



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Theoretical Study of Agricultural High-tech Industrialization

Jian XU, Xianming WU*

Economics and Management School, Wuhan University, Wuhan 430072, China

Abstract This paper introduces the characteristics of the agricultural high-tech industries, and points out that the agricultural high-tech industries are intelligence-intensive and knowledge-intensive industries with the characteristics of high investment, high risk, high value-added, which focuses on constant innovation, having strong horizontal and vertical linkages with other enterprises and showing the trend of internationalization. The connotation of agricultural high-tech industrialization is analyzed as follows: Agricultural high-tech industrialization is the process of transformation of the agricultural high-tech achievements to the agricultural high-tech industries; essentially the marketization and commercialization of agricultural high technology; the manifestation of scale and level of agricultural high-tech industries; the manifestation of social impact, social status and social role of agricultural high-tech industries. The development strategies are put forward for agricultural high-tech industrialization: (1) Bringing the research of agricultural high technology into the orbit of the market economy; (2) Implementing the new mechanism to closely link agricultural high technology with modern rural enterprises; (3) Building the agricultural high-tech team with a larger size and high level; (4) Further improving the construction of the agricultural high-tech industrial development zone; (5) Solving the issues concerning agricultural intellectual property and patent; (6) Increasing policy guidance and support efforts for agricultural high-tech industries.

Key words Agricultural high technology, Industrialization, Connotation, Development strategy

Agricultural high-tech industrialization can effectively improve agricultural technology content, form new industries and new economic growth points, which is one of the effective ways to increase farmers' income in the new rural construction. China is now in the important stage of transforming from traditional agriculture to modern agriculture. China's agricultural high-tech industries have made certain achievements, but there are still many problems, such as lack of supply and effective demand of agricultural high technology, shortage of effective mechanism for the promotion of agricultural high technology, imperfect organization system of agricultural high-tech industrialization, and lack of agricultural high-tech talent^[1]. Based on the characteristics of agricultural high-tech industries, we analyze the connotation of agricultural high-tech industrialization and put forward corresponding development strategies.

1 Characteristics of agricultural high-tech industries

High-tech development is closely linked to the establishment of high-tech industries. Only when the agricultural high technology forms industries can it fully play its role. Thus, in recent years, countries in the world have been adjusting high-tech development strategy, forming a new wave of high-tech industrialization; the core is to achieve the integration of science and technology and economic development. For example, the U. S. government proposed to change the management system of science and technology activities from the linear mode of "basic research-applied research – technology development – industrialization" to the integration mode that can ensure mutual coordination and promoting among basic research, applied research, technology development and in-

dustrialization. The basic research and applied research results provide new ideas, new ideas and new methods for agricultural high-tech industries. Technology development and product development are the ties for science and technology to convert into productivity; the development goal and competitiveness of high technology rely on industrialization and economies of scale.

Therefore, agricultural high-tech industries often integrate science, agriculture, industry and trade. The agricultural high-tech industries often have the following characteristics:

(1) Agricultural high-tech industries are intelligence-intensive and knowledge-intensive industries. This is reflected in the greater proportion of the enterprise workers with high education level and high quality than that of workers in traditional agricultural technology industries.

(2) Agricultural high-tech industries focus on constant innovation. In the process of operation, it is necessary to continue to increase investment in research and development, attract talents with innovative spirit and ability to open up, accelerate the introduction of the latest products and capture the market^[2].

(3) In comparison with traditional agricultural technology industries, agricultural high-tech industries have characteristics of higher investment, higher risk and higher value-added. Therefore, it requires a certain amount of economic strength, coupled with the spirit of innovation.

(4) There are stronger horizontal linkages and vertical linkages between agricultural high-tech industries and other industries. It is not just to meet the needs of the rural population and the development of agricultural technology, but also directed at the whole society.

(5) Agricultural high-tech industries have a cosmopolitan nature. High technology must have high value-added, and get domestic and international recognition. As a high-tech enterprise, it should constantly introduce its own leading technology products,

and participate in international competition, to meet the challenges of goods internationalization and production internationalization.

2 Connotation of agricultural high-tech industrialization

Correct understanding of the entire connotation of agricultural high-tech industrialization is an important prerequisite for accelerating the industrialization process of agricultural high-tech industrialization. Agricultural high-tech industrialization is the integration of multiple connotations^[3]. Agricultural high-tech industrialization refers to the process of agricultural high-tech achievements transforming into agricultural high-tech industries, that is, the agricultural high-tech research results are absorbed and utilized by the whole society, to realize the technological, economic and social value. This value can be realized in a variety of forms.

2.1 Agricultural high-tech industrialization is the agricultural high-tech marketization and commercialization in essence Agricultural high-tech industrialization actually transforms science and technology into the business behavior. Scientific and technological research is usually divided into three categories, namely basic research, applied research and development research. In many developed countries, applied research and development research are carried out in the enterprises, rather than research institutions. The enterprise is the main body of the industry, and the adjustment of the industrial structure rely more on the enterprise. A major weakness of many businesses is to be only engaged in the production, taking scientific research as the business of scientific research institutions. For the modern enterprise, it should achieve the combination of production and research. The enterprise is not only a production base, but also a scientific research base. Therefore, it is necessary to push up the agricultural high-tech research to market, and break the original organization, to achieve the process of industrialization of agricultural high-tech organization mechanism.

2.2 Agricultural high-tech industrialization is the manifestation of the scale and level of agricultural high-tech industries

The agricultural high-tech researches are included into the range of social production, and the large social production is adopted, forming large scale and high level of specialized production system. In many developed countries, the production system of high-tech industries has taken shape, and the modernization level is high.

2.3 The agricultural high-tech industrialization in a broad sense is still the manifestation of social impact, social status and social role of agricultural high-tech industries

It marks a pivotal role of agricultural high-tech industries in the national economy and social development. As a matter of fact, agricultural high-tech industrialization is a leap in the development of the agricultural high technology. At this stage, the number of its results, scale, social status, role and impact all reach unprecedented height. Therefore, achieving the transformation of the agricultural high-tech industrialization is a daunting task, and a complex systematic project, which requires a solid foundation and some basic

conditions.

3 Strategies for the development of agricultural high-tech industrialization

3.1 Bringing the research of agricultural high technology into the orbit of the market economy In order to achieve agricultural high-tech industrialization, it is necessary first to establish the guiding ideology of commercialization and marketization of science and technology to include the agricultural high-tech research into the orbit of the market economy. It is the awareness premise for the access to market. For a long time, the main body of China's agricultural science and technology is not clear.

In fact, the government can not become the subject of science and technology. In the situation of current conditions, the development of agricultural high-tech industries should abandon the concept of planned economy to adapt to the market economy system and promote the progress of science and technology in accordance with the laws of the market economy. The market economy is the largest contemporary social background and social existence, so it certainly should be the starting point and destination of the agricultural high-tech research. Therefore, the high-tech agricultural research and extension workers should strive to nurture and develop consciousness and conscious behavior of always paying close attention to the market and participating in the competition.

3.2 Implementing the new mechanism to closely link agricultural high technology with modern rural enterprises The competitiveness of enterprises relies on product competition, and product competition relies on competition of science and technology, so enterprises should take research and development work as the basis of survival and development of enterprises.

On the one hand, we should gradually shift some of the high-tech agricultural research institutions to the agricultural high-tech enterprises in accordance with the principle of "self-management, self-financing, self-development, self-restraint" and the market mechanism; streamline the high-tech agricultural research institutions, especially those agricultural research institutions not engaged in production; on the other hand, the enterprises applying agricultural high technology and especially those agro-industrial and township enterprises should pay attention to raising research funding; at the same time, the enterprises with conditions should gradually streamline the jumbled regulatory agencies, set up research institutions and strengthen research capacity.

3.3 Building the agricultural high-tech team with a larger size and high level The improvement of economy, science and technology and social modernization leads to high standardization of quality requirements of the high-tech agricultural scientists. The most prominent changes are as follows:

(1) The requirement level is high. Professional ethics, courage, knowledge and operational capacity all require a new level. As far as the range of knowledge, the technical expertise level should be required, and the management level and market analysis and forecast level should also be required.

(2) The team is required to have large scale. The overall structure is reasonable, including the rationalization of the structure of division of labor, profession structure, knowledge structure and age structure. Especially the structure of division of labor, and the development of agricultural high-tech industries need all kinds of suitable professionals. In other words, in order to make high-tech achievements enter the industry, there must be a form of social production. In addition to a research team, it still needs a high-quality team of management personnel and high-level producers.

Thus, we can have three feasibility conditions for the conversion of high technology into productivity, namely feasibility in science, feasibility in research and development of equipment, technology and engineering, and feasibility in economic returns.

3.4 Further improving the construction of the agricultural high-tech industrial development zone Agricultural high-tech industrial development zone is a social phenomenon of coexistence with agricultural high-tech development, and a new form of organization and management combining technology and economy. The role of it in promoting agricultural high-tech industrialization is multifaceted.

First, the high-tech industrial development zone can get more research funding, so as to strengthen the mutual support mechanism between research teaching units and production enterprises, making the invention, experiment, and use in the production process nearly integrated. This will inevitably lead to accelerated industrialization and commercialization process of technological achievements.

Second, many agricultural high-tech industrial development zones established in the outskirts of the city, are both the distribution centers for science and technology talent, and the propeller for suburban economic revitalization and rapid growth. The knowledge, technology and talents are intensive in the high-tech development zone, making it easy to make breakthrough in highly difficult technology and major technology, conduct supporting development of the industry series technology, so that high technology and products can be constantly provided to many industries and sectors, and a group of senior scientific research personnel and technology entrepreneurs can be nurtured.

3.5 Solving the issues concerning agricultural intellectual property and patent High technology must have high value-added, which is determined by the originality. The originality must get domestic and international recognition, and we have to apply for patent, participate in the competition, and learn to use patents to protect intellectual property. With the continuous development of the agricultural high technology, issues concerning intellectual property protection have also attracted the attention of the agricultural research institutions in various countries. The laws related to the intellectual property of protected agricultural field mainly include Plant Breeders Rights Act (also known as the Plant Variety Protection Act) and the general patent law.

Most of the countries implementing Plant Variety Protection Act are the treaty powers of the Geneva International New Plant Varieties Protection Convention. Since the Convention was signed in 1961, most industrialized countries have adopted Plant Variety Protection Act to protect new varieties of plants. Most of the countries establishing the patent system implement patent protection on food, animals and plants, microorganisms and their products.

With the rapid development of agricultural biotechnology, the developing countries have begun to realize the importance of protection of various germplasm resources, and have begun to pay attention to the value of these germplasm resources; they do not allow the outflow of special germplasm resources. The measures for solving disputes on intellectual property problems of the foreign agricultural areas often include arrangement for cross-licensing, genetic material exchange agreement, compensation for the use of the protected variety and licensing. In the process of future agricultural high-tech industrialization in China, we should learn from the experience of foreign countries, to solve issues concerning intellectual property and patent.

3.6 Increasing policy guidance and support efforts for agricultural high-tech industries The agricultural high-tech industrialization will be a great change in China's science and technology and economic structure, and its success or failure will have a significant impact on the reform of agricultural science and technology in China and the agricultural extension system and the development of entire rural economy. To ensure the smooth progress of the agricultural high-tech industrialization, in addition to good market conditions for its survival and development, we must also have reasonable policy orientation and policy protection.

First of all, it is necessary to give a clear definition of new operation mechanism and system of agricultural high-tech industries, such as property rights system, the distribution system, personnel system and the tax system, so that agricultural high-tech industries are revived.

Secondly, it is necessary to offer preferential policies on input to the emerging agricultural high-tech industries, to gradually establish multi-channel, multi-form and multi-level social investment system and reasonable investment way.

Finally, it is necessary to develop and improve the legal system related to agricultural high-tech industrialization for the implementation of legal management.

References

- [1] SONG CQ, XIAO M, WANG M. Analysis on development status of agricultural hi-tech industrialization and its countermeasures in China [EB/OL]. [2006-03-08] <http://www.cqagri.gov.cn/detail.asp?pubID=166908>.
- [2] MA LH, YANG HZ, YAN PJ. Measuring research on county agricultural technological innovation ability index [J]. *Asian Agricultural Research*, 2011, 3(6):16-20. (in Chinese).
- [3] ZHAO QH. The theoretical connotation and systematic essence of core competence of agricultural high-tech enterprises [J]. *Asian Agricultural Research*, 2010, 2(4):22-26. (in Chinese).