

# Current Position and Future Direction of Agriculture in Northeast Asia : Lessons from Japanese Experience

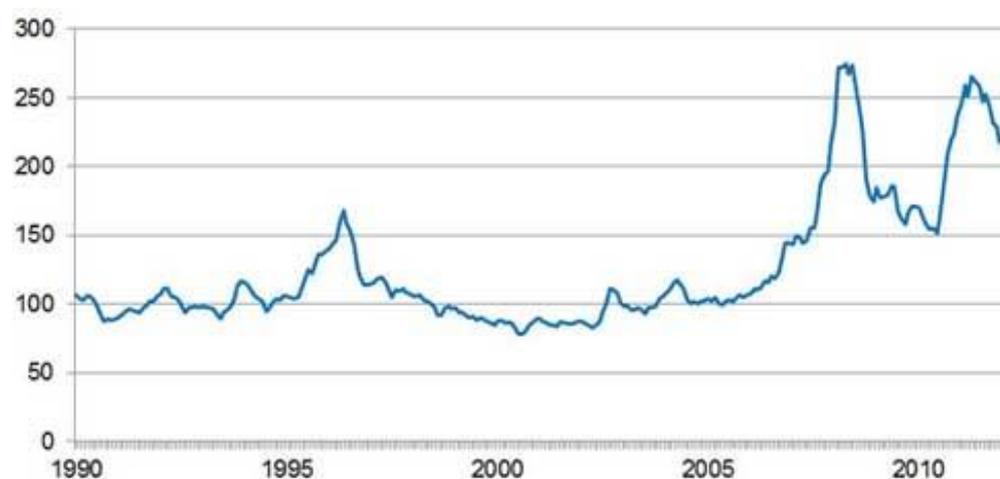
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*The following is a lecture paper presented and delivered by Dr. Shin-ichi Shogenji, a Professor at the Graduate School of Bioagricultural Sciences, School of Agricultural Sciences, Nagoya University in Japan. Professor Shogenji delivered this lecture recently at the "Taiwan-Korea-Japan International Conference on Agricultural and Resources Economics," Department of Economics, National Taiwan University. The said international conference was organized by the Rural Economics Society of Taiwan, Korea Agricultural Economic Association and the Taiwan International Industry and Welfare Association*

## Introduction

After the record-breaking price rise of cereals in 2007 and 2008 (Fig.1), it is widely believed that the world food market has entered into a new stage in the following two aspects. First, the market has become much more volatile than before. We also remember another acute price rise in 2010 and 2011. Second, the level of equilibrium price of basic foods has shifted upward, reflecting on-going changes in fundamental factors such as increasing food demand due to the economic growth in developing countries. Even after the end of the rising phase, the price of cereals didn't return to its previous low level.

Fig. 1 Change of the grain price index in the world



Source: Ministry of Agriculture, Forestry and Fisheries "food, agriculture, a farm village white paper reference statistical table" (2011 and 2012 versions). Original source is from FAO Food Price Index.  
Note: The index of each month assuming an average price from 2002 through 2004 as 100.

The changing world food market makes people across the world recognize the importance of food security. Needless to say, the price rise severely damaged poor households in

developing countries (Table1). This is the main reason why as many as 30 countries triggered their regulation on food exports including embargo as its extreme case. It is quite natural that the government tried to protect its own nation. However it is also recognized that the regulation on food exports accelerated price rise, especially in the case of rice.

Table 1. Distribution of the world malnutrition population

	2007-2009
World in total	8.67
Developed country	0.15
Developing country	8.52
North Africa	0.04
Sub-Saharan Africa	2.16
West Asia	0.18
South Asia	3.11
Caucasus • Central Asia	0.07
East Asia	1.69
South-Eastern Asia	0.76
Latin America	0.43
Caribbean Islands	0.07
Oceania	0.01

Source: FAO, The State of Food Insecurity in the World 2012

Food security issue is important for people in food importing countries as well. In this regard we have to be cautious about the fact that regulations adopted by food exporting countries might damage food security in food importing countries. The changing world food market seriously poses food security problem to the government in food importing countries. And in this sense it has become quite important for Northeast Asian region to understand its current position of food trade in the international context. Also it is important to design future direction of food supplying industry in a realistic manner.

In terms of position of food and agriculture, Northeast Asian countries, which comprise of Japan, Korea and Taiwan in this paper, share a couple of common characteristics. The first one is their position in food trade. Northeast Asian countries are now net importers of huge amount of food stuff, which is a consequence of continuous economic growth. It should be noted that developed countries in West Europe and those with European origin such as US and Australia are mostly net exporters of basic food, while developing countries by and large

stay in a position of net importer. In this sense the food trade position of Northeast Asian countries, that is, the position as already developed country with net food imports, is unique in the history of mankind.

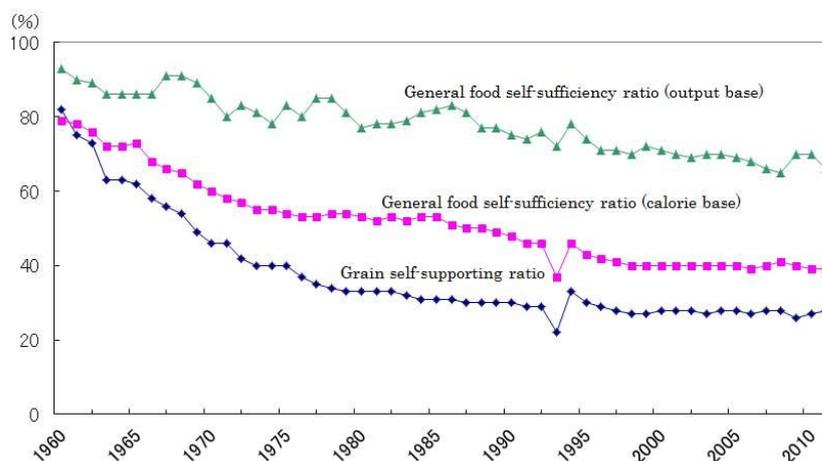
The second common denominator among Northeast Asian countries are agricultural in structure. Tiny farm size has long been major characteristic of farming in this region. And with rapid increase in per capita income, it became inevitable for farm business to expand its size in order to get comparable income. This proposition will sooner or later become applicable to other monsoon Asian countries which also share a similar structure of tiny size of farming, which in turn reflects historically high level of carrying capacity of paddy farming.

This paper focuses on issues of food, agriculture and rural resources in Japan which has been a front runner at least until recently in the post-war economic development. It will try to clearly show the characteristics of Japanese experience so far and then try to draw a few lessons for the future of Northeast Asian region. The lessons might include negative ones which should not be followed after.

### Declined food self-sufficiency with increased food consumption

Let us make a quick review of food and agriculture in Japan for the past half century. First, Fig. 2 shows the rates of food self-sufficiency since 1960. Among three series, the middle one, which is calorie base rate, is widely known in Japan. The rate had continuously declined and then became constant at around 40% for the past two decades or so. This might give an impression that, first, Japanese agriculture gradually shrank for four decades and, second, afterwards, it has been keeping a certain level of production. Yet both are not correct.

Fig. 2. Change of the food self-sufficiency ratio



Source : Ministry of Agriculture, Forestry and Fisheries "Food supply and demand list"

As the indices in Table 2 shows, the aggregated agricultural production in Japan kept increasing until mid 1980s although products such as rice and potato decreased significantly. It was rather rapid change in people's dietary pattern that causes the decline in the rates of food self-sufficiency. Table 3 shows how drastically the Japanese food consumption changed. In particular increase in livestock products is remarkable. These products were largely supplied by domestic production, but livestock production required huge amount of imported

feed stuff such as corn. Also increased consumption of oil was supported by imported soybean.

Table 2. Change of the agricultural production index

	Total	Rice	Wheat variety	Beams	Potatos	Vegetable	Fruits	Livestick products
1960-64	100	100	100	100	100	100	100	100
1965-69	117	107	107	78	73	82	123	151
1970-74	120	94	94	27	64	60	135	205
1975-79	129	99	99	25	49	59	141	241
1980-84	129	84	84	44	49	63	145	280
1985-89	134	87	87	55	57	70	147	307
1990-94	128	81	81	38	40	63	137	313
1995-99	122	79	79	28	38	58	129	297
2000-04	115	70	70	40	46	53	121	286
2005 self-sufficiency rate	68	95	95	12	7	81	79	66

Source: Ministry of Agriculture, Forestry and Fisheries "Agricultural production index"

Note: The mean of the index in each period (1960-64 years = 100)

Table 3. The food consumption that changed a lot

Year	(Kg)									
	1955	1965	1975	1985	1990	1995	2000	2005	2010	$\frac{2005}{1955}$
Rice	110.7	111.7	88.0	74.6	70.0	67.8	64.6	61.4	59.5	0.55
Wheat	25.1	29.0	31.5	31.7	31.7	32.8	32.6	31.7	32.7	1.26
Potatos	43.6	21.3	16.0	18.6	20.6	20.7	21.1	19.7	18.6	0.45
Starch	4.6	8.3	7.5	14.1	15.9	15.6	17.4	17.5	16.7	3.80
Beans	9.4	9.5	9.4	9.0	9.2	8.8	9.0	9.3	8.4	0.99
Vegetable	82.3	108.2	109.4	110.8	108.4	105.8	102.4	96.3	88.1	1.17
Fruits	12.3	28.5	42.5	38.2	38.8	42.2	41.5	43.1	36.6	3.50
Meat	3.2	9.2	17.9	22.9	26.0	28.5	28.8	28.5	29.1	8.91
Chicken Egg	3.7	11.3	13.7	14.5	16.1	17.2	17.0	16.6	16.5	4.49
Milk· Dairy products	12.1	37.5	53.6	70.6	83.2	91.2	94.2	91.8	86.4	7.59
Seafood	26.3	28.1	34.9	35.3	37.5	39.3	37.2	34.6	29.4	1.32
Sugar	12.3	18.7	25.1	22.0	21.8	21.2	20.2	19.9	18.9	1.62
Oils and fats	2.7	6.3	10.9	14.0	14.2	14.6	15.1	14.6	13.5	5.41

Source: Ministry of Agriculture, Forestry and Fisheries "Food balance sheet"

Note: Supply pure food per one person per one year.

Economic growth since mid-1950s changed people's food consumption drastically both in quality and quantity. The dietary pattern in Japan was largely Westernized. However, data in Table 3 also shows that, for some items such as dairy products, eggs and oil, per capita consumption already hit the peak and began decreasing. Perhaps, to some extent, the aging demography now checks people's excessive intake. At the same time one can raise the following question. Does the recent change in dietary pattern in Japan suggest a possible peak level for people in Northeast Asian region, or more widely for people of mongoloid race?

Recently Japan has entered into the era of declining population. Therefore, with the declining per capita consumption, the denominator for calculation of self-sufficiency rate has been declining gradually. Therefore the almost constant level of self-sufficiency rate during the past two decades entails a declining tendency of domestic food production. This is confirmed through the data in Table 2. Constant rate of self-sufficiency does not mean stable situation of food production. Self-sufficiency rates must be interpreted carefully.

Facing declining agricultural production, the Japanese government decided to set target rates of self-sufficiency every five years in accordance with the Basic Law of Food, Agriculture and Rural Areas enacted in 1999. At present, target rates toward 2020 are set at 50% for calorie base and at 70% for market value base, respectively. The target rates are now under review towards the next Basic Plan of Food, Agriculture and Rural Areas which will be formulated by March 2015. At this stage, it is difficult to tell the direction of ongoing review. Yet, towards March 2015, along with resetting process of self-sufficiency rates, the so-called self-supplying capacity of domestic resource might become a point of argument.

There is no threshold level for the rate of food self-sufficiency under which the food security cannot be ensured. Also the following proposition is misleading. That is, the higher the rate, the more certainly the food security is ensured. For example, in 2009 the self-sufficiency rate of cereals in India and Bangladesh were 104% and 97%, respectively. In the same year the rate was 26% in Japan. But no one believes that the situation of food security in south Asia is far better than that in Japan. Simply the level of food self-sufficiency rate depends on people's dietary pattern.

Regarding food security, the more relevant indicator than self-sufficiency rate is absolute and potential supplying capacity of available resources to supply basic nutrition. The crucial question to be answered is whether this potential capacity, expressed in terms of per capita daily provision of calorie, will be sufficient or not for a nation to survive any type of food shortage. Importance of absolute supplying capacity of domestic resources has been gradually shared among policy makers and even among some politicians.

### **How to reconstruct sustainable paddy farming**

In Japanese agriculture there are subsectors, such as livestock farming and green house horticulture, which have been successful in farm size expansion and in getting income comparable to non-agricultural industries. In contrast a long-lasting problem remains in paddy farming. Japanese paddy farming could not overcome its farm size problem in spite of strong intention among policy makers. During the past half century the average size of rice growing farm doubled, while the average number of cow heads in dairy farm, grew up to more than 30 times. This is an example of successful intensive farming (Table 4).

Table 4. Change of agricultural scale

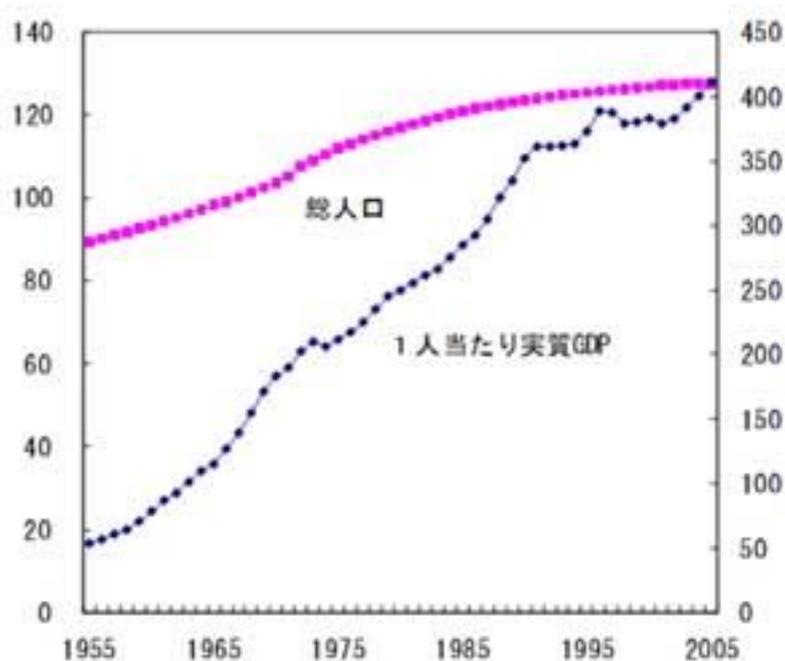
		1960	1970	1980	1990	2000	2010
Rice planted area(a)		55.3	62.2	60.2	71.8	84.2	105.1
Number of dairy cattle		2.0	5.9	18.1	32.5	52.5	67.8
Management cultivated area (ha)	Whole Japan except for Hokkaido	0.77	0.81	0.82	1.10	1.21	1.42
	Hokkaido	3.54	5.36	8.10	10.8	14.3	21.5

Source: Ministry of Agriculture, Forestry and Fisheries “Agricultural census”

Note: A management cultivated area and the rice planted area after 1990 show numerical values of the sale farmhouse where a management cultivated area is more than 30 ares or farm products sale amount of money is more than 500,000 yen).

Average size of rice farming has been too small to get comparable income. As Fig. 3 indicates, per capita real income in 2005 was 7.7 times larger than that in 1955, the memorial year when the so-called high economic growth era had started in Japan. The majority of paddy farm households got their income mainly from off-farm job opportunities. They chose to continue their lives in rural areas as part-time farmers. This farmers’ adjustment to economic growth was quite rational, taking into account widely spread job opportunities even in rural areas. Also modern equipment such as transplanting machines supported part-time farmers’ holiday operations.

Fig. 3. Real GDP per a person and total population



Note: The real GDP is a fixed price for 1990.

Source: Cabinet Office "National economic accounting-related statistics", Ministry of Internal Affairs and Communications "State of the nation findings" and "population prediction"

The part-time farming was not only rational but also stable until recently. However, this type of farming has been rapidly losing its sustainability mainly because of lack of successors. Along with aged farmers' retirement the amount of farmland has been increasing. This means that a good opportunity for farm size expansion is now provided. Whether this change of situation will work in favor of farm size expansion or not depends on a number of factors.

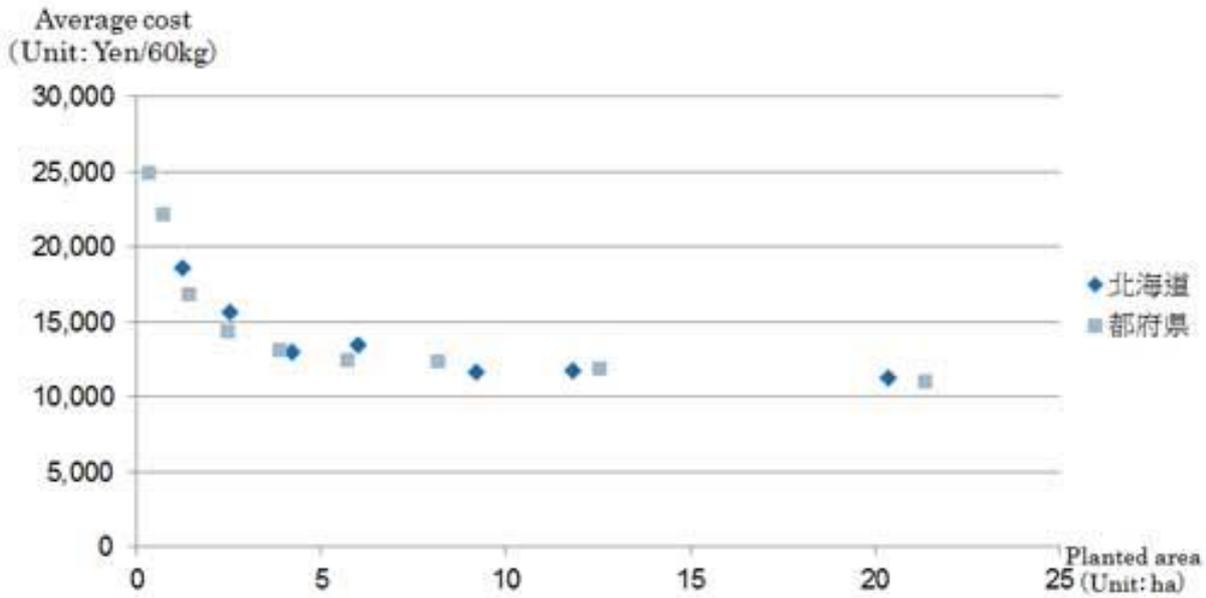
Among others the key factor must be consistent and stable policy which supports core farms such as full-time family farm, hamlet-based group farm and corporate type of farm. These core farms would expand their farm land size, if it is judged by them as profitable to do so. Regrettably actual process of agricultural policy in recent years was not consistent or stable enough. Rather, there has been a sort of swinging situation where policy set affecting farm income changes frequently. One might criticize that agricultural policy in Japan became most serious risk factor of farming.

The main reason for the swinging situation is political instability. Not only actual change in ruling party but also election campaign for getting power tends to create unstable situation of agricultural policy. At the same time, basic and overall system for policy making should be carefully examined. There is the Basic Law for agricultural policy making in Japan. Current law was enacted in 1999. Also the government draws up the Basic Plan every five years in order to materialize the ideas of Basic Law as concrete policy measures. However, inspite of this formal procedure, additional new policy measures are occasionally created in the form of administrative guidance and/or budget items. This system brings about frequent change in policy measures. There have been cases where newly introduced policy measures by, for example, new budget item is inconsistent with provision of existing law.

One can call this system as a loose system. When political situation is stable, there might not be serious inconsistency between existing lawful structure and policy set created through the so-called loose system. Rather flexibility and quickness given by this loose system might be appreciated and even enhance the efficiency of agricultural policy as a whole. Yet, it should be noted that loose system under politically unstable situation may create unpredictable swinging policy measures inconsistent with existing ones.

Let us think about another necessary condition for stable agricultural policy. That is consistent support by people as consumers and tax payers. It is well known among professionals that farm size expansion will reduce production cost significantly. Fig.4 shows relationship between size of planted area and average production cost. Policy resource mobilized for farm size expansion will surely lead to a lower cost which in turn will result in lower food price and/or decreased policy support expenditure. These policy effects would benefit people as consumers and/or people as tax payers. It is important to convey this sort of information to people outside farming community. For long-lasting and powerful agricultural policy nation-wide correct understanding about this relationship is essential.

Fig. 4. A scale and production cost of rice (2011)



Source: Ministry of Agriculture, Forestry and Fisheries "Production cost of rice and wheat".  
 Note: The production cost consists of capital interest and production cost including ground rental fee.

For viable paddy farming as an income source, farm size expansion is undoubtedly a basic condition. But in order to strengthen its sustainability through getting more value added and attracting young successors, vertical expansion of business size is also effective. The vertical expansion includes introduction of intensive farming items such as vegetables, high quality fruits and mushrooms. This can be interpreted as a more intensive utilization of expanded farm land.

Also farmers might extend their business activities, introducing some elements of food industries. Food industries here mean food manufacturing, food distribution and restaurant industry. Nowadays it is not rare for farmers to process their products and/or to use their products in farmers' restaurants. Also it is fairly common that farmers directly sell their farm products to their customers, mainly using information technology. In terms of industry categorization these farms, which sell products for themselves, engage in food distributing business.

Previously change in dietary pattern was discussed in terms of composition of food stuff category. It is now appropriate to point another aspect of change in dietary pattern. This is increased use of processed food and increased frequency of eating out. Currently less than 20% of consumers' expenditure on foods and drinks goes to unprocessed products such as vegetables, meats and rice. Over 50% was spent to purchase processed food and around 30% spent for eating out. Accordingly a large amount of value in food is now created in the food industries which function in the downstream of agriculture and fisheries as food stuff industry.

Growing presence of food industries can also be confirmed by changing composition of working population among industries shown in Table 5. Forty years ago, ten million people worked in agriculture and fisheries while five million worked in the food industries. Afterward employment in food industries grew significantly and nowadays eight million people work in food industries while three million in agriculture and fisheries. It is reasonable

strategy for farmers to extend their business wing to get much more value added in downstream industries.

Table 5. Population employed in agriculture, fisheries and food industry

		(Unit: 10 <sup>4</sup> persons, %)				
		1970	1980	1990	2000	2010
Real number	Agriculture· Fisheries	987	596	430	320	309
	Food production industry	509	643	723	804	792
	Food industry	106	115	138	143	119
	Food distribution industry	244	299	333	382	345
	Restaurant	159	229	253	280	328
	Total	1496	1239	1153	1124	1103
Percentage	Agriculture· Fisheries	66.0	48.1	37.3	28.5	28.0
	Food production industry	34.0	51.9	62.7	71.5	71.8
	Food industry	7.1	9.3	12.0	12.7	10.8
	Food distribution industry	16.3	24.1	28.9	34.0	31.3
	Restaurant	10.6	18.5	21.9	24.9	29.7
	Total	100.0	100.0	100.0	100.0	100.0
Total employee number		5259	5581	6168	6298	5961

Source: Data based on "Economics of the food system (the fifth edition)" written by Hiromi Tokiyama and Fumio Egaitasu: Medical and Dental medicine publication (2013). The original source is Ministry of Internal Affairs and Communications "National census".

Among food industries, processing business is densely located in local cities and rural areas. As well as agriculture, food processing business is not highly profitable on average. But it is fairly stable against the ups and downs of economic condition. Stable job opportunities will be one of the essential conditions for a matured society in which one cannot optimistically expect a high rate of economic growth experienced in the past.

In near future agriculture in connection with food industries, in particular, food processing industry in rural areas will be able to contribute as suppliers of stable job opportunities. If this situation spreads widely in rural Japan, one can say as follows.

In the long history of social and economic development since Meiji Restoration, rural communities have been contributing in a variety of ways. But among others contribution through providing massive workforce to secondary and tertiary industries was enormous indeed. However, now, the Japanese society stands at the turning point. Today rural communities in Japan is expected to contribute to the stability of society in the opposite way, that is, by providing stable job opportunities, although not quite massive perhaps, for people even from urban areas.

### Rural resources for future generations

Farming with expanded land size will require some change in rural system of resource management. Regarding modernized Asian agriculture, in particular, paddy farming, its basic nature might be depicted as a two-tier structure (Fig. 5). Namely, the upper tier is business one which constantly interacts with market economy and the lower tier is communal one with collective action for maintenance of local common resources. As farm business on upper tier

grows larger with modern machinery equipment, adaptive alteration becomes necessary for the system on the lower tier.

Fig. 5. Japanese agriculture has 2-layer structure



The function of lower tier normally takes a form of collective action by farmers. An example is collective action for maintenance of irrigation facilities such as canal and reservoir. It is quite common in paddy farming areas that farmers in a hamlet meet together one morning just before transplanting season in order to dredge canals and make repairs if necessary. Usually one male adult is called from each household. Collective actions in a hamlet, and sometimes in a wider village area, cover many aspects of rural life. For instance, farm road maintenance, shrine maintenance, fire brigade, and social events such as festivals and funerals are operated based on communal collective action.

Rural resources maintained by local people can be characterized as local commons under communal control. Different from the commons described in "The Tragedy of the Commons" by Garret Hardin, which broke down due to a rational and selfish behavior of members, local commons in rural Japan, and in monsoon Asian rural areas, have been kept for a long time up until present. The key to this continuity is communal rules of control which enable local commons to be transferred over generations.

However, composition of community members in rural areas has changed significantly. In the old days, shortly after the land reform which was completed in early 1950s, farm size and crops produced are similar among hamlet members. Hence, it was quite understandable for members to participate in communal activities. If the hamlet consists of 30 farm households, then, by participating in some collective action, each household makes 1/30 contribution to and gets 1/30 benefit from it. This relationship makes communal rules easily acceptable for members.

Today membership of hamlet is highly diversified especially in terms of involvement in farming. Usually majority of farm households get income from off-farm job. Also, there are ex-farmers who live in a hamlet as a land owner. In some cases land owner does not live in the area. Meanwhile a few household members run their expanded farm as full-time farmers. However, even among full-time farmers the main product for income earning might be different from each other.

In short, rural community has changed from traditional homogeneous one to highly heterogeneous one. Under this heterogeneous structure, it has been becoming difficult for rural community to force its members to participate in communal activities as an *a priori* duty. Among members with varying involvement in paddy farming the balance between contribution and benefit is no longer self-evident to the members.

However, it is necessary and even rational for rural communities in even today's Japan to organize collective action to maintain rural resources in good condition. Falling into inferior Nash equilibrium or prisoners' dilemma, the commons as described by Hardin, collapsed. But regarding actual commons in rural areas, win-win relationship can be achievable and should be obtained with coordinated equilibrium through cooperative communication among members.

It has been a historically given rules for controlled local commons. But in the future it will be an explicit consensus that maintains rural resources in a good condition. Sometimes patient communication will be necessary. It might be effective for consensus building to make an adjustment of burden on members among different communal activities. Persuasion for avoiding myopic personal comparison between cost and benefit which will be necessary for sustainable resource management.

Finally let us look at rural resource issues from a broader perspective. It is well known that the concept of multi-functionality of agriculture has been widely accepted both in EU countries and in North-east Asian countries. Although type of farming is quite different between two regions, agriculture provides society with a variety of valuable byproducts in a form of external economy. The reason for this commonness lies in a similar structure of space use in rural areas. This can be called as multi-purpose use of rural space. This similarity in space use implies that large population in both EU and northeast Asian countries can actually enjoy multiple functions of agriculture on site.

As Fig. 6 shows in a simplified way, rural space in Japan, as well as in other Northeast Asian countries, is used in three-dimensional manner, namely, as a space for primary industry, a space for residential place of households including non-farm households, and a space for visitors from outside community. This structure seems to be natural for people in EU and North-east Asian countries. It can be applied by and large for people in aged countries with lengthy history of social development. Yet, the situation is quite different in newly developed countries such as US, Canada, and Australia as shown in Fig. 7.

Fig. 6. Structure of the farm village space: Japan and Europe

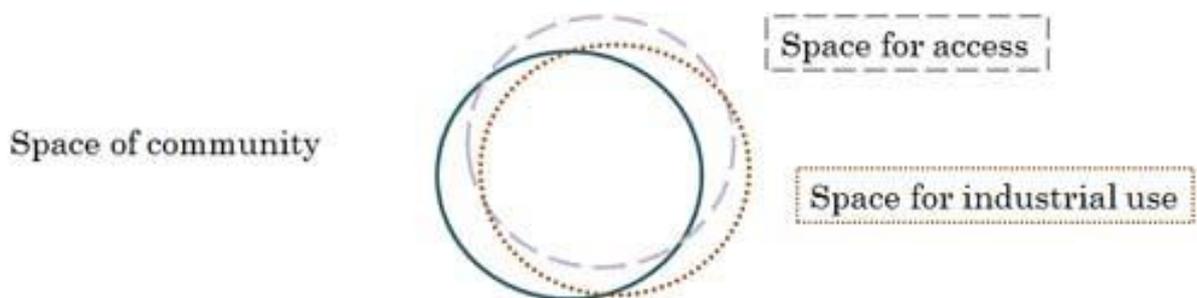


Fig. 7. Structure of the farm village space: USA and Australia



In aged counties almost all the available spaces were developed in early stage of their history. Therefore, society was forced to make use of given space more intensively for different purposes at the same time. In Japan, majority of residents in rural areas are non-farm families, some of whom have moved to the village from urban areas. Also people in urban areas frequently visit rural areas as holiday makers or homecoming relatives. These dwellers and visitors can enjoy multi-functionality of agriculture such as landscape, natural creature, and traditional culture on site. Indeed, the concept of multi-functionality can be socially meaningful only with its repeating users.

Japanese society has many things to be changed. Of course things in agriculture and rural areas are not exception. But at the same time Japanese society has many things not to be changed and to be handed over to the future generation. Among others this chapter stressed the importance of collective action for rural resource management on the one hand and the irreplaceable value of byproducts of agriculture based on multi-dimensional use of rural space on the other.

## CONCLUSION

Taking into account common elements in agriculture in Northeast Asian countries, more intimate academic interchange of information and ideas will be highly beneficial for each country. This paper summarized the Japanese situation. It is author's pleasure, if it gives readers a small hint for considering his or her own nation's agriculture and agricultural policy.

Let me add one more thing. Among common elements, that of trading position of basic food strongly suggests the necessity to express our possible common interest in policy-making in an international context. In relation to this suggestion, let us remind ourselves that, after the conclusion of GATT Uruguay Round negotiation, the WTO member countries have been adjusting their agricultural policy in accordance with the WTO agreement. In particular policy measures which might lead to increase in agricultural production have been rather restrained.

Of course it is member country's obligation to observe the existing rules. But, at the same time, the rules are rules and can be, and should be modified, if appropriate. In this regard a sentence in introduction of this paper is worth repeating.

The food trade position of Northeast Asian countries, that is, the position as already developed country with net import of food, is unique in the history of mankind.