Changing Agriculture in Japan and Relevant Problems based on Long-term Transition Analysis

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Even though Japan has become very wealthy and people can obtain many kinds and a large amount of foods by various improvements in technique and manpower, it is not easy to expect the same situation in the future because of the time of bewildering the change in agricultural structure. Examining the agricultural structure in Japan including the production circumstances of food in the world seems to have a bigger meaning now. Therefore, this study focused on the position of agriculture in economy by some indicators such as farm labor and cultivated land, etc. adopting long-term transition analysis. Finally, the problem is concluded referring to results of the agricultural activities according to a long-term transition.

Key words: Agriculture, Long-term transition analysis, Japan, Farm labor, Cultivated land

1 INTRODUCTION

Japanese agriculture, which has seen the limited growth and stagnant income in recent years, has undergone a long process of transformation from traditional methods to a modern agricultural sector with many challenges and policy reforms. High-quality and specialized products for domestic and foreign markets is a key comparative advantage. For rice, a major staple product of Japanese agriculture, these challenges are particularly acute. Small average farm sizes and small and fragmented plots of land are farmed by a work force that is older than average and aging more rapidly than the general population (OECD, 2009). Major investments in agricultural research and extension systems resulted in agricultural growth from 1945 to 1980. The agriculture played a crucial role in the industrial development of Japan in terms of providing food, savings, and labor (Grabowski, 1993). However, agricultural support policies in Japan have reduced national income by encouraging inefficient usage of resources. They have also transferred resources from consumers and taxpayers to agricultural producers and from the non-farm to the farm sector. Also, food security is of legitimate concern to the Japanese populace and policy makers. High prices of domestic commodities created by support to agriculture have resulted in the relocation of some food-processing facilities outside Japan, causing food security to decline (Roningen and Dixit, 1991). In addition, Vitanov et al. (2007) discussed a critical issue for the sustainable development of the society in Japan due to the large network of economic, ecological and social components. They also mentioned that a sudden decrease of the agriculture production can lead to social tensions and the governments try to regulate the market for agriculture goods especially after large crises; the requirement for steady increase of the food quality and quantity presses entire branches of the agriculture system to move from the natural (due to the climate) regimes of cyclic output to more uncontrollable regimes of chaotic output.

This research attempts to examine the agricultural developments in Japan from long-term aspects as much as possible. The authors confirm at what position agriculture is in the whole society and economy first. In the second, some indicators which explain the features of agriculture are analyzed. When speculating about the essence of things or materials, it is fundamental to understand the characteristics of developments in a long-term change.
There were some researchers who thought like this so far when analyzing the characteristics of agriculture. For instance, Motoki (2006) explained the food environment in Japan using a lot of maps according to prefectural divisions by such an aspect. Teruoka (2003) discussed the transition of the farm problem with Japan for 150 years from the end of Edo era and Meiji Restoration while relating it to progressing of capitalism concisely and systematically. Moreover, Grigg (1982, 1985) also had historically thought about the agriculture in the world in his books.

The number of farm households in Japan has decreased, and the area of abandoned cultivated land has extended. Therefore, the cultivated acreage has decreased, too. Most of foods depend on the import from foreign countries, and this tendency is almost established. Although there have been many opinions that worry about the low degree of the rate of food self-sufficiency in Japan beforehand, on the contrary to this, the ratio has been decreasing gradually for about 40 years. In general, Japan is a rich country because a lot of foreign currency reserves and savings are in Japan that is called an economically advanced country.

Certainly, Japan has been developed economically and rapidly over the majority of the 20th century, the economic base of agriculture, forestry, and fisheries has showed a weakness. The management scale of agriculture and forestry was originally petty in a capital scale, and subsistence character was strong. Hence, an industrial character of primary industries might be essentially low. However, a managerial effort might have been few so far compared with secondary and tertiary industries. Although the management of farmland and forest has comparatively used the vast terrain, it becomes difficult now. In the following parts of the study relevant difficulties and problems will be concretely analyzed in detail.

2 POSITION OF AGRICULTURE IN THE ECONOMY

2.1 GDP by industry

Fig. 1 presents the temporal change between 1955 and 1998 of gross domestic product in Japan classified by economic activities (major industry groups) at constant prices (according to the market prices in 1990). The total of GDP increased from 53,142 billion yen in 1955 almost thoroughly, and increased to 503,255 in 1998. The total of GDP increased 9.5 times during about 40 years. Although the total of GDP increased remarkably due to the increase mainly in manufacturing, wholesale and retail trade, and service activities, the change of GDP in primary industries is only a little. GDP in agriculture, forestry, and fisheries is 8,863.9 in 1955 and 9,266.7 in 1998 with fluctuations in several times.

Fig. 2 depicts the temporal variation of these ratios. The ratio of agriculture, forestry, and fisheries decreases greatly from 1955 to 1970, and keeps decreasing gradually afterwards. The ratio decreased to 1.8% in

![Fig. 1 The temporal change of gross domestic product in Japan by economic activities](image-url)
Fig. 2 The temporal change of the rate of gross domestic product in Japan by economic activities

Fig. 3 The temporal variation of the gross income of farm household in Japan

1998 though it was 16.7% in 1955. A fundamental or drastic shift of the agricultural policy might be necessary and expected in the near future though it is difficult to increase GDP by primary industries.

2.2 An economy of farm households

Fig. 3 shows the temporal variation of the gross income of farm household in Japan. In the gross income of farm household, non-agricultural incomes have been more than the income generated in agriculture. Although the gross income of farm household was 761 (in thousand yen) in 1965, it increased afterwards and became 4,515 in 1980. The most of the increase is due to the one of a non-agricultural income.

Although the gross income of farm household increased till the middle of the 1990's, it turned to decrease. On the other hand, agricultural income hardly increases. Agricultural income should become one of the main portions in the gross income of farm household for the long term.

2.3 Employed persons 15 years old and over by major occupation groups

There is a method of a detailed distinction in about ten kinds to classify the occupations. However, even if this method is adopted, there is a little complexity incontrovertibly. Therefore, to make the whole image easy to understand, the study attempted to classify the occupation into four groups as follows; 1) agriculture, forestry and fishery, 2) production and transport, 3) sales and service, and 4) clerical, technical and managerial occupations.

Fig. 4 shows the transition of the number of population engaged by four occupation groups in Japan.
The total of the number of workers engaged increased between 1950 and 1995. It is 35,995,501 in 1950, 52,955,010 in 1975, and 62,241,335 in 2000, respectively. It is clear that while the number of workers in the sector of agriculture, forestry and fisheries keeps decreasing, the number of persons engaged for other occupations increases. The employed persons in agriculture, forestry and fishery occupations were 17,292,280 in 1950; however, the number of persons decreased to 3,149,337 in 2000. The number of employed people in this sector showed a surprising sharp decrease for about half a century. In a word, the numerical value in 2000 decreased to 18% of the one in 1950.

In contrast, the number of population engaged for the section other than primary industries have increased remarkably in the same period of time.

2.4 The ratio of employees by average weekly hours of work in 2005

Fig. 6 shows the ratio of employees by average weekly hours of work and principal industry in 2005. In most industries in Japan, worker's ratio of 35-48 hours occupies more than the half. The distribution of the working hour of the agriculture and forestry industries seems to be similar that of eating and drinking places like the restaurant, and accommodations. In these types of business, there are a lot of ratios of the working hour of 29 hours or less. It is thought that this is connected with there are a lot of ratios of a sideline, irregular employment, and the part-time job.
2.5 Employment of new school graduates

Fig. 7 shows the transition of employment of new school graduates (1951-2002). The employment of new school graduates has increased while repeating the increase and decrease from the 1950's to the 1960's. However, it started to decrease and showed a stagnation tendency since the high economic growth period. After the 1990's, it has continued to decrease further. It was 1.06 million people in 1951, 1.6 million people in 1966, and 630 thousand people in 2005. The ratio of the junior high school graduates occupied half or any more till the early the 1960's. The number of junior high school graduates of those who were employed showed about 8.6 million of the highest values in 1957. The ratio that the junior high school graduate occupied to new those who were employed was about 62% in the same year. After middle of the 1960's, the ratio of the senior high school graduates occupied half or any more until beginning about the 1990's. The number of the senior high school graduates of those who were employed was about 9.4 million people in 1968, and the ratio was about 61% in the same year. The number of technical college, the junior college, and university graduates of those who were employed surpassed that of the senior high school graduates in 1993 for the first time. The number of university graduates of those who were employed indicated the highest value by about 3.5 million people in 1997.

2.6 Employed persons by employment status

Next, the number of workers by three industry groups is examined according to the position in employing. Fig. 8 shows the number of persons engaged for agriculture and forestry and fisheries in Japan by employment status. The number of persons has decreased very remarkably. Originally, this industry has been supported by a lot of family workers. Although family workers were 9.14 million people in 1953, it decreased till only 980 thousand people in 2005. Moreover, although the ratio of family workers was 61% in 1953, it decreased to 37.8% in 2005. Self-employed person was 4.91 million in 1953; however, it decreased to 1.25 million in 2005.

Fig. 9 shows the number of persons engaged for secondary industries in Japan by employment status. In fact, although Fig. 9 is not so important for this study as well as Fig. 10, we presented these to compare it with Fig. 8. The number of workers of secondary industries increased gradually in the latter half of the 20th century. However, the number of workers has decreased in the 21st century. Both self-employed and family workers are consistently very few. Although the
Fig. 8 The transition of population engaged for primary industries in Japan by employment status

Fig. 9 The transition of population engaged for secondary industries in Japan by employment status

ratio of employees in secondary industries was 76% in 1953, it rose to 89% in 2005.

Fig. 10 shows the number of persons engaged for tertiary industries in Japan by employment status. The number of workers has increased steadily through the period of about 50 years. Both self-employed and family workers are very few as well as in secondary industries. Although the ratio of employees in tertiary industries was 59% in 1953, it rose to 88% in 2005.

Fig. 11 shows the temporal change of agricultural income and manufacturing wages. Although agricultural income of farmer per person for one day was 539 yen in 1960, it jumped to 5,588 yen in 2005. The income generated in agriculture in 2005 became 10.4 times higher in 1960. Manufacturing wages per person for one day as to the office of five regular employees or more was 847 yen in 1960, it grew to 19.14 thousand yen in 2005. Manufacturing wages in 2005 became about 23 times in 1960. The income generated in agriculture was considerably less than manufacturing wages. Although it was only 64% in 1960, it came to decrease to 43% in 1980, and to decrease further to 29% in 2005.

3 SOME FEATURES IN AGRICULTURE IN JAPAN

3.1 The number of farm household members

Fig. 12 shows the transition of the number of population of farm household members in Japan from...
Fig. 10  The transition of population engaged for tertiary industries in Japan by employment status

Fig. 11  The transition of agricultural income and manufacturing wages in Japan

Fig. 12  The transition of the number of farm household members in Japan
1965 to 2003. The average number of household members has decreased from 5.32 people in 1965 to 4.4 in 1980. It also continued to decrease afterwards resulting in 3.76 in 2003. This situation roughly corresponds to an increase in the ratio of the households composed of parents and the children regardless of the distinction between city and rural village. It can be thought that an increase of the single-person household is closely related to this finding, too.

3.2 The employment of new school graduates in primary industries

Fig. 13 shows the employment of new school graduates in agriculture, forestry, and fisheries (1951-2002). The number of new employed in agriculture was 460 thousand people in 1951. However, they decreased afterwards and were 280 thousand people in 1955, 140 thousand in 1960, and were 70 thousand in 1965. It became less than 50 thousand people by keeping decreasing in 1970; similarly resulting in less than 10 thousand people in 1985 and less than 5,000 in 1991.

3.3 Population engaged in farming by age group

Fig. 14 shows the transition of population engaged in farming in Japan by age group (1980-2004). The farm labor force has depended on 65-year-old or more, the elderly people for a long time (without the distinction of man/woman). The number of farm workers has decreased surely as several current figures have shown so far.

The number of male, 30-49 years old was 625 thousand people in 1980; it decreased to 344 thousand in 1990. Also, the number of female, 30-49 years old counted 1 million and 393 thousand people in 1980 and it decreased to 777 thousand in 1990. Then, the number of male, 30-49 years old in only commercial farm household was 338 thousand people in 1990; it decreased to 164 thousand in 2004. Also, the number of...
female, 30-49 years old counted 684 thousand peoples in 1990 and it decreased to 284 thousand in 2004.

Then, the number of people of elderly people is examined and observable that the number of male, 65 and over was 836 thousand people in 1980, it increased to 962 thousand in 1990. Also, the number of female, 65 and over counted 874 thousand people in 1980 and it increased to 1,059 thousand in 1990. Then, the number of male, 65 and over in only commercial farm household was 776 thousand people in 1990, it increased to 989 thousand in 2004. Also, the number of female, 65 years and over counted 821 thousand people in 1990 and it increased to 1,075 thousand in 2004.

Figs. 15 and 16 were prepared to make these changes easy to understand. Namely, Fig. 15 shows the temporal change of male population engaged in farming by age group and Fig. 16 similarly shows female population. In each figure, the number of workers, 65 or more has increased. On the other hand, the number of less than 65 years old workers has been decreasing gradually.

In addition, we converted these data into the ratio, and illustrated in Fig. 17. Fig. 17 depicts a diachronic increase of the rate of 65 years old or more senior citizens in both male and female visually and plainly. On the other hand, the decrease in the ratio of young men is especially remarkable.

3.4 Area of cultivated land
Area of cultivated land is normally composed of paddy fields, fields and land under perennial crops. Fig. 18 shows the transition of cultivated acreage in Japan for about one century. There is no big difference by time. However, a decrease before and behind World War II stands out though in the cultivated acreage. Moreover, the cultivated acreage keeps decreasing gradually during the latter half of the 20th century. This tendency is not desirable and worried the society in Japan. In most annuals, the area of paddy field is larger than the area of field. The cultivated acreage is 4,830 thousand hectares in 2000, and the paddy field accounts for 55% of it.

Fig. 19 presents the area by type of cultivated land in the latter half of the 20th century at intervals of five years. The area of cultivated land is a total of the arable land that the farm households manage and the one which belongs to agricultural establishments except farm households. In the case, the fields and the orchards are drawn by another item. The area of the field is a total of ordinary fields and extensive use for meadows. The land under perennial or permanent crops is composed of orchards, tea fields, and mulberry fields.

Although the cultivated acreage was 5.09 million hectares in 1950, it increased to 5.28 million hectares in 1970. Afterwards, it became 3.97 million hectares in
2000 by keeping decreasing. The rate of land under permanent crops was 5.6% in 1950, 9.4% in 1980, and 6.7% in 2000; it was less than 10% in each annual. The area of the paddy field increases until 1970, and the one of fields has increased until 1960. A decrease in the area of the paddy field and the field after 1985 is considerably remarkable compared with earlier periods. Both of the area of the paddy field and the one of the fields has decreased to about 3/4 between 1950 and 2000. Perhaps, it is not preferable for Japan that this changing trend continues in the future.

### 3.5 Agricultural income produced

Although the amount of an agricultural income increased until about middle of the 1980’s, it stagnated until beginning of the 1990’s afterwards. After the 1990s, the amount of an agricultural income has decreased (Fig. 20). The ratio of rice is always the maximum; however, the ratio has been decreasing gradually. The rate of rice was 53.8% in 1955, 39.2% in 1970, 34.5% in 1984, and 27% in 2003, respectively. Agricultural income of rice was 8,634 (in hundred million yen) in 1955, 17,662 in 1970, 39,300 in 1984,
Fig. 18  The transition of cultivated acreage in Japan

Fig. 19  The transition of 3 kinds of cultivated acreage in Japan

Fig. 20  The transition of agricultural income produced in Japan

The rate of vegetables was 7.4% in 1955, 16.4% in 1970, 17.3% in 1984, and 24.2% in 2003, respectively. Agricultural income of vegetables was 1,191 (in hundred million yen) in 1955, 7,400 in 1970, 19,718 in 1984, and 21,035 in 2003.

When beef cattle, milk cows, raw milk, pigs, hens, and chicken's eggs are totaled, the ratio of livestock is also considerably large. The rate of livestock was 10.9% in 1955, 23.3% in 1970, 27.3% in 1984, and 25.7% in 2003, respectively. Agricultural income of livestock was 1,749 (in hundred million yen) in 1955, 10,488 in 1970, 31,107 in 1984, and 22,308 in 2003.

4 CONCLUDING REMARKS

The income by agriculture is very little in industry in Japan, and, in many cases, agriculture has continued as an occupation. However, the agricultural policy in the latter half of the 20th century should have aimed to promote farmer's viable unit. No one is sure that the target has been achieved enough though the result is not analyzed in detail here. Nevertheless, the competitive edge of Japanese agriculture to foreign agriculture has not grown. Especially, the agricultural production expenditure and the distribution cost in Japan are high as usual. As a result, cheap, a large amount of farm products came to be imported. Although the width of the merchandise choice expanded for the consumer, the agriculture and livestock products to lack safety were imported sometimes because self-sufficiency in food has continued to decrease consistently, too. There are a lot of criticisms to this. There are obviously a lot of problems in this situation in a long-term aspect.

In GDP by industry, the ratio of agriculture is a little, and the ratio has decreased more and more during the years. In an economy of farm households, most of farmer's living is supported by the incomes other than the income generated in agriculture. Moreover, employed persons 15 years old and over in agriculture, forestry and fishery in Japan was 17,292,280 in 1950, however, these decreased to 3,149,337 in 2000. In a word, the numerical value in 2000 decreased to 18% of the one in 1950. Although the ratio of the number of employed workers in agriculture, etc. was 48% in 1950, it decreased to 13.8% in 1975 and 5.1% in 2000. In addition, the number of persons engaged in agriculture and forestry and fisheries in Japan has decreased very remarkably. Originally, this industry has been supported by a lot of family workers who were 9.14 million people in 1953, and decreased to only 980 thousand people in 2005. Although the ratio of family workers was 61% in 1953, it decreased to 37.8% in 2005. The income in agricultures was considerably less than manufacturing wages. Although it was only 64% in 1960, it came to decrease to 43% in 1980, and to decrease further to 29% in 2005.

A substantial change is not seen in the number of farm household members. It has decreased gradually for the long term. New employed in agriculture were also 460 thousand people in 1951. However, they continued to decrease afterwards and have been less than 5,000 in 1991. Many of farm labor force have depended on 65-year-old or more, the elderly people for a long time.

The cultivated acreage keeps decreasing gradually during the latter half of the 20th century by worrying the society in Japan. In agricultural income, the rate of rice has maintained the large percentage as usual since the past. The ratio of the vegetable and livestock increases since an economic high growth period, and the stable fraction is occupied.

As mentioned above, the agricultural activities in Japan have decreased generally according to a long-term transition of some indicators. In agriculture, the barrier of the national boundary decreases, and it has become indefinite. It is exactly time of the change now. Moreover, it is worldwide in the situation of the recession and the transition stage. As for the whole policy, the industry policy to consider the international rivalry is fundamentally needed. Hence, it is necessary to attempt the conversion of the industrial structure by not a short-term but a long-term aspect. It should be also thought that the era when only the city prospered based on the capitalism is ending. The cities and the rural areas should originally live together. Therefore, it might be preferable to reexamine agriculture with many sides from such a viewpoint.

For the time being, it is important to promote the activities that employs the unemployed in the city and in the rural areas. It is also hoped to use the vacant houses in the de-populated and rural areas. The administration should establish the proper and reasonable system in which the administration borrows the abandoned cultivated lands and lent them to another persons or bodies.

For this, it is necessary to take an openhearted attitude so that the residents who reside in the rural areas may friendly accept the person somewhere else. It will be also needed to devise the farm policy so that a
lot of foreigners and young person may work at the farm village. In this respect, the system that each agricultural commune jointly manages the arable land of a constant area might be promising. Moreover, the green space should be extended in the cities and the food production function should be improved in many regions.

Finally, the temporal variation of some agricultural indicators has chiefly pointed out some long-term transition problems in Japan. As a further point of examining agricultural developments, it is necessary to add the regional variation to future researches including the yearly change of the staple crop.

Notes
1) Until 1972, excluding Okinawa prefecture.
2) The left half of Fig. 14 until 1990 reflects the whole of agriculture including the subsistence. On the other hand, the right side of Fig. 14 after 1990 relates only to the commercial farm households, and doesn't include the subsistence farm households. Therefore, we cannot compare the half at the left side of Fig. 14 and the half at the right of Fig. 14 immediately. Please, note that there are two pillars where the age distribution in 1990 is shown.

3) Other crop cultivation, other livestock, and agricultural product processing are not included.

REFERENCES