

Changing Structural Patterns in Japanese Agriculture with Special Reference to Tohoku

著者	SUM Kong-sut
雑誌名	The science reports of the Tohoku University. 7th series, Geography
巻 号	21 2
ページ	235-246
発行年	1972-02
URL	http://hdl.handle.net/10097/44949

Changing Structural Patterns in Japanese Agriculture with Special Reference to Tohoku

SUM Kong-Sut

Introduction

The Agrarian Reform of 1947 has, to a great extent, relieved most of the Japanese farmers, who until then were largely composed of tenants, from paying excessive rents by changing their status to ownerfarmers. This movement, together with the subsequent Land Improvement Law of 1949, has set the pace for agricultural improvement in Japan. At the same time the rapid industrialization and urbanization of Japan after World War II have their impacts on agriculture in terms of competitive land use and attracting labour from rural areas. This was specially so in the last decade 1960-1969. It is the objective of this paper to present the relevant facts and to analyse the factors of these important changes which have helped to bring about significant socioeconomic evolutions in modern Japan.

Changing Structural Patterns in Japanese Agriculture

There are many ways to indicate changes. But none would be more effective than the total number of farm households and the total number of households engaged in full-time and part-time farming, as statistics are available to allow a spatial distribution of these changes all over Japan to be shown on maps (Fig. 1, 2, 3).

From 1955 to 1965 among 46 prefectures 40 reported decreases in farm households while only 6 reported increases. The magnitude of decrease was far greater than that of increase, the former was 19% (Tokyo), whereas the latter was only 4% (Akita prefecture). As shown in Table 1 the number of households engaged in full-time farming has shown a marked decrease, with the exception of Hokkaido, and the number of households engaged in No. 2 part-time farming¹⁾,

1) For definition of types of farming: According to the 1950 World Agricultural Census a farm household is defined as (1) Ordinary Households which cultivate 9.9 are or more of land in Kanto, Hokuriku and further north; and 4.9 are or more, in districts further south, (2) as exceptions to the above, the households with less than 9.9 or 4.9 are operating hot-houses and selling their products by cultivating a small area intensively, or those engaged in livestock breeding or sericulture (without tilling land) with a sale not less than 10000 yen for the previous year, but for 1955 those whose total sale of agriculture products during the preceeding year amounted to 20000 yen and over. (continued on the next page)

Table 1 Changing structural patterns in agriculture as seen from increase/Decrease in the total number of house-holds engaged in various types of farming* 1955-1960

1955=100									
	Farm House-holds	Full Time	Part-time No. 1	Part-time No. 2		Farm House-holds	Full Time	Part-time No. 1	Part-time No. 2
All Japan	93.5	57.7	91.5	142.1	Mie	92.4	37.9	90.3	141.6
Hokkaido	84.0	100.0	66.4	78.7	Shiga	96.1	27.6	122.0	142.9
Aomori	102.2	65.1	108.0	151.7	Kyoto	90.9	50.5	68.8	153.7
Iwate	102.1	80.1	91.9	147.8	Osaka	84.7	50.3	54.4	126.8
Miyagi	101.1	56.4	115.5	153.1	Hyogo	93.1	41.4	65.0	169.0
Akita	104.3	49.4	116.0	152.6	Nara	93.1	63.0	68.0	130.2
Yamagata	100.9	50.9	128.2	150.3	Wakayama	88.1	84.8	68.1	106.2
Fukushima	98.4	59.8	109.2	165.9	Tottori	96.6	54.9	93.6	149.0
Ibaraki	96.5	58.3	133.0	164.4	Shimane	91.2	63.3	78.0	131.5
Tochigi	96.0	59.4	119.9	134.3	Okayama	93.6	51.6	89.4	160.7
Gumma	95.7	52.8	114.9	158.0	Hiroshima	89.0	57.9	64.8	149.1
Saitama	93.6	46.8	121.7	144.9	Yamaguchi	91.4	66.2	69.5	139.1
Chiba	95.8	56.1	115.6	167.2	Tokushima	94.8	58.3	102.4	122.4
Tokyo	81.3	57.4	61.8	113.7	Kagawa	89.8	49.0	83.8	148.6
Kanagawa	85.0	54.3	90.9	108.7	Ehime	88.9	60.3	77.8	144.7
Niigata	96.8	33.5	121.8	155.8	Kochi	85.5	76.1	70.3	110.0
Toyama	97.0	27.9	98.4	156.8	Fukuoka	93.1	53.5	96.3	128.2
Ishikawa	90.5	30.3	74.5	146.0	Saga	93.8	56.9	115.9	117.2
Fukui	91.0	33.0	92.0	123.4	Nagasaki	89.4	61.1	82.2	139.9
Yamanashi	93.9	70.7	77.5	146.5	Kumamoto	93.9	70.7	94.2	138.4
Nagano	94.9	58.1	89.9	138.1	Oita	91.8	70.4	74.9	149.1
Gifu	94.4	43.6	73.8	157.2	Miyazaki	94.0	61.0	88.5	172.9
Shizuoka	91.2	57.6	87.0	125.6	Kagoshima	103.0	78.7	88.2	182.2
Aichi	90.9	37.6	84.3	156.7					

* For definitions of types of farm households, see footnote 1) compiled from Japan Statistical Yearbook (1960) p. 70, (1965) p. 82

again with the exception of Hokkaido, has shown a marked increase. This means farmers no longer depend exclusively on farm income. They work in the cities whenever they find employment. In fact most of the young men under thirty have left their farms to become wage earners in cities, leaving behind the women and the aged to look after the farms. It should be noted that the relatively low indices for Tokyo, Kanagawa, Fukui, Shizuoka, Osaka, Wakayama, Kochi, Fukuoka and Saga is an indication that by 1955 there were already a large number of farmers in No. 2 part-time farming. Therefore, the change in percentage is not so high as in other prefectures, where the number of households engaged in No. 1 part-time farming was still large.

Beginning with 1941, a farm household whose members are all exclusively engaged in agriculture of their own household is classified as main; otherwise as subsidiary. Of subsidiary occupation those which subordinate other occupations are classified as No. 1 and those other than this No. 2 (Japan Statistical Yearbook, p. 71).

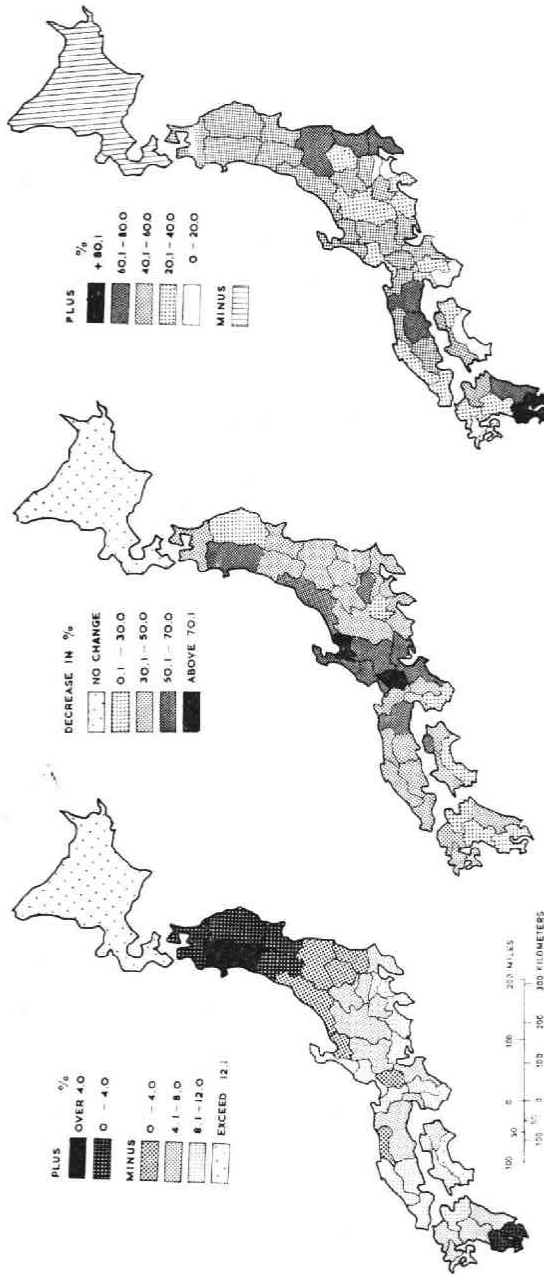


Fig. 1

Fig. 2

Fig. 3

Fig. 1 Changes in the total number of farm households, 1955-1965
 Fig. 2 Decrease in the total number of full-time farm households, 1955-1965
 Fig. 3 Changes in the total number of number two part-time farm households, 1955-1965

This downward trend is also reflected in the number of persons actively engaged in farming. The number declined from 14,541,624 in 1960 to 11,513,989 in 1965 or a decrease of 21%. That this trend is still operative can be seen by comparing 1968 figures with those of 1967. The former is 10,132,000 while the latter is 10,583,000 showing a decrease of 4.3%.

The sex composition in farm labour before World War II showed a marked difference from that after it. For instance in 1930 of a total farm labour force of 13,549,491 55% were male and 45% female, (Statistical Year Book of the Japanese Empire 1938). But the situation has completely reversed after the War. In 1965 the corresponding figures for male and female were 40% and 60%. This is because high wages in urban areas has drained off young male labour from the land, especially those who have graduated from high schools. At the same time the gradual mechanization of the farms has made male labour less indispensable than it was previously.

According to 1965 Agriculture Census Japan has 457,051 animal driven cultivators and a total of 1,698,600 tractors and power cultivators, the majority of which ranged from under 5 h.p. to 10 h.p. (Table 2). This gives one tractor/power cultivator every three farm households or one tractor/power cultivator per 30 hectares of cultivated land. The question facing Japanese farms is not whether

Table 2 Number of tractors and power cultivators in Japan
(1965 Agriculture Census)

Horse Power	Number	Percentage of Total
under 5	760,236	44.76
5-10	899,528	52.96
10-20	33,644	1.98
20-30	1,632	0.09
over 30	3,560	0.21
Total	1,698,600	100.00

Source: Japan Statistical Yearbook (1965) p. 98

further mechanization is possible or not. But rather under the present situation of small-sized fields, fragmentation and dispersion will a tractor be put to its optimum use in case of further mechanization? Obviously in Japan, except in Hokkaido and some areas in Tohoku, many farm holdings are too small, too fragmented and too dispersed to engage tractors profitably. Therefore, before mechanization can be fully realized the social problem of consolidation must be overcome. This will be an immense task as fragmentation and dispersion have a

long history and have been practised for centuries. One difficulty regarding the implementation of consolidation is that the quality of land varies from field to field. Since the whole process is voluntary, the final exchange is only arrived at after long negotiations and hard bargaining.

Since the passing of the Land Improvement Law there have been varying degrees of success in consolidation in rural areas. Regions with rapid progress are the dry fields and one-crop rice fields along the coast of the Japan Sea. Whereas Tohoku and Kinki are slow in promoting land consolidation (Shirai Y. 1964).

In Hokkaido some households even proceed from consolidation to co-operative farming²⁾. One farm in eastern Hokkaido near Nakashibetsu was started in 1958 by grouping of four farms to make a combined acreage of 51.4 hectares. The four family heads specialize in different sections of the work, one in field work, another in machinery, the third in bookkeeping and the fourth runs the dairy which had 34 cows. Remunerations are based on a system mutually worked out and agreed upon. By 1965 there were 380 such farms with an average of 5.3 families in each in Hokkaido.

Agriculture production in Japan has revealed three dominant trends in recent years as illustrated by the agriculture production indices (Table 3).

With the exception of rice all field crops i.e. beans, potatoes, etc. and grains show a marked decrease from 1965. In the case of wheat, despite increasing home

Table 3 Agriculture production index

	1960	1965	1966	1967	1968
Farming	89.4	100.0	103.8	113.1	116.7
Cultivation	101.0	100.0	103.2	112.9	116.0
Rice	103.3	100.0	102.7	116.7	116.6
Wheat	144.5	100.0	85.7	81.6	87.0
Other grains	224.2	100.0	84.7	73.2	62.1
Beans	144.9	100.0	85.6	100.9	86.7
Potatoes	107.9	100.0	87.8	86.5	86.9
Vegetables	86.4	100.0	108.8	112.7	121.9
Fruits	81.6	100.0	116.5	120.1	143.7
Livestock	53.6	100.0	106.3	114.6	119.8
Milch cows	70.6	100.0	99.9	110.1	125.0
Beef cattle	80.1	100.0	72.9	72.4	77.3
Pigs	43.1	100.0	133.1	136.9	128.5
Chickens	35.8	100.0	121.0	135.8	147.8
Eggs	51.1	100.0	100.2	116.1	123.1
Milk	58.6	100.0	105.8	110.7	124.7

Statistical Tables of the Ministry of Agriculture and Forestry (1968-69) vol. 45 p. 328

2) Dempster, Prue (1969) Japan Advances Methuen and Co. Ltd. 154-155

demand and tariff protection, production has declined. This is due to two factors: the cost of production for home grown wheat is higher than the price of imported wheat; and the quality of home grown wheat is not ideal for the making of bread. As for beans Japan finds it cheaper to import from the U.S. and the Republic of People's China. With a rising standard of living the dietary taste of the nation also changes. Sweet potatoes, which once formed a staple food before and during the war, become rapidly out of favour.

On the other hand vegetables and fruits show a remarkable increase since 1965. This is a reflection of the rapid industrialization and urbanization in recent years. As more and more people are attracted to the cities and as the purchasing power of city workers increases, so the demand for these products also multiplies. As the demand for silk continues to decline, so are the profits of sericulture. A recent tendency is that an increasing number of mulberry trees are being replaced by apples, pears and grapes (Hasegawa, N. 1960, 1970, Kasai, Y. 1969, Noh, T. 1967). At the same time an increasing quantity of vegetables are grown to meet an ever expanding market.

The production of livestock and related products are also increasing rapidly, with the exception of beef cattle. The most remarkable rise is the production of chickens which increases by 48% in three years. Though fish and soybean still constitute the major sources of protein for the majority of the Japanese this increasing demand for animal protein is certainly an indication of improved economic conditions.

Because of the small-sized farms, the application of fertilizers in large quantities and the intensity with which the fields are worked, Japanese agriculture has high productivity per unit area of cultivated land. For instance, in the production of rice Japanese yield per hectare is 5.75 tons in 1967; ranking second after Spain (6.10 tons/hectare), the highest in the world. This is double the yield of People's China, three times that of India and Pakistan, and fourfold that of the Phillipines³). However, despite this high yield the productivity per farmer remains low compared with other densely populated industrialized nations such as West Germany, Denmark and Britain. This is due entirely to the small farm holdings of Japanese farmers. If this could be increased, then farm income (about US \$4100 per year in 1966) would also rise correspondingly. The future of Japanese agriculture, therefore, lies in a further reduction of farm labour force, in amalgamation of farm holdings, in higher degree of mechanization and in co-operative farming. This process can be accelerated by further industrialization and urbanization of cities with a population ranging from 300,000 to 500,000. No

3) The Tsuneta Yano Society: Nippon, a Charted Survey of Japan, 1970 219ps.

doubt this will be a complicated and difficult evolution, demanding the co-operation of all interested parties and socio-economical readjustments of many individuals. But unless this is done, farm income will remain low and the gap between agriculture and industry continues to widen.

As indicated in Table 4 farm income improves rapidly since 1950. It doubles itself from 1950 to 1960, and again from 1960 to 1966. From 1961 to 1966 the rise over the previous year has been 13.2% whereas the consumer price indices (1965/1966) increased by 4.6 to 7%. Therefore, farm income has been able to keep ahead of the general rise in the costs of living by a 6% margin.

Because of this steady improvement in the farmer's economic conditions, farmers begin to possess, in ever increasing numbers, durable consumer goods

Table 4 Farm economy: Gross and net income per household
(area in ares, amount in 1000 yen)

	1950	1955	1960	1961	1962	1963	1964	1965	1966
Households enumerated	5,306	5,666	5,781	5,776	16,882	16,920	16,981	17,002	16,883
Household members	6.65	6.27	5.72	5.64	5.53	5.43	5.38	5.30	5.21
Area of land in operation	261	240	196.2	195	204	202.2	204.9	208.8	209.7
Cultivated land	121	117	98.2	98.0	100	100.4	102.0	103.2	104.8
Gross Income	201.9	358.1	409.5	459.4	525.4	584.9	666.6	760.8	861.4
Net Income*	20.0	38.1	71.2	102.1	114.5	156.3	185.4	223.6	243.8

Compiled from Japan Statistical Yearbooks (1965) p. 120-121 (1968) p. 126-127

* Net Income is the balance left over after the deduction of all expenses such as farm management expenses, household expenditure and taxation etc.

Table 5 Ownership of durable goods (in % of households)

Year	Non-farm			Farm		
	1967	1968	1969	1967	1968	1969
Durable Goods						
Sewing machine	82.1	82.3	84.8	80.8	83.4	83.8
T.V. set	96.7	96.3	94.5	94.9	96.6	95.7
Colour T.V. set	2.0	6.3	16.0	0.6	2.6	6.2
Washing machine	81.3	85.1	88.9	75.7	83.9	86.4
Vacuum cleaner	56.1	61.4	69.5	21.9	30.5	37.5
Refrigerator	76.9	82.2	88.2	49.3	63.3	68.6
Room cooler	3.7	5.0	5.9	0.3	0.4	0.4
Private car	10.6	13.7	18.1	6.6	11.4	14.5
Organ	17.1	18.2	20.1	7.7	8.8	10.3
Piano	6.3	6.5	7.5	0.8	1.1	1.1

Source: Nippon, A Charted Survey of Japan (1970) p. 121

formerly denied to them (Table 5). Admittedly, the economic conditions of Japanese farmers are still interior to those achieved by farmers in advanced nations in the west. This gap might never be closed unless farm holdings can be drastically increased. But so far as Asia is concerned, Japanese farmers are in a leading position and will remain so in the foreseeable future.

Agriculture in Tohoku

Tohoku district of Japan comprises of six prefectures in northern Honshu: Aomori, Iwate Miyagi, Akita, Yamagata and Fukushima. Though industries have already to leave their imprints on the landscape, agriculture still plays a major role in the region's economy⁴).

It is, therefore, important to examine the agriculture situation closely both in relation to Japan as a whole and within the region itself.

In Tohoku, except Fukushima, a slight increase is observed in the number of farm households from 1955-1965; whereas the general trend for the nation is that of decline (Table 1). This perhaps is related to the monocultivation of rice, the price of which is not only high but also guaranteed by the Japanese Government.

As to changes in the number of full-time farm households, the tendency for Tohoku is similar to that of the nation. But here differentiation are evident within the region itself. Aomori, Iwate and Fukushima are below the national figure, while Miyagi, Akita and Yamagata are above it.

From 1955-1965 the number of No. 2 part-time farm households is on the increase all over Japan. In this respect Tohoku is keeping abreast with the nation. The rate of change for Fukushima is specially fast, with an index of 165.9 i.e. 23.8% above the national figure. However, this rapid increase should be interpreted as more people are being employed in the services and various trades rather than directly in industry.

In the agriculture of Tohoku certain features are eminent and these help to give Tohoku its regional character.

In 1965 Japan had a total labour force of 48,268,767 of which those engaged in farming were 10,866,693 or 22.51%. In the same period the percentage for

4) Miyakawa Y. (1969): Location Behaviours of Electronic Appliance Industry and Clothing-knitting Industry in Tohoku. Sci. Repts. Tohoku Univ. 7th Ser. Geog. 19 45-70

There are a number of cement plants and food processing factories lining the highway from Sendai to Shiokama. An industrial estate covering some six hectares of land, with factories ranging from food processing to machine making, has already been established in Tachiya Valley, Yamagata prefecture. At present an even bigger industrial estate, said to be the largest in Tohoku, is being planned for Tendo town, Yamagata prefecture (writer's observations).

Tohoku varied from 21.6% to 30.6% (Table 6). Therefore, farm labour force is high in Tohoku, higher than the national figure.

Similarly Tohoku has a high percentage of cultivated land in Japan as revealed by Table 7.

All over Japan rice (paddy) occupies more than half the cultivated land (57.8% in 1965). This is specially true in Tohoku, ranging from 52.2% in Iwate to 80% in Akita (1965).

Table 6 Percentage of labour force in agriculture, Tohoku 1965

	Total labour force (a)	No. in agriculture (b)	% b/a
Aomori	969,532	271,577	22.44
Iwate	981,597	300,509	30.61
Miyagi	1,249,496	270,019	21.61
Akita	906,678	273,013	30.11
Yamagata	914,531	268,085	29.31
Fukushima	1,374,795	389,070	28.63
Japan	48,268,767	10,866,693	22.51

Source: Japan Statistical Yearbook (1968) p. 65

Table 7 Percentage of cultivated land in Japan by regions 1965

Hokkaido	15.84	Chugoku	7.50
Tohoku	17.10	Kanto-Tosan	19.93
Hokuriku	7.85	Shikoku	4.15
Tokai	7.75	Kyushu	13.80
Kinki	6.08		
			100.00

Table 8 Rice Yield (kg/10 ares) for prefectures with high than national average 1968

Yamagata	569	Fukushima	485
Akita	543	Hokkaido	474
Nagano	535	Miyagi	474
Aomori	520	Iwate	471
Niigata	518	Shiga	469
Ishikawa	512	Fukuoka	460
Toyama	503	Kumamoto	457
Saga	498		
Fukui	495	Japan	449

Source: Japan Statistical Yearbook (1969) p. 118

In 1967 Tohoku had 20.05% of the total acreage (3,149,000 hectares) planted in rice in Japan and 22.94% of its rice production. Corresponding figures for 1968 were 20.45% and 23.2% respectively. In terms of rice yield its position is undisputable (Table 8).

Table 9 Farm economy: Gross and net income in 1000 yens per household

	Gross		Net	
	1967	1968	1967	1968
All Japan	1029.7	1125.7	304.5	319.8
Hokkaido	1301.2	1420.9	483.9	443.3
Tohoku	1014.6	1088.3	260.8	264.2
Hokuriku	1116.7	1250.0	297.6	353.0
N. Kanto	1047.4	1137.1	318.2	340.1
S. Kanto	1107.1	1230.3	331.5	501.6
Tosan	1001.9	1077.4	294.3	314.5
Tokai	1119.5	1243.3	379.4	391.4
Kinki	1148.0	1298.7	340.2	332.0
Sanin	888.3	973.2	218.4	225.1
Sanyo	1049.3	1091.5	308.0	268.8
Shikoku	949.2	1035.0	303.7	292.3
N. Kyushu	930.1	1002.7	280.8	279.8
S. Kyushu	110.7	723.5	142.6	197.7

Source: Japan Statistical Yearbooks (1968) p. 127 (1969) p. 129

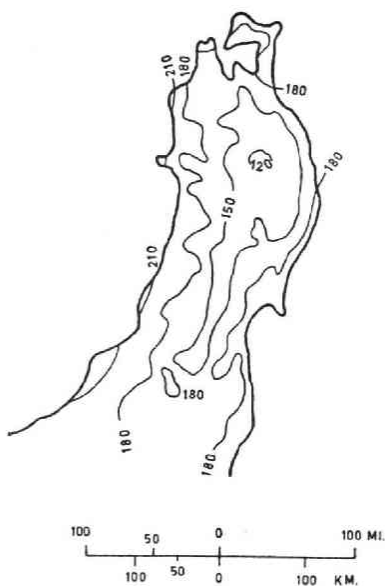


Fig. 4 Frostless period (days) in Tohoku

Source: Atlas of Japan, Physical, Economic and Social, Tokyo (1970) p. 17

This dominance of rice is closely related to the rice policy of the Japanese Government, which buys all rice at high prices from the farmers and resells it at moderate prices to the consumers. This security offered by the government to the rice farmers led to the record production of 14,453,000 tons in 1967 in Japan and helps to perpetuate the dominance of rice in Japan, particularly in Tohoku.

In Tohoku, where winter conditions are harsher than other parts of Japan except Hokkaido, winter cropping is almost out of the question. The frostless period ranges from 120 days to 210 days (Fig. 4). With rice now enjoying the economic privilege denied to other crops, rice farmers in Tohoku, and for that matter in all Japan, really have no desire to replace it by other crops. In fact it is difficult to find any other crops that would fit into this one-cropping requirement stipulated by nature, and earn as much.

Admittedly, dairy farming, grapes and other fruits such as apples, and pears have become important gradually. But their increase has been at the expense of mulberry trees and other forms of land use, not paddy fields.

Therefore, unless the Japanese government modifies or repudiates the present rice policy, rice will continue to dominate the agriculture landscapes in Japan especially in Tohoku. As the policy is under critical review, it is to be expected that in not too distant future, the agricultural land use pattern in Tohoku will have to change. The extent of this change is, however, determined by government policy, and not by climatic or technical factors.

In recent years agriculture in Tohoku has experienced rapid progress in the form of land consolidation, greater mechanization, elimination of extreme rich and poor farmers, higher crop yields and better gross income (Hasegawa, N. 1962). Yet underneath this facade of advancement Tohoku is still relatively a depressed area. This phenomenon was observed by Prof. Noh some ten years ago (Noh, T. 1962). Today, the situation has but little improved. As shown in Table 9, the gross and net income for Tohoku is still below the national figure and ranked 8th and 11th respectively among 13 major regions of Japan.

Conclusion

As Japan becomes more and more industrialised, the significance of agriculture inevitably declines. It accounted for only 8% of the national economy in 1967 and engaged 20.5% of the total labour force in 1968 (Noh, T. 1962).

The Tohoku case is interesting in three aspects:

- (a) agriculture still plays an important role in the regional economy though climatic conditions are hardly favourable;
- (b) rice cultivation dominates the rural landscape and its perpetuation is due to the present rice policy of the Japanese Government;
- (c) despite progress made in recent years both in terms of gross and net farm income, Tohoku still remains comparatively depressed economically.

It seems by agriculture alone Tohoku is unable to lift itself out of this depression. Its hopes and future, therefore, depend on industrialization and urbanization of the region. However, in this process new industries should be established within the region to accelerate changes already taken place in agriculture and not by attracting labour to existing plants in the big cities.

Acknowledgements

No word can express my feelings of gratitude to the entire staff, academic

and administrative, of the Institute of Geography, Tohoku University for their kind assistance and the facilities made available to me. I am specially grateful to Professors Toshio Noh, Kasuke Nishimura, Norio Hasegawa and Hiroshi Shitara for their valuable advice. Moreover, their friendliness made me feel very much at home despite a bitter winter.

References (*in Japanese)

- Dempster, P.** (1969): Japan Advances Methuen and Co. Ltd. 332ps.
- Hasegawa, N.** (1960): Apple Culture on the Midare Fan in Yamagata Basin, Yamagata Prefecture Sci. Rep. Tohoku Univ. 7th Ser. **9** 41-50
- (1962): Changing Features of Agriculture in Tohoku Sci. Rep. Tohoku Univ. 7th Ser. **11** 13-30
- (1970): Fruit Cultivation in Midare Fan* Yamagata Geographical Society Publication 129-145
- Kasai, Y.** (1969): The Fruit Raising Area in The Tachiya Fan* Tohoku Chiri **21** 30-37
- Miyakawa, Y.** (1969): Location Behaviours of Electronic Appliance Industry and Clothing-knitting Industry in Tohoku Sci. Rep. Tohoku Univ. 7th Ser. **19** 45-70
- Noh, T.** (1962): Agriculture Problems in Tohoku Papers of the Michigan Academy of Science, Arts and Letters **6** 91, 199 **57** (1961) Meeting 517-520
- (1967): Changing Aspects of Land Use in the Southern Part of Tohoku Festschrift Leopold G. Scheidl zum 60. Geburtstag II, Teil, Wien 133-136
- Shirai, Y.** (1964): Some Phases of Farmland Consolidation in Japan* Geog. Rev. Jap. **37** 425-449
- Atlas of Japan: Physical, Economic and Social** (1970) International Society for Educational Information, Tokyo
- Nippon, A Charted Survey of Japan*** (1970) Edited by the Tsuneta Yano Soceity 560 ps.
- Statistical Yearbook of the Japanese Empire*** (1938) Edited by the Bureau of Statistics **57**
- Statistical Tables of the Ministry of Agriculture and Forestry*** (1968-69) **45**
- Japan Statistical Yearbooks** (1965, 1968, 1969)