12 Changes of shipment value of flat knitted goods in Tokyo and Osaka Prefectures.
Census of Manufactures.

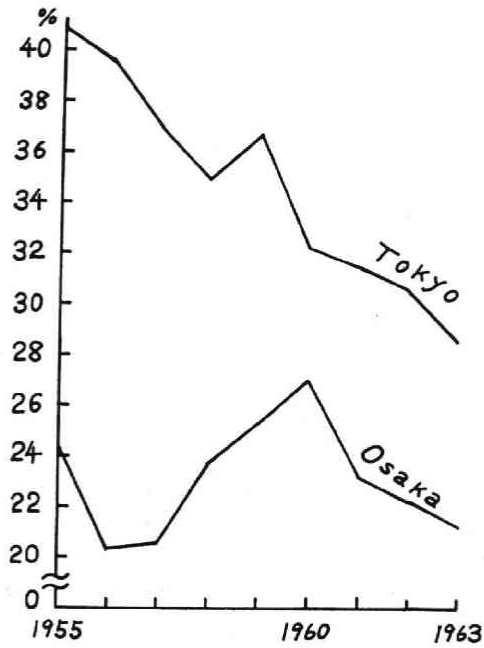


Fig. 13 Changes of shipment value of Tokyo and Osaka Prefectures to national total.
Census of Manufactures.

the period of highly growing economy in Japan.

The rate of shipment value of the two prefectures to national total, however, decreased in the same period (Fig. 13). We can regard shipment value of the two prefectures as that of the two cities, because, as mentioned above, the greater part of machines as well as their owners in the prefectures are distributed in the two cities. This tendency is remarkable in Tokyo Prefecture. Table 8 shows that the percentage of Aichi Prefecture decreased in the same way as Tokyo and Osaka Prefectures. In Aichi Prefecture, 66.8% of machines and 52.9% of owners

Table 8 Changes of rate of shipment value of flat knitted goods to national total and minimum wages by prefecture. *Census of Manufactures and Data furnished by Ministry of Labour.*

Prefecture	Rate of shipment value to national total, 1955 (A)	Rate of shipment value to national total, 1963 (B)	(B)-(A)	Minimum wages (estimated) as of December 31, 1963 (yen/day)
Hokkaido	0.1%	0.1%	0.0	—
Akita	0.1	0.0	- 0.1	—
Yamagata	1.6	2.9	+ 1.3	315
Fukushima	1.4	5.6	+ 4.2	330
Ibaragi	0.3	0.1	- 0.2	—
Tochigi	0.3	1.9	+ 1.6	360
Gumma	2.3	5.0	+ 2.7	345
Saitama	0.6	2.5	+ 1.9	355
Chiba	0.3	0.2	- 0.1	300
Tokyo	40.9	28.9	-12.0	370
Kanagawa	0.2	1.9	+ 1.7	360
Niigata	4.9	4.5	- 0.4	360
Toyama	1.2	1.4	+ 0.2	—
Fukui	0.0	0.1	+ 0.1	—
Yamanashi	2.5	4.1	+ 1.6	345
Nagano	1.2	2.3	+ 1.1	355
Gifu	0.2	0.5	+ 0.3	—
Shizuoka	0.1	0.1	0.0	—
Aichi	13.1	11.6	- 1.5	380
Mie	0.2	0.1	- 0.1	—
Shiga	0.0	0.3	+ 0.3	—
Kyoto	0.4	0.3	- 0.1	—
Osaka	24.3	21.2	- 3.1	—
Hyogo	1.6	1.9	+ 0.3	—
Nara	0.3	0.2	- 0.1	350
Wakayama	0.0	0.1	+ 0.1	355
Shimane	0.0	0.2	+ 0.2	—
Hiroshima	0.1	0.0	- 0.1	—
Tokushima	0.1	0.2	+ 0.1	—
Kagawa	1.7	1.8	+ 0.1	—
Total	100.0	100.0	0	

are distributed in Nagoya. Therefore, we can regard the relative decrease of production in Aichi Prefecture as that of production in Nagoya. By and large, it is certain that large cities such as Tokyo, Osaka and Nagoya are going down in their share of national production. Decreased rate of production in an industrial area must be interpreted as relative decline as A. Takeuchi pointed out.⁽²⁾

2) Relative prosperity of medium and small flat knitting areas

In contrast with decline of large cities, percentage went up in medium and small areas (Table 8). In other words, production expanded more rapidly in medium and small cities and rural region than in large cities. New centers of flat knitting industry were formed recently. Hobara Town and Yanagawa Town in Fukushima Prefecture are representative examples of such new flat knitting areas⁽³⁾

Generally speaking, such rapid expansion is based on industrial structure with many small-scale subcontractors who are under unstable conditions. But areal difference of production is not explained in full by means of the structure alone.

3) Wage-differentials by area

Added value per worker in flat knitting industry is below the average of manufacturing industry (Fig. 14). Flat knitting industry is one of labour intensive industries. Wage per employee is below the average, too (Fig. 15). This industry depends upon cheap labour.

As heavy industry has absorbed many labourers during the last ten years of highly growing economy, labour market in small-scale industry became favorable to "sellers" of labour force. Under this sort of conditions, security of cheap labour became much more important for the development of flat knitting industry.

Wages are determined in substance by living costs which are different by area. In general, living costs are higher in city areas than in rural areas. There are wage-differentials by area corresponding to areal differences of living costs. Therefore, wages are one of the locational factors. Areal difference of minimum wages will approximately indicate the difference in average wages. The author showed areal wage-differentials of flat knitting industry with minimum wages by prefecture as of December 31, 1963, the figures for average wages being unable to obtain (Table 8)⁽⁴⁾.

(2) **Takeuchi, Atsuhiko** (1966): The Decline of Industrial Production in Kita Kyushu Area, *Geogr. Rev. Japan*, 39 665-679

(3) **Naito, Hiroo** (1966): Recent Development of Knitting Industry in Rural Region — in the case of Fukushima Basin —, *Sci. Reps. Tohoku Univ., Ser. 7 (Geogr.)*, 15 147-164

(4) Since 1959, minimum wages in Japan are fixed on the basis of agreement made by manufacturers, by area and by industry.

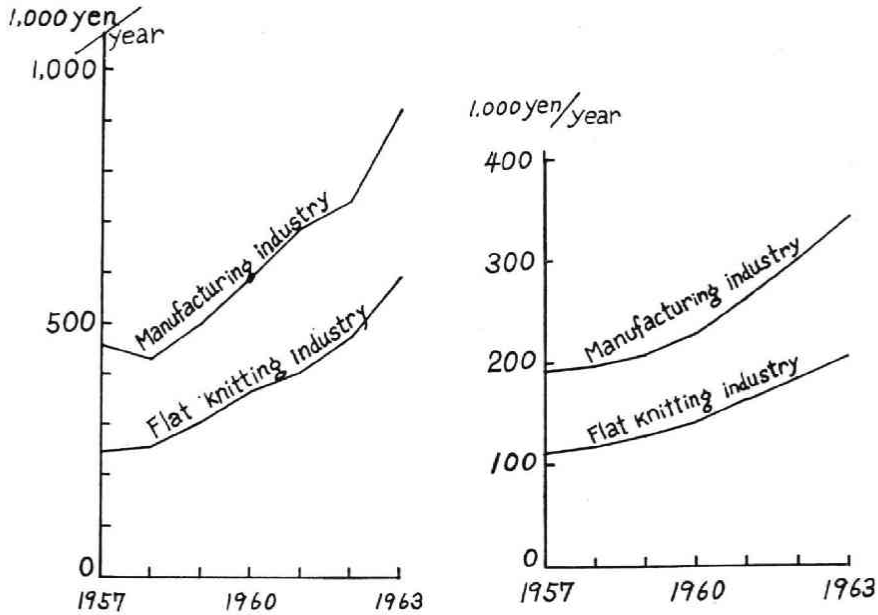


Fig. 14 Changes of added value per worker. 1957-1962: factories with 4 workers or more, 1963: factories with 10 workers or more. *Census of Manufactures*.

Fig. 15 Change of wage per employee. 1957-1962: factories with 4 workers or more, 1963: factories with 10 workers or more. *Census of Manufactures*.

Production rate to national total went down in such high wage prefectures as Tokyo and Aichi, and rose in low wage prefectures as a whole. Although minimum wages were not fixed in Osaka Prefecture in those days, average wages in Osaka Prefecture were undoubtedly so high as in Tokyo and Aichi Prefectures.

5. Conclusion

Flat knitting industry is a labour intensive industry and has many small-scale and unstable subcontractors. The scale of flat knitting areas is susceptible to the influence of the cycles of national economy because of the unstable character of flat knitting industry. Areal wage-differentials are the second but direct incentive that causes areal difference of production.