

## Policy Change, Science and Technology Drive and Agricultural Modernization Process

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### Abstract

**Agricultural modernization is the foundation of socialist modernization with Chinese characteristics. The formulation of agricultural policy affects the progress of science and technology, while the effect of science and technology popularization directly promotes the process of agricultural modernization. Agricultural modernization in our country has experienced the mechanization, scientific, four stages of industrialization and information, through the course of our country agricultural policy change, analyzes the agricultural policy, science and technology driven and the link between the agricultural modernization, and puts forward much starker choices-and graver consequences-in period on the basis of building science and technology driven system, countermeasures and Suggestions to promote agricultural modernization.**

### Keywords

**Policy Changes; Technology Driven; Agricultural Modernization.**

### 1. Introduction

Policy change is the reform activity of current policy, which is constantly evolving due to the continuous influence of external and internal factors. Any public policy needs to be dynamically adjusted according to the changes in the surrounding environment to adapt to the new development situation. Agricultural modernization is a process of transformation from traditional agriculture to modern agriculture. "Introducing new production factors into traditional agricultural sector is the key to transform traditional agriculture". the innovation of agricultural science and technology is the fundamental driving force of agricultural modernization development and the core factor of the transformation from traditional agriculture to modern agriculture. Agricultural modernization is the foundation of socialist modernization with Chinese characteristics, and is also the focus of the Party, the government and all sectors of society. Since 2013, the central Government has successively issued four No.1 documents focusing on the development of agricultural modernization, taking agriculture as the top priority of the work concerning agriculture, rural areas and farmers. Xi Jinping stressed that agricultural modernization is the weakest link in promoting the synchronization of the four modernizations of new industrialization, informatization, urbanization and agricultural modernization, and special attention must be paid to it. On the basis of sorting out the changes of agricultural policy in China, this paper analyzes the influence of modern agriculture on the

progress of science and technology and the promotion of scientific and technological innovation on the process of agricultural modernization, and puts forward the countermeasures and suggestions for constructing the science and technology driven system and promoting the process of agricultural modernization in the 13th Five-Year Period.

## **2. Agricultural Machinery Engineering Technology Innovation and Agricultural Mechanization in Planned Economy Period**

After the founding of new China, the first generation of central collective leadership in order to solve the problem of agriculture that the foundation of the national economy, put forward the "technology first, to promote all sectors with xing" of economic development decision [4], to the "four modernizations" construction as the center to promote agricultural modernization, explore agricultural economy driven by science and technology development road.

### **2.1. Agricultural Mechanization Policies Promote Technological Innovation of Agricultural Machinery Engineering**

In the early 1950s, MAO Zedong put forward the guiding ideology of "two steps" for agricultural development. The first step is to realize collectivization, and the second step is to realize agricultural mechanization and electrification. Subsequently, the agricultural development ideas such as water conservancy being the lifeblood of agriculture and gradually increasing chemical fertilizers were put forward. In 1951, the State issued the Plan for Agricultural Scientific Research 1951-1955, focusing on farming methods, pest and disease eradication, seed screening and other issues in the field of agricultural technology. In 1954, Zhou Enlai was first put forward the demand of the "modern agriculture", through a large water conservancy project construction to ensure agricultural production from the influence of drought and flood disasters, by promoting the new tools, water pumps and water wheel to improve agricultural production conditions, by improving farming techniques and the use of improved varieties, such as high-quality fertilizer increase agricultural productivity. In 1956, the State promulgated the National Plan for The Development of Science and Technology from 1956 to 1967, making the improvement of crop varieties and the increase of grain yield per unit a key work of agricultural science and technology. In 1958, MAO Zedong proposed the eight-character Agricultural Constitution of soil, fertilizer, water, seed, density, protection, management and industry according to the current situation of China's agricultural development and scientific and technological achievements, including land improvement and planning, fertilizer and superior seed selection, close planting, protection and management of crops, and innovation of agricultural machinery and tools. In the 1960s, Zhou Enlai proposed the "four modernizations" of agricultural modernization, including farming, transportation, mechanization of processing, irrigation engineering, water conservancy, fertilizer research and development, and electrification of pipe network. In his 1964 government work report, he elevated modern agriculture to the height of national strategy. Further put forward the development goal of "building China into a powerful country with modern agriculture, modern industry, modern national defense and modern science and technology". During the Cultural Revolution, political movements were carried out all over the country, agricultural research institutions were damaged to a certain extent, and agricultural modernization developed slowly.

During this period, the country chose the road of industrialization supported by agriculture. Agricultural development mainly served the needs of industrialization, and the processing industry of agricultural and sideline products was mainly operated by state-owned enterprises. The original accumulation of state-owned assets mainly depended on the difference between industry and agriculture. the natural links between urban and rural areas, citizens and farmers, industry and agriculture, industry within rural areas and various industries between urban and rural areas have been cut off, hindering the development of agricultural modernization.

## **2.2. Agricultural Machinery Engineering Technology Innovation Drives the Process of Agricultural Mechanization**

In order to promote the process of agricultural mechanization, the state, through the overall planning of agricultural policies, has carried out large-scale agricultural infrastructure construction and agricultural machinery manufacturing nationwide, focusing on water conservancy and mechanization. During this period, the state invested a total of more than 100 billion yuan in the construction of water conservancy projects, and built more than 60,000 small rural hydropower stations and more than 47 million kilowatts of drainage and irrigation machinery, irrigating 47 million hectares of farmland, laying a solid foundation for agricultural mechanization through technological innovation in agricultural machinery engineering. At the same time, in order to increase the strength of agricultural science and technology innovation and accelerate the process of agricultural mechanization, the state has set up agricultural research institutions at different levels from the central to local governments through planning and arrangement.

On May 1, 1949, the North China Institute of Agricultural Sciences was founded, which was the first agricultural research institution in New China. Since then, a large number of local agricultural scientific research institutes and comprehensive agricultural specialized research institutions have been established. In November of the same year, the Chinese Academy of Sciences (CAS) was founded with seven agriculture-related research institutes, which are the earliest state-level agricultural research institutions in China. In 1952, the state reorganized and built a large number of agriculture and forestry colleges. On March 1, 1957, the State Council approved the establishment of the Chinese academy of agricultural sciences, the agency as a national agricultural research institutions, at the time for the national agricultural infrastructure and the major task of agricultural science and technology innovation, plays a major agricultural science and technology problems, develop agricultural science and technology talents, the important role of promoting agricultural mechanization process. Under the guidance of agricultural science and technology policies with mechanization as the core, these research institutions have adopted measures such as building agricultural machinery projects and cultivating fine seeds to improve grain output and production efficiency. In the 1960s and 1970s, grassroots agricultural research institutions nationwide were set up under the state's planned arrangements, and a "four-level agricultural science network" of prefectural and county agricultural and forestry research institutes -- commune agricultural technology stations -- production teams and science and technology extension stations -- production teams and science and technology groups was generally established in all localities, thus accelerating the effective transformation of scientific research achievements.

In short, during the collectivization period, through the establishment and development of agricultural scientific research institutions, China formed an agricultural science and technology driving system with deepening seed production technology, building large-scale water conservancy projects and promoting agricultural machinery products as the core, and embarked on the road of agricultural mechanization. However, due to the strong color of planned economy in this period, the government, as the main body of technology selection, mainly promoted the development of agricultural science and technology through administrative orders. In addition, the low level of agricultural science and technology made it difficult to stimulate the internal motivation of agricultural science and technology innovation.

## **3. Innovation of Experimental Technology and Scientization of Agriculture in the Early Stage of Reform and Opening up**

The early reform and opening up, the central in Deng Xiaoping's "science and technology is the first productive force", under the guidance of the idea put forward "through the improvement

of agricultural science and technology content of developing modern agriculture", agricultural modernization road from mechanization to scientific, across the country have established a large number of scientific experiment base, We will actively promote the transformation of agricultural scientific and technological innovations into advanced productive forces and promote the development of modern agriculture.

### **3.1. Agricultural Scientific Policy Promotes Innovation of Experimental Technology**

In March 1978, the Outline of the National Plan for The Development of Science and Technology for the period 1978-1985, adopted at the National Science Congress, stressed that innovation in agricultural science and technology should be guided by the concept of scientific development, and called for the establishment of agricultural scientific experimental bases throughout the country and the strengthening of scientific research in farming techniques, cultivation techniques of superior varieties and disaster prevention and control techniques. In September 1979, the fourth plenary session of the eleventh through the "about to speed up the decision some issues of agricultural development, proposes establishing and perfecting the mechanism of agricultural scientific research, professional and technical personnel training to master modern science and technology and scientific management personnel, to the rural cadres and peasants popularize knowledge of science and technology, equipped with advanced equipment for agricultural development, Improve farmers' agricultural technology level. In 1980, Deng Xiaoping pointed out clearly at the central Work Conference that "China's agricultural modernization should follow a path that suits China's situation". From 1982 to 1983, with the establishment of the national Agricultural technology extension station and agricultural science and Technology Committee, China's agricultural technology extension system has been rebuilt and developed. In 1985, in order to adapt to the requirement of market economy, there are serious defects in our country science and technology system reform, use the wisdom of science and technology and create talents, improve the ability and speed of transformation of scientific and technological achievements, the party central committee and the State Council promulgated the "decision on reform of the system of science and technology", put forward the requirement of agricultural science and technology system reform, Promoting the transformation of rural economy to specialization, commercialization and modernization marks that China's agricultural science and technology has entered the period of institutional reform. In the reform of agricultural science and technology system in China, enterprises and farmers are the practice subjects of agricultural science and technology innovation, and the state, as the main body of policy supply and financial support, its main function is to organize and coordinate the development of agricultural science and technology. In 1988, Deng Xiaoping put forward the idea that "agricultural modernization is not only about mechanization, but also about the application and development of science and technology", calling for the integration of modern production factors into agriculture. The scientific agricultural policy in this period not only led to the rise and development of the rural secondary and tertiary industries, but also greatly improved the income level and quality of life of farmers.

The modern agricultural policy in this period gradually led the way of agricultural development from the mechanization in the collectivization period to the road of scientific development, and then promoted China's agricultural modernization into the exploration and development period of optimizing agricultural structure, strengthening agricultural science and technology education, and introducing modern production factors. At the same time, with the establishment and expansion of agricultural science and technology research institutes and experimental bases, agricultural science and technology has gradually become the direct driving force to promote agricultural modernization, and agricultural scientific and technological achievements have been gradually promoted and applied. In particular, China has

continuously strengthened international economic exchanges and cooperation, and introduced a large number of scientific experimental technologies and innovative models and successful experiences in production, processing, operation and management from the world's agricultural developed countries, thus broadening the development path of China's modern agriculture.

### **3.2. Innovation of Experimental Technology Drives Agricultural Scientific Process**

In the early years of the reform and opening up, driven by the national agricultural scientific policy, especially the reform of agricultural science and technology system, the establishment and development of a large number of agricultural modernization research institutes and experimental bases, as well as the transformation and application of a large number of scientific experimental results, promoted the perfection and innovation of modern agricultural science and technology theory and practice.

In 1978, the Chinese Academy of Sciences submitted to The State Council the Report on The Request for Instructions on the Establishment of Comprehensive Experimental Bases for Agricultural Modernization, which advocated the establishment of a number of specialized and comprehensive experimental bases for agricultural modernization throughout the country and was approved by the central government. Subsequently, a large number of agricultural and forestry, microbiology and other experimental centers and scientific experimental bases for aquatic multiplication have been established throughout the country to serve the development of local agriculture, forestry and animal husbandry and explore the road of China's agricultural modernization. In April of the same year, the Chinese Academy of Sciences convened a conference on the Comprehensive Scientific experimental bases for agricultural modernization in various regions, and decided to establish scientific experimental bases for agricultural modernization in Heilongjiang, Hebei and Hunan provinces. The three provinces would decide the research direction and focus of the experimental bases according to their own characteristics and regional conditions. These three provinces are required to provide experience for the construction of experimental bases in other provinces on the basis of exploring the path of agricultural modernization development in their own provinces. At the same time, the Chinese academy of agricultural sciences organization of domestic agricultural research experts and scholars on the goal, the development of agricultural modernization path and other special investigation and research, and strengthen the innovation mode of western developed country modern agriculture and potential problems in-depth analysis, in order to provide lessons for China's modern agriculture development. In 1979, the Ministry of Agriculture organized a symposium on "establishing pilot counties for agricultural science and technology testing, popularization and training centers", requiring the establishment of agricultural technology popularization centers at the county level. By 1987, a total of 906 county-level agricultural technology extension centers had been built and accepted, and all counties had books, materials, archives, laboratories, showrooms, training sites and test bases necessary for their work. At the same time, many places also changed the original county-level agricultural mechanization research institutions into agricultural mechanization promotion institutions. Among the 1,262 county-level agricultural mechanization research institutions in China, 735 of them were changed into agricultural mechanization technology promotion service stations, greatly strengthening the promotion of agricultural technology. at the same time, mass agricultural technical institutions in various localities also developed rapidly. According to statistics of the China Association for Science and Technology, by the end of the 1980s, there were 75,000 research institutes (associations) in more than 160 specialized categories nationwide, with more than 1.47 million rural households participating.

In a word, through the national agricultural scientific policy in the early years of the reform and opening to the outside and the advancement of agricultural science and technology system reform, set up a large number of agricultural research institutions and agricultural micro-economic organization, to set up the experimental technology development and service entities, enrich the agricultural technology innovation carrier, pay more attention to scientific experiments and scientific research test, enhance the level of the commercialization of the content of science and technology of agriculture and modern agriculture, And through agricultural technology extension mechanism innovation for rural economic development into new vitality.

#### **4. High and New Technology Innovation and Agricultural Industrialization under Market Economy System**

From the end of the 20th century to the beginning of the 21st century, with the establishment and development of China's socialist market economy system, agricultural modernization, as an important part of China's market economy, has been developing rapidly towards industrialization, commercialization and socialization, and has put forward higher requirements for agricultural science and technology. The application of high and new technology based on biology and information technology to modern agriculture has formed the industrialization mode of developing modern agriculture.

##### **4.1. Agricultural Industrialization Policy Promotes New and High Technology Innovation**

In 1992, the central committee of the Communist party of China under the State Council issued "about shunt talents, adjust the structure, further deepening the reform of the science and technology system several opinions, put forward in the field of agricultural science and technology to" hold one end, and let go of a "policy requirements, encourages the agricultural industrialization management pattern, strong investment in agricultural science research, allowing flexibility of all kinds of agricultural technology research and development and promotion. In 1993, the central Committee of the Communist Party of China promulgated the Law of the People's Republic of China on Agricultural Technical Popularization, providing legal norms for the construction of agricultural technical popularization system. In 1995, under the guidance of the national strategy of "Rejuvenating the country through science and education", the Ministry of Agriculture issued the Decision on Accelerating the Progress of Agricultural Science and Technology, putting forward the requirements of improving the technical service system through product research and development and technology promotion of science and technology enterprises, and defining the development path of agricultural industrialization. According to the ninth Five-Year Plan of The State, the requirements of agricultural applied research are "subject comes from production, results serve production, and development depends on production", and the project commissioning system of "local stage, science and technology play" is adopted to focus on the development of large-scale breeding of livestock and poultry and the research and development of high-yield and high-efficiency comprehensive technical system of main cash crops. In 1998, the Third Plenary Session of the 15th CPC central Committee adopted the Decision on Some Major Issues concerning Agriculture and Rural Work, emphasizing that "agricultural industrialization is an effective path to realize agricultural modernization in China and can solve the problem of farmers' application of science and technology in market-oriented and large-scale operation". In 1999, the central Committee of the Communist Party of China issued the Decision on Strengthening Technological Innovation, Developing High Technology and Realizing Industrialization, which called for the market-oriented development of agricultural technology and the transformation of scientific and technological achievements into commodities through the application and promotion of high

and new technologies. Since entering the 21st century, the state has taken measures such as actively adjusting the structure of agricultural investment, strengthening the construction of agricultural infrastructure, strengthening the promotion of agricultural high and new technology and the construction of market information service system to intensify the innovation of agricultural high and new technology.

During this period, China's agricultural modernization combined with high and new science and technology, management technology and processing technology, realized the industrialization development of the whole process of production and operation under the market economy system, while improving agricultural productivity and farmers' income, paid attention to the protection of the ecological environment, and promoted the steady progress of China's modern agriculture.

#### **4.2. High-tech Innovation Drives the Process of Agricultural Industrialization**

After the establishment of the socialist market economy, with the introduction and implementation of agricultural science and technology policies, the utilization rate and output rate of agricultural production materials have gradually increased, and the supply of agricultural products has also been effectively increased. During this period, guided by market allocation and government regulation, the state intensified efforts to promote the improvement of agricultural innovation capacity and the transformation of scientific and technological achievements with the purpose of strengthening the wide application of biotechnology and information technology and speeding up the combination of basic research and technological innovation. Under the promotion of the policy of "stabilizing the market and opening up the market", scientific research institutions have cooperated with agricultural enterprises in the form of technology investment, technology transfer and technical services according to their own development needs. The economic entities developed by agricultural research institutions have doubled in five years. In order to adapt to the new trend of the development of high-efficiency factory agriculture in the world in the new century, the state has organized the establishment of a number of industrialization engineering demonstration zones and science and technology demonstration zones, integrating modern industrial engineering technology and high and new agricultural technology, and building a model of agricultural demonstration zones supported by science and technology. By the beginning of the 21st century, although the contribution rate of agricultural science and technology in China is still far behind that of developed countries, its share in China's agricultural growth has increased significantly. The fifth Plenary Session of the 16th central Committee of the Communist Party of China put forward the requirement of adhering to the scientific outlook on Development and promoting modern agriculture into a new stage of comprehensive, coordinated and sustainable development.

In short, after the establishment of the socialist market economy system, with the extensive application of biotechnology and information technology and the continuous enrichment of agricultural technological innovation carriers, agricultural modernization policy has steadily moved toward industrialization. In the agricultural industrialization policy support, as the technology popularization system, legal system, capital support system, the continuous improvement of the scientific research innovation system and the talent training mechanism, service mechanism, international cooperation mechanism to improve the integration mechanism, market-oriented agricultural industrialization mode gradually formed and developed rapidly.

## 5. Countermeasures and Suggestions for Accelerating Agricultural Modernization during the 13th Five-Year Plan Period

To guide the development of agricultural science and technology by top-level design, the report on the work of the Government in 2016 requires the government to grasp the orientation of modern agricultural development and inject vitality into the development of agricultural science and technology through top-level design. Above all, aggrandizement is opposite agricultural science and technology "first productivity" understanding. The value of science and technology lies in having advanced development concepts, constantly meeting and creating demands, giving full play to the role of science and technology as the first productive force, and forming a model of world-class modern agriculture. Agricultural development in our country due to excessive emphasis on grain yield and economic indicators of development mode, lead to damage the ecological environment and carrying capacity is close to the limit, the restriction of the agricultural ecological environment and resource conditions reversed transmission change the way of agricultural development, give play to the role of agricultural science and technology "the first productive force", by the science and technology promote the development of modern agriculture. Secondly, we should focus on the transformation of agricultural scientific and technological achievements. At present, China's scientific and technological innovation capacity is insufficient, the construction of talent team is relatively backward, and the ability of scientific research achievement transformation is weak. To address scientific and technological bottlenecks in agricultural development, first, we need to establish systems and mechanisms conducive to innovation in agricultural science and technology, improve agricultural science and technology management systems and systems for project application, funding and process management, and achieve breakthroughs in core technologies and innovation in agricultural science and technology. Second, we will focus on developing non-profit agricultural research and build a platform for the rapid development of non-profit agricultural research.

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