

LEARNING OF DEVELOPED COUNTRIES' MODERN AGRICULTURE AND ENLIGHTENMENTS ON CHINA ITSELF¹

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Abstract: With the acceleration of human's "Science and Technology Rejuvenation", more Breakthroughs have been made in the research area of high-tech agriculture around the world. Therefore, Chinese agriculture not only needs to be generalized in all-dimensions with modern features, but also requires innovations in the new-born post-industry. The thesis summarizes the current situation about Chinese modern agriculture combined with foreign experiences, so as to probe into the problems and find out relevant solutions in modern agriculture practice.

Key words: Modern Agriculture, Foreign Experiences, Enlightenment

Since China's Reform and Opening up, it has gained great achievements in the agriculture and rural economy areas, as demonstrated in supporting successfully 22 percent of the world total population while depending on only 10 percent outputs of the world glebe. Recently, China is undergoing the moment of truth when transferring from traditional agriculture to modern agriculture. Nevertheless, China must realize that the pattern and development dimension of such a kind of modern agriculture still lags behind the advanced georgic countries, especially those developed ones. As a result, China should learn their favorable experiences and adjust their development theories in a scientific way and make effective policies so as to guarantee the sustainable, fast and healthy progress of China's agriculture and rural economy.

1. THE DEFINITION OF MODERN AGRICULTURE

The academic circle holds different opinions as what modern agriculture really means. The most accordant definition is that the modern agriculture is not an abstract concept, but a concrete object, an important stage in the agriculture development (Zhang, 2007). Scholars divide the whole development process of the agriculture into a few stages according to some basic standards, among which "Three Stages" and "Four Stages" are widely accepted. "Three Stages" considers the agriculture Progresses from original agriculture, through traditional agriculture to modern agriculture. As the latest stage, modern agriculture is equipped with the modern technology and guided by experiments. It is the kind of

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agriculture that regards merchandise production as its main purpose (Tao Wuxian, 2004). On the other hand, “Four Stages” divides the progress into original agriculture, ancient agriculture, recent agriculture and modern agriculture. It considers the modern agriculture as the agriculture after World War II, when the developed countries extensively utilized machine instead of handicraft and employed chemicals and large facilities. They reformed agriculture with modern science and technology together with advanced management science (Tao Lixin, 2004). According to China’s development level of agriculture, modern agriculture means reforming traditional agriculture through using biological technology, information technology, deep-processing technology and farming facilities so as to promote industrialized and market-oriented operation and scientific management. It should undergo constant innovation while saving resources and be a sustainable green agriculture.

2. SOME EXPERIENCES HELD BY FOREIGN COUNTRIES

2.1 USA

As the world’s largest country of modern agriculture, the USA holds farmers that account for 2 percent among its total population who contributes 2 percent of American GDP. Its modern agriculture mainly focuses on improving labor productivity through mechanization and scale expanding. For example, it adopts government intervention and “market leading” mechanism, using modern scientific technology and industrial equipment to improve productivity, selling, economic benefit and the effectiveness of resource configuration. As a result, the USA agriculture maintains an operating style of “scaled production + market mechanism+ government protection”.

2.1.1 High level of industrial, commercial and socialized service for agriculture

In America, farmers mainly depend on themselves to establish self-moving organization in order to develop industrialized services such as product circulation, pre-processing, storage and transportation, etc., which plays an important role in the combination of production and market. It is said that currently 70 percent of the American agricultural exports is contracted by such organizations. Among all those private and company held farms, above 90 percent of them is joint venture which take over 70 percent in sales.

2.1.2 Regularized, systematized and continuing government protection

The American government constitutes a well agricultural policy system through legislations and adjusts “the law of agriculture” for every 5 years and establish some other controlling measures which mainly contain: (a) Protection policies for farmers aiming at maintaining farmers’ rights (such as protection of agricultural resources, price subsidies and agricultural loans and so on). (b) Some legislation which strengthens the market economy and maintain market order. (c) Agricultural protection and development policies that support the government to develop agricultural productivity (such as the policy of land rest and food storage, the loan of government promise and the crop insurance plan). Thanks to the government’s protection and market regulation, the American agriculture is famous for its unbelievable high-efficiency.

2.1.3 Adopt high- new technology to promote the durable development of crops

Besides normal farming, the American government has established recreational subsidy policy to encourage farmers to carry out recreational service for cost reduction. If a ground rest for 10 to 15years, the government will provide farmers the total capital to plant trees and flowers to protect the environment. More over, it actively carries out Integrated Pest Management (IPM) by adopting an integrative system which consists of biology overlays, rotation of crops, antiviral varieties to reduce pesticide and protect the environment. In the promotion of transgenic varieties, recently the American government has already carried out some laws. The exploitation of transgenic products is so fast that the

BT antiviral cotton has taken 36 percent of the whole American cotton's acreage, even 50 percent in Georgia.

What's more, the combination of agriculture and stockbreeding, together with agricultural and machinery, especially network technology and precise agriculture technology has stimulate the informationization, internetlization and automation of agriculture, which is the new trend of the US farming system. The US Agricultural Research Service has developed a precise machine use "3S" technology, which is equipped with computer controlling system, output prosecution, laser technology and other advanced high-tech equipments, which is now in the pilot stage of exploration.

2.2 Japan

In Japan, land is small and narrow, always scattered as "Latticed Field". Along with the steadily decline of arable land, farmers has increasingly recognized the value of the field. Thus, Japan's modern agriculture put more emphasis on the multi-functional agriculture which has the following outstanding features:

2.2.1 Focus on multifunction agriculture

The proportion of the products in Japan's agricultural production which is used to meet the basic needs of people is steadily declining, while various agricultural products used for modern consumption, industrial materials and export, as well as restoring and maintaining the ecological balance and protecting the natural environment is undergoing a significant increase. The supply of agricultural materials, agricultural infrastructure, purchase of agricultural products, processing, storage, transportation, the promotion of agricultural technology, personnel training, information consultation and other economic activities that are to provide direct services for agricultural production are now developing fast with the proportion steady rising.

2.2.2 Establish environment protect agriculture

Environment protective agriculture is a sustainable agriculture which gives the agriculture its full play to material cycle, reducing the burden on the environment while searching for increased productivity. In March, 2005, the Japanese Government introduced the " Basic Plan for Food, Agriculture and Rural Areas" which showed that the Japanese agricultural policies changed towards the environmental policy , while at the same time provided a supportive policy to promote the environment protective agriculture.

2.2.3 Regard agriculture as a social and public section

In Japan, the agricultural issue not only belongs to the micro-economic area, but also is a macro-economic problem. With its contribution to the industrial economy sector is continuously weakening, agriculture is increasingly becoming a social public sector. Along with the development of multi-functional agriculture, recreation, sightseeing and tourism agriculture which can meet consumer's need as a new type of industry is booming. The whole society is the preferred beneficiary of multifunctional agriculture followed by the operators. In this sense, agriculture is a commonwealth with a strong external identity.

2.3 Holland

The population density of Holland is among the most intensive in the world as it comes to 435 per sq.km. Although it is short of land, Holland is becoming one of the three largest exporters around the globe through their efforts over the years. Recently, it exports agriculture products that accounts for 1/10 of the world's total export quantities, or worth 40 billion US dollars.

2.3.1 Optimize agriculture construction and develop high-performances

The success of Holland's agriculture depends on their scientific usage of soil resources. While located in high latitude and comparatively enjoying less sunshine, Holland boasts flat topography and flush rain, which turns out to foster silt soil. According to these environment and the country's basic situation, Holland chooses to reduce the acreage for large scale crop-farming and develop high value-added stock raising and horticulture so as to optimize productivity.

2.3.2 Extensively using of science and technology

Regarding provisionment, Holland mainly focuses on fine breed selection and the use of scientific and mechanized cultivation. Its wheat yield is nearly 9,000 kg per hectare which is 3000kg higher than the world average level, while the corn yield per unit is 6 -7 times above the world level. In stockbreeding, Holland attaches great importance to the fine breeding of cow varieties and grassland improvement. The average annual output per cow is 6,500 kg each year which is much higher than the world average level. Flower and vegetable production in Holland takes a large part in agricultural production. Lately, Holland has built 110 million square meters of glass greenhouse (the world's 1 / 4) which uses computer management and enjoys high productivity. Holland nowadays exports 17 million branches and 1.7 million pots of flowers everyday with a share of more than 60 percent of the world market.

2.3.3 Scaled intensive operation

Forms of agriculture in Holland are all family operating whose size is gradually expanding. Currently the average size of farms which engaged in cultivation is 50 hectares, stockbreeding 40 hectares and flower gardening 2 hectares; the number of agricultural families has reduced to 120,000 by now compared with 650,000 at the end of World War II while the size and efficiency of each farm have increased significantly.

2.3.4 Attach great importance to develop various peasant organizations and cooperation

The production and business activities of agricultural cooperation organizations in Holland have gradually expanded to storage, processing, livestock health, finance and insurance, technical consultation, technology services and so on. At present, there are more than 2,000 agricultural cooperation organizations with different functions which provide farmers with comprehensive and quality services. Farmers participate in cooperation according to their needs so as to concentrate on production. Thus, the connection between trade, industry and agriculture is established and production, supply and distribution integration is realized.

3. PROBLEMS IN CHINA'S MODERN AGRICULTURE CONSTRUCTION

3.1 Excessive burden on farmers and lack of social security system

Because of the extensive mode of production, agriculture input is significantly increasing while its yielding is growing. As a result, farmers' burden is still excessive although agricultural products enjoy a good harvest each year. There are still many charge items in agricultural production and farmers' lives, such as operating expenses, apportionment, fund collection and so on. In recent years, the scissors gap between industry and agriculture is undergoing a trend of expansion, which also virtually increases the burden on peasants. Meanwhile, farmers' deficiency in the education, medical, pension and other social welfare and security system areas has put them in a weak and backward position.

3.2 Imperfect market and service system for agricultural products

The further establishment of market economy has transferred the agriculture from under a single

constraint of natural resources to the dual constraints of market and natural resources. Farmers have to withstand the tests of both natural and market risks. Agricultural market system is less than perfect performance. First of all, impeded distribution channels for agricultural products and low level of industrialization result in the backlog of local agricultural products. Second, the service system lags behind the market. Because of the lack of flexible intermediary agencies, farmers can not perceive changes in market prices, supply and demand and other early warning information in time. Third, the market legal system is unhealthy since there are unfair and disorderly competitions. All the above factors have constrained farmers' ability to counteract market risks.

3.3 Arduous tasks of transferring surplus rural labor

According to foreign experience, the basic way to achieve long-term increase in farmers' income is to transfer surplus rural labor to non-agricultural industries. China still has an agricultural population of more than 50 percent compared to developed countries which accounts for only less than 5 percent of their total population. Other factors, such as educational backwardness, the absence of scientific and technological knowledge and vocational skills also prevent labor from transferring to non-agricultural industries to a certain extent.

3.4 Insufficient capacity of scientific and technological innovation and promotion

Modern agriculture in developed countries is an industry of high-input, high-efficiency and high-income while China has not attached importance to agricultural inputs through the years. The government investment in agriculture accounts for an average share of 5 percent to 6 percent in GDP, while in the United States, Canada, the United Kingdom, Australia and other developed countries, governments give financial support to the agricultural sector which is equivalent to more than 25 per cent of the agricultural GDP itself. While in Japan this figure is even higher (about 45 percent ~ 95 percent). Inadequate investment in agriculture, particularly the lack of investment in science and technology innovation impacts the upgrading of its expanding capacity.

4. THE INSPIRATION OF OVERSEAS EXPERIMENT OF MODERN AGRICULTURE

4.1 Make effective agricultural policies

Governments of developed countries always take intervention measures on agricultural resource transferring among which protecting the prices of agricultural products is the core purpose and restrict the import quantities and afford export subsidies, sometimes even resort to diplomatic channels to compete in the international market. The United States often use political and diplomatic means to request Japan and the European Union to expand imports of agricultural products from the USA. The EU has also established a common agricultural market and implemented common agricultural policies which abolish tariff and non-tariff barriers between member countries, support export and free circulation of agricultural products. At the import sector, the EU provides a "Threshold Price" which means other countries need to pay "Post Tax" if they want to export farm produces to the EU.

Generally, if the GDP per capita reaches 1000 US dollars, it is the best time to implement agricultural protection policies. In view of China's agricultural development, the objective economic conditions and the international environment, China should explore various types of agricultural protection policies. As the beginning, China should deepen the agriculture reform; straighten out the relationships between urban and rural areas, as China's industry and agriculture. Then it should fully tap the potential of

agriculture development according to the basic aim of enhancing comprehensive agricultural producing capacity and forming agriculture industrialization, so as to support and protect the production, processing and trade sectors of modern agriculture in financial, technological and security ways.

4.2 Increase human capital investment to improve the quality of agricultural laborers

Education is the most important form of investment in human capital. Modern agriculture is known as a knowledge-intensive and technology-intensive industry while high-quality agricultural laborers are essential for its development. In developed countries, there are perfect agricultural education systems. For example, Holland boasts various agricultural institutions with a total number of 60,000 students which is equivalent to 29 percent of the total agricultural labor. Significant decline in the number of agricultural employment occurs while agricultural production increasing obviously, which correlates closely to the improvement of farmers' quality.

China has abundant labor resources but of low quality. Ever since the founding of People's Republic of China, more than half of the 1.4 million trained agricultural staff flowed to other sectors. In order to build modern agriculture, China should particularly focus on policy encouraging, public opinion guiding, education investment and other measures to train and gather agricultural professionals.

4.3 Focus on the utilization of new and high technologies in agriculture

When agricultural output reached a certain level, the growth is mainly dependent on scientific and technological progress. Many developed countries have established fairly complete systems and boasts strong agricultural research institutions and large-scale science and technology promotion contingents. Their annual funding for agricultural research is generally 0.6% to the national agricultural GDP while the promotion of agricultural science and technology support is two times above the research funding. There is a three-dimensional structure of agricultural research, education, and promotion in the United States protected by law. Agriculture legislation also prescribes that each state should provide the same amount of funds as federal grants for agriculture in science and technology promotion. Holland, Japan and other countries also have well-developed agriculture research and extension systems. These countries carry out agricultural research according to their national conditions and search for suitable modern technology. For example, USA is highly mechanized while Japan is highlighting the biochemistry, mechanical technology and so on. Eventually they all have highly efficient agricultural industries.

In view of this, China should give full play to agricultural scientific research and technology advantages, focus on investment of technologies in the construction of modern agriculture, improve the key technologies and raise science and technology promotion system in order to promote technological progress and agricultural production efficiency.

4.4 Establish the agricultural social service system

In developed countries, agricultural social service is mostly in provision of technical, production, supply and marketing, credit, insurance and other services. American agriculture community covers a broad area of almost all kinds of agricultural production and operation. Farmers who directly do tilling are only 3 percent of the total population while the number of people in supporting services accounts for 27%. Japan Agricultural Cooperation is close-knit in the formulation of policies and regulation of agriculture. On behalf of the farmers' political and economic interests, such cooperation participates in organization and management functions and becomes a strong intermediate among government, market and farmers.

Chinese farmers' operation is small in scale, insufficient in technical information, difficult in market accessing and low in agricultural efficiency. Thus, the development of social service system of

agriculture is an urgent task. In quantity, China's industrialized agricultural intermediary organizations have reached to 160,000. However, they are active in the county and mainly focus on marketing with imperfections. As a result, China should set up legislation to promote the establishment of various agricultural social service organizations, and promote these organizations to become fine media to let farmers enter the market and finally form scaled operation.

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