



## The Choice of Sustainable Development Model of China's Agriculture

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### Abstract

Whether China's agriculture can achieve sustainable development, it not only has a great impact on the realization of a harmonious society, but also has an important impact on the realization of 9 million peasants' all-round well-off issues. In this paper, through analyzing the meaning of agricultural sustainable development, the problems within in it are described, and sustainable development model of China's agriculture is explored.

**Keywords:** Agricultural economy, Sustainable, Development model

### 1. The meaning of sustainability of the agricultural economy

The sustainability of the agricultural economy is a rich concept. It can be summed up in the embodiment of the "three sustainability". First, it is sustainability of agriculture production. That is to ensure the stable supply of agricultural products to meet the needs of the society for agricultural products. Second, it is sustainability of rural economy. That is to increase the peasants' income and improve their quality of life. It should be reflected in the rural industrial structure, the extent of rural industrialization and the living standards of peasants. Third, it is sustainability of ecology and environment. That is, mankind's ability to withstand natural disasters and the ability to develop, conserve, and improve the environment. This capability is the foundation of overall agricultural development and economic growth. Without a sound resource base and environmental conditions, the conventional modern agriculture would fall into a difficult position. China is the world's largest developing country. It has a low level of agricultural inputs, operating extensive cultivation and small-scale. Agricultural productivity, per capita share of grain, meat, and per capita agricultural output is only 1/5, 1/3, 1/5, and 1/4 of the developed countries, respectively. Under such circumstances, China should put sustainable development to a prominent position, and take "three sustainability" into account.

### 2. The problems within China's Agriculture Sustainable Development

The sustainable development of the agricultural economy is related to agricultural resources, environment, production, market, consumption, and management etc. However, the key still relies on the substantial development of the agricultural natural resources and the environment. In a rural-based agricultural economy, whether it is a modern industrial-style agriculture, alternative agriculture or traditional agriculture, the key issue is the foundation to achieve sustainable development of agricultural economy.

#### 2.1 *The problems of modern industrial type agriculture*

The industrial type agriculture is capital intensive, specialized and scale production, which based on machinery and agricultural chemical products. The industrial type agricultural evolution resulted serious pollution and breakage in agricultural environment and ecosystem. The main reasons are as follows: First, the residual of chemical fertilizers, insecticides, farming PVC films, and etc, pollute and destroy the soil, water and atmosphere. Second, the shifts of intensive breeding animals, the wastes of agricultural and livestock products processing plants, and the wastes of energy consumption during agricultural production directly get into environment, which result in the pollution and breakage of agricultural environment. Third, the great usage of chemical fertilizers and machine cultivation result in soil's hardening and make agricultural land resource quickly deteriorate. Forth, the unreasonable irrigation results in soil alkalization and shortage of water supply. Fifth, the unreasonable reclamation and excessive exploitation result in desertification and soil

erosion. Sixth, the great usage of chemical fertilizers, and insecticide, etc, result in agricultural chemicals directly remain in plant food and condensable remain in animal food, which increase the risk of food safety. Seventh, the agrochemicals have direct damage to users. Industrial agriculture has already become energy-intensive and capital-intensive type industry. This is in consistent with the requirement of sustainable agricultural development.

### *2.2 Problems with Alternative Agriculture*

During 1960s and 1970s, the alternative agricultural development model was proposed. It negated the industrial type agriculture ignoring environment and resource, but pursuing profit maximization. It emphasized the sense of harmony between environment, quality of food and nature. Furthermore, it attempted to make more use of natural process and biological process, to reduce the intervention to the nature and agricultural ecosystem. Alternative agricultural models include organic agriculture, biological agriculture, natural agriculture, environmental-friendly agriculture and ecological agriculture, etc. Various alternative agriculture models emphasize different principles, and the technique adopted are also different, but they still have some similarity. For example, we should adopt a system of minimum tillage or no tillage, and emphasize alternate tillage and mixed planting, in order to achieve the integration of using the land and improving the land. Talking about agricultural chemical product, we emphasize use less or disuse chemical fertilizers and insecticides, and restore of straws, sugar shells and people and livestock's manures. We also emphasize biological and integrated control of insect pest and plant diseases. Talking about agricultural energy, we should do our best to make use of renewable energy, resources, manpower and animal power, and at the same time try to increase energy efficiency. Although the alternative agriculture lowered output to some extent, but the production of little added value products increase. The pace that agricultural labor productivity and economic returns increased was not fast, but it has a positive impact on sustainable agricultural development in resource and environment aspect.

The problem of sustainable development of alternative agriculture is the limitation of application. It reflects on two aspects: region and technique.

First, although alternative agriculture is regarded as an ideal agricultural development model, and has some superiority in the aspect of resources and environment. However, it was proposed under the background of developed countries, where it has smaller population pressure, development pressure and inequality. Talking about numerous developing countries and region, under the low level of regional development, it is not enough to only consider resources and environment, but has to consider substantial population pressure. It is a difficult position that less developed countries and regions face. Therefore, the ideal alternative agricultural model inevitably has some regional limitations. It is difficult to effectively solve the sustainable development problems of developing and less developed countries, and can only be practiced in certain scope.

Second, alternative agriculture model has some limitations and shortcomings in techniques.

Firstly, agriculture system is an open system, and the crop nutrition needs to be replenished and exchanged. Alternative agriculture depends on alternate tillage and the usage of organic fertilizer. It can solve the supply of nitrogen, but it is difficult to keep the balance of phosphorous and potassium, etc.

Secondly, alternative agriculture claims using biological and combination method to control insect pests and weeds. It must rely on the openness of bioprocess technologies and investment requirement. However, various alternative agriculture models generally have lower economic returns, which hardly to meet the high investment requirement.

### *2.3 The problems of traditional rural economy*

The traditional rural economy exists commonly in less developed region. The characteristics are slow and inactive development of technology, extensively use of natural resources and environment, which lead to extremely low efficiency. The model sharply contradicts with expanding population's requirements of natural resources and environment, and it restricts the substantial development of traditional rural economy.

First, because of the limitation of technology development, the information of traditional rural economy relies on the combination of extensive land and labor production and management. The facts are: The total plantable land continues decrease, the marginal input of land also continues decrease, and the increase of rural economy is maintained by increasing labor input. The result is the expansion of rural population. A vicious circle is therefore formed between the increase of rural population and the decrease of plantable land, which cause sustainable development problem.

Second, under the dual difficult position of increasing population and low production efficiency, it is difficult to reasonable utilize the agricultural resources and environment. In order to earn a living, resources and environment are seriously damaged. For example, forests are cut down, grasslands are cultivated, and lakes and wetlands are also cultivated. The agricultural sustainable development problem is becoming more serious day by day.

## **3. The choice of China's sustainable development model**

Along with knowledge-based economy and arrival of sustainable development era, China's agriculture will face more rigorous situation in 21th century. In order to achieve sustainable development of agriculture, the right sustainable

model must be chosen. The details are as follows:

### 3.1 Green agriculture

The green agriculture based on environment-friendly agriculture, where high technology leads, green production and green food are characteristics, and whole nation's green consciousness is established. 21th century will be the century that the agriculture keeps developing. The green consumption will be a main tend in the century, and the green requirements will become main requirements gradually. The humans need more hygiene, nourishment, and free from pollution agricultural products. They not only require the safety of future development of agriculture and agricultural products, but also require high grade, high quality, and outstanding type green food in order to achieve virtuous cycle between humans and environment. Therefore, carrying out the green agricultural development strategy is the ideal and feasible model of 21th century agricultural development model. After 5-year protection period after China's enter into WTO, the requirements of international market for high grade, high quality, outstanding type, and non-toxic, harmless, pollution free and green trade barrier in international trade have become important trade barriers. Therefore, we have to implement the road of green agricultural development.

### 3.2 Gene agriculture

In knowledge-based economy era, biotechnology will be widely used. DNA recombination technology, clone technology, and application and utilization of new advanced biological process all bring infinite expectations for humans. Because of the birth and development of gene engineering technology, the agricultural biotechnology has changed fundamentally. If gene engineering technology is selectively used, we can active or control certain gens, or transform gens using new method. In this way, we could produce all new and safe food. Along with the fast development of biological technology, gene agriculture inevitably becomes growth engine of China's agricultural sustainable development.

### 3.3 Eenvironmental-friendly agriculture

According to Ministry of Agriculture and other six Ministries, <The Report for Quicken Environment-Friendly Agriculture> pointed that China's environment-friendly agriculture is based on ecology and ecological economics, and applies system engineering. It combines the technology of traditional and modern agriculture, and utilizes advantage of local natural resources to act according to circumstance, plan, design, organize and implement integrated agricultural system. It aims developing greater agriculture as a starting point, and according to the principle of overall coordination so as to practice overall planning of agriculture, forest, herd, auxiliary and fishing. The result is that all industries support each other and reinforce each other in order to promote multi-tier usage and virtuous circle of matter energy of agro-ecosystem. Therefore, continuous, fast, and healthy development of agriculture can be achieved.

### 3.4 White agriculture

White agriculture makes use of microorganism resources, which is one of three largest biological resources in the world and has not been widely used by humans. People use technology to exploit white agriculture and create a new type of agriculture - microbiological industry. The traditional agriculture use sun as direct energy, and green plants through photosynthesis to produce human food and animal feeds. However, white agriculture use man-made energy, and is not restrained by climate and season. A large scale production can be done in the factories all year round. Microbiology industry is land-saving type industrial production. The factory that produces 100 thousand tons single cell protein a year only occupies a little land. The output is equivalent to 130 thousand kilometer squared soy protein, or animal protein from cattle fed by 20 million kilometer squared grassland. It is thus clear that developing white agriculture in China has a bright future.

### 3.5 Network agriculture

In knowledge-based economy era, all kinds of agriculture information are gathered into computer network. People could share the information through internet. For example, the information about all kinds of natural resources: climate, soil, water and spices etc., the information about supply and demand of raw material for production, the information about agricultural production, logistics, price, technology, education, policy and laws, etc. More and more peasants found that internet has a wide range of uses, and is convenient and fun to use. For example, farmers live in Henan and Shandong Province, who plant apples and peanuts, etc. They could not only expand sales through internet, but also sell the products to overseas. The information network makes a breakthrough in agricultural production localization and makes internationalization and globalization possible.

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