Toward a Realization of Food Security from a Viewpoint of Agricultural Multifunctionality

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The service of maintaining food security as well as national defense and keeping social order is a public good. The agricultural sector produces food as a private good and externalities such as environmental burden and multifunctionality as joint products. Government intervention in markets is theoretically justified if externality exists. Conceptually this is easy, but it is difficult to implement. Since the degree of externalities is unobservable, it is hard to develop concrete or exact policies without any dead weight loss. In this paper, I examine how to develop food security linked to multifunctionality, aiming for a society in which all people can enjoy food security through sustainable agriculture without deteriorating rural areas.

Key words: externality, food security, international trading rule, market mechanism, multifunctionality of agriculture

1. Introduction

The population of the world is projected to be 9.7 billion in 2050 from its current level of 7.7 billion people. Economic growth and population growth in developing countries will lead to the increase in food demand and may induce food problem. On the other hand, climate change due to global warming is also affecting world food production such as decrease in local food production due to extreme phenomena, increase in international food price volatility, decrease in grain yield in low latitudes where many developing countries lie and increase in grain yield in high latitudes. The number of poor and undernourished people in developing countries is increasing, and food security issues are being highlighted.

The issue of food security is how to supply food as a private good stably to the people. The service of food security is a public good like national defense and maintaining security, which is provided by the government. In addition, agricultural production has externalities such as multifunctionality and environmental burden.

In the presence of externalities, market failure occurs. Markets cannot bring optimal allocation of resources. Government intervention is justified. But when we consider government intervention for removing the distortion due to these externalities, difficulties arise since it is hard to measure the extent of the distortions.

Most scholars agree that it is necessary to internalize externalities such as multi-functionality of agriculture, and to establish international trade rules that take externalities into account as well. Since food security is a public good, the government should be responsible for provision of this service.

In this paper, I will discuss food security while keeping in mind a society in which all people can consume the food they need by conducting environmentally and economically sustainable agriculture without exhausting the rural areas in the country.

2. The Concept of Food Security

The concept of food security has changed depending on the supply and demand situation of grains in the international market. At the 1974 World Food Conference, food security was defined as the situation of “availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” (United Nations, 1975). The focus was on the volume and the stability of food supply reflecting the food shortage in the early 1970s. In the late 1970s, most governments in developed countries employed agricultural support programs to increase the agricultural production. The policy was successful and the food problem at the national level in these countries has been resolved.

As a consequence, the 1980s was an era of excess agricultural production. At the same time, a food distribution problem at the micro level had been recognized. Some people...
were still in constant food insecurity even after the national level food security problem was resolved. The Food and Agricultural Organization expanded the concept of food security in 1983 in order to include securing access by vulnerable people to available food supplies. The viewpoint had shifted from the supply side to the demand side, from nation and region to household and individual.

The 1996 World Food Summit defined food security as the situation in which “all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” It is refined in The State of Food Insecurity 2001 as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2002).

In recent years, reflecting the problems of undernutrition and obesity, the definition of food security has continued to evolve according to the needs of the times.

The World Trade Organization regards the open international trading system as a necessary condition for ensuring quantitative food security among member countries, whereas the World Food Summit declares that the hunger and undernutrition which are almost out of scope in the WTO should be considered in international trade and trade policy.

As for the Japanese case, considering the fact that food is indispensable in maintaining human life and important as a basis for a healthy and fulfilling life, food security is defined as the situation in which a stable supply of high-quality food at a reasonable price shall be secured into the future in the Food, Agriculture and Rural Areas Basic Act. Because of some uncertainty in the world food supply and demand situation, a stable food supply shall be secured by increased domestic agricultural production as a base together with an appropriate combination of import and reserve. The government prepares the manual for a stable food supply under unforeseen circumstances.

Food safety and assurance are also important aspects of food security. Food safety must be judged objectively based on scientific evidence, and the safety standards are the minimum quality requirements. At the purchase of food, consumers think the assurance in food important as well as the safety. Food assurance is a subjective concept. Consumers do not always have assurance in food even if it is proved safe. It is important to ensure food relief for food security.

In addition to the food security concept as explained above, there is concept called “food sovereignty.” The Japanese concept of food security emphasizes the option to provide food security through domestic production and emphasizing unforeseen circumstances. There is a slight difference from the international concept of food security.

3. Externality and Optimal Resource Allocation

Externality is an effect caused by an activity of one economic agent directly to the behavior of other agents without the involvement of the markets. There are positive externality and negative externality. Externality, both positive and negative, causes serious problems. According to the fundamental theorem of welfare economics, competitive equilibrium brings the optimal allocation of resources. When externality exists, competitive equilibrium will not bring the optimal allocation of resources. This is well known as market failure.

The need to remove external diseconomy is obvious, since it is a bad. It might not be so clear for the case of external economy, or positive externality. Consider an agricultural activity which produces food and multifunctionality. Farmers provide food security service and multi-functionality with their products, but they cannot recover the cost of positive externality. This means less than the optimal level of production from the social point of view.

1) Rome Declaration on World Food Security and World Food Summit Plan of Action. World Food Summit 13-17 November 1996, FAO, Rome.
2) It is not accurate to express it as quantitative, since there is the Agreement on Sanitary and Phytosanitary Measures, for example.
3) From the WTO’s point of view, raising income levels through a free trade system should solve the problems of hunger and undernourishment, or taking measures with domestic policies that “do not distort” trade.
4) Autarky had been the fundamental thought in Japanese food security before the end of World War II (Kabuta, 2012).
5) Official Development Aid for agricultural development by the government increases agricultural production in food importing developing countries, which contributes to the food safety in Japan while making food importation decrease in these countries.
6) This is a concept advocated by La Via Campesina, an international peasant organization (Mashima, 2011). According to Nyéléni (2013), food sovereignty is the right of people to consume healthy and culturally sound food produced through ecological and sustainable methods. It is also a right to define their food and agricultural system. It is characterized by focusing on where the food came from (where it was produced) and under what conditions it was produced and distributed. The international definition of food security focuses on food consumption and does not concern itself with where the food came from or under what conditions it was produced and distributed (Burnett and Murphy, 2014).
Without government intervention or internalization of the externality, the provision of food safety service and agricultural production is less than the socially optimal level. Note that there exists negative externality in agriculture as well. From the general equilibrium perspective, the welfare may not be improved with a reduction of a distortion if there are more than one distortion. It is required to reduce all the distortions proportionally at the same time or reduce the largest distortion to the level of the second largest distortion (Saito, 2013). Generally speaking, as far as agriculture is concerned, the external economy is considered to be dominant in Japan (Sakuyama, 2003).

4. Multifunctionality of Agriculture

One of the agricultural policy goals is to fulfill multifunctionality for the future in the Food, Agriculture and Rural Area Basic Act. Multifunctionality is defined as the multiple roles which agriculture plays through stable production in rural areas. Details of the multifunctionality are summarized in Science Council of Japan (2001).

The following three characteristics of multifunctionality are important. The first characteristic is non-excludability. No one who wants to enjoy the service can be excluded or the cost for exclusion is prohibitive. The second characteristic is non-rivalness. The amount of services anyone consumes is independent of the service any other person consumes; i.e., anyone can enjoy the same amount of services. Goods that satisfy these characteristics are called public goods. Because of these characteristics, economic agents in the market will not provide public goods and their provision by the government is justified.

The third characteristic is the jointness to agricultural production. This means that agricultural products and multifunctionality are joint products. This is an important characteristic to link multifunctionality and agricultural policy and is one of the fundamental backgrounds for supporting agriculture in order to sustain multifunctionality.

Food security has the characteristics of non-excludability and non-rivalness in consumption that public goods satisfy. Its beneficiaries extend all over the nation. It has the characteristics of pure public goods. What about the jointness? From the perspective of food security, the jointness is weak. This is because a stable food supply can be achieved through importation and stockpiling. However, from the perspective of providing options in food security through domestic agricultural production, it can be considered that there is some degree of jointness.

In addition, among the agricultural multifunctionality, the conservation of the bio-ecosystem and genetic resources constitute positive feedback for food safety in the long run since genetic resources play an important role for developing high-yielding varieties that are resistant to high temperature, droughts, salt damage, floods and pests.

5. Trade Discipline and Food Security

Because of the increase in negotiating power of developing countries, it was difficult to get the agreement in a framework of multilateralism in the WTO Doha Round. The platform for trade liberalization has shifted from the WTO to free trade agreements. As a result, the number of countries which have concluded FTAs has been increasing. I will consider, however, the relationship between food security and trade discipline in the WTO, since the free trade agreement is fundamentally based on the WTO trade discipline. The fundamental rules of the WTO are indiscrimination in trade (Most Favored Nation Treatment and National Treatment), multilateralism, reduction of trade restrictive measures (tariff, non-tariff barriers, export subsidies and domestic support of industries) and general elimination of quantitative restrictions. There are other disciplines as well in order to minimize trade distortions in non-tariff barriers. The fundamental concept underlying the WTO trade discipline is the market mechanism under the perfect competitive markets. But once some of the assumptions are not satisfied, market failure will occur and market intervention by the government is justified. When we take into consideration the externality in agriculture such as multifunctionality, the trade discipline might deteriorate the economic welfare. It is necessary to make efforts to construct a trade discipline which seriously considers food security in all countries.

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7) During Uruguay Round negotiations, the Cairns Group, which consists of agricultural exporting countries, insisted on trade rules that integrate agriculture, mining and manufacture without considering agricultural characteristics. On the other hand, the G10, including Japan, has developed a concept of “multifunctionality of agriculture” that emphasizes the positive role of agriculture. Despite this important point, claims raised by the G10 were never incorporated into the agreement on agriculture. OECD (2001) is the first document to strictly define multifunctionality.
1) General elimination of quantitative restrictions
   Quantity restrictions in both import and export are generally prohibited. However, export prohibitions or restrictions are permitted as exceptions if they are imposed temporarily to prevent critical shortages of food and other products. Export restriction in order to maintain food security in an exporting country is allowed, while import restrictions to sustain long term food safety are not allowed in food-importing countries. Exporting countries and importing countries are not treated symmetrically. Though reciprocity is the basis in the WTO discipline, this reciprocity is not satisfied in the case of food security.

2) Measures in order to sustain food security
   Public food stockpiles to achieve food security, food provision for the poor with subsidized prices in developing countries, and subsidy to food aid for the poor are allowed if they do not distort market prices. No intervention in producer price is allowed. The only measure permitted in the WTO rule to supporting producers is by direct payments. No upper limit of the direct payment is imposed if the production quota is applied. No producer price support is allowed to increase the production even for food security. From the viewpoint of food safety, treatment is unequal between exporting countries and importing countries.

   Looking back on the declaration at the opening of the Uruguay Round agricultural negotiations which aimed to achieve further liberalization in agricultural trade and effective operation of all the measures which affect import access and export competition, it is inferred that there was no interest in food security at the beginning of agricultural negotiation.

   Regarding important matters such as food security and environmental conservation raised in the process of Uruguay round negotiation, non-trade concern and special treatment for developing countries including adverse effect of trade liberalization on food security were confirmed, but not included in the agreement on agriculture. It was extremely inadequate.

   The result of the negotiations was to prioritize the reduction of subsidized exports and securing the export destination for exporting countries at the back of the budgetary burden due to the excess agricultural production in the 1980s.

3) Food security problems in developing countries:
   The case of the Food Security Act in India
   The Public Distribution System (PDS) has been used since the 1930s in India for food security. The government purchases grains from farmers at the government procurement price to reserve for a supply shortage and to supply it to people at a reasonable price. The government collects PDS grains from low-income, small-scale farmers at a higher price than the market price in order to raise their farm income and to increase grain production. The government believes this policy contributes to food safety. On the consumer side, the government sets a distribution quota for each household depending on the income level and the consumer price below the market price.

   In 2013, PDS was enacted as a Food Security Act. The functions of this food security act are public stockpiling for food security purposes and food aid for the poor. It was pointed out at the 10th WTO Ministerial Conference that the procurement price for stockpiling was set higher than the market price. Producer support must be counted as an Aggregate Measure of Support (AMS) and reduced. The AMS did not exceed de minimis at the time of the ministerial conference. The Indian government called for the public stockpiling system for food security to be excluded from the reduction target, since the government expected the AMS to exceed the de minimis level in the near future. There was a controversy between grain exporting countries and importing countries which have public stockpiles for food security purposes.

   It was agreed as a temporary rule that the subsidy for stockpiling in order to secure a stable food supply in developing countries would not be subject to WTO complaint for coming four years. There are some options for treating Indian Food Security Act: (1) use the peace clause, (2) raise the level of de minimis in developing countries, (3) re-evaluate the external reference price, (4) introduce inflation adjustment in AMS estimation in developing countries and (5) include public stockpiling for food security in the green box regardless of producer price support. Although food security was treated as a non-trade concern in the agricultural agreement, it is necessary to discuss the treatment of food security in the WTO discipline.

4) Trade rules regarding quality in food security
   Another exception to the General Elimination of Quantitative Restriction is the measures necessary to protect the life or health of humans, animals or plants. Basically, the protection of the life and health of people, animals and plants acts in the direction of restricting imports. For avoiding unnecessary restrictions on imports, promoting trade and
protecting the lives and health of people, animals and plants, the agreement on the application of sanitary and phytosanitary measures (SPS agreement) has been established.

Preventing human, animal and plant diseases from entering a country in advance and protecting the country are extremely important for ensuring the qualitative aspect of food security. There are differences in food security policies between nations. Thus, it is an important issue for the WTO in promoting free trade to overcome the differences in food security policies between nations and minimize the effects of trade restrictions. It is characterized by applying measures based on a risk assessment (scientific principle) based on scientific evidence.

It has been pointed out that the number of SPS reports has been increasing since the WTO was established, and that it has had a negative correlation with tariff reduction. It might be used as a border measure to replace tariff reduction (de Melo and Nicita, 2018).

6. Toward the Sustainable Food Security

It is important to ensure profitability, environmental health, and social and economic equity for sustainable agriculture. For profitability, the reduction of production costs and increase in income is necessary and will be achieved by diversifying business and improving sales prices through marketing. Environmental health is achieved by reducing chemical inputs such as fertilizers and pesticides, and by employing environmentally friendly farming methods such as agroecology. Multifunctionality in agriculture such as stable food supply (food security service), land conservation and maintenance of biodiversity will contribute to the economic and social equity. It is also important to remove or internalize externality arising from multifunctionality.

1) Large-scale farming

Compared to other agricultural sectors, rice farming is behind in structural reform, and reducing the cost of production by increasing the operating scale is one of the important issues. Judging from the orthodox theory of international trade, land-intensive agriculture as an industry has no comparative advantage because of the relative scarcity of arable land in Japan. However there exist efficient rice managements whose cost of rice production is very low due to the accumulation of paddy fields.8) It is suggested that the cost of rice production may be significantly reduced by expanding the scale of operation (Saito, 2012).

Trade liberalization based on mega FTAs such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership and the Agreement on EU-Japan Economic Partnership implies an import increase in agricultural commodities. But at the same time, the export opportunity for agricultural commodities increases as well. There is a high possibility that importing Indica rice for pilaf and fried rice and exporting Japonica rice for high income earners in Asian countries coexist (Intra-industry trade).

Paddy fields are a source of greenhouse gas (methane). According to the Paris Agreement, Japan must reduce greenhouse gas emission by 26% compared to 2015 by 2030. Methane emission can be reduced on average 30% by the additional one-week increase in the mid-dry period at the sacrifice of 5% yield reduction (Kunimitsu and Nishimori, 2019). By employing appropriate farming practice, it is possible to consider environmental health.

Large-scale rice management not only contributes to the stable supply of staple food, but also contributes to the creation of multifunctional value of agriculture. It may be that effective policies to accelerate paddy-field accumulation to core farmers will improve social justice.

2) Small-scale farming

Food sovereignty is a movement which assumes small-scale farmers in developing countries; This movement may be difficult to apply it to agriculture in Japan. But it can be an interesting farming model in that it is based on small-scale farming and it achieves food security for individual farm households by using sustainable farming methods.

Small-scale farmers could reduce the cost of capital by outsourcing some work which requires agricultural machines to large-scale managements. Large-scale farmers could reduce the cost as well by increasing the usage rate of agricultural machines. Small-scale farm households may be suppliers for manuring labor demanded by large-scale rice managements.

The questions are whether any small-farm farmer can master the technology for organic farming or agroecology which are expected to have a low environmental load and sufficiently high yield, whether it is possible to establish the logistics which overcome the problems in the distribution production technologies. Further, it is not inconsistent if there exist producers with international comparative advantage.

8) Since standard trade theory assumes homogenous producers, land intensive agriculture has no comparative advantage in countries with relatively scarce arable land endowment. In reality, there is heterogeneity among producers with different scales and
system such as minimum lot requirement, and whether it is possible to maintain a sufficient market price which assures the profitability of small farms. It is not sustainable if the profitability condition is not satisfied even if the environmental requirement is attained.

7. Conclusion

It seems that the global food supply and demand will become increasingly tight, and hunger and poverty will be difficult to eliminate as food demand increases due to global population growth, economic development in low-income countries and global climate change. In Japan, there are many concerns about maintaining domestic food production, such as the aging of agricultural workers and the increase in abandoned arable land. It is one of the important roles for the government to ensure food security. Forty percent of Japanese food demand is covered by domestic production, but the remainder depends on importation. In the face of progress in agricultural trade liberalization, it is necessary to improve efficiency in domestic agricultural production and ensure food security. At the same time, it is required to reduce the environmental burden in the agricultural sector.

It should also be kept in mind that sustaining domestic agriculture leads to the maintenance of the multifunctionality of agriculture. Regarding the international trade system, it is necessary to construct a trade discipline that stabilizes the international market and improves food security for developing countries as well as food importing in developed countries.

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