



# Analysis on the Development Mode and Optimization Path of Digital Agriculture in Chengdu

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**Abstract.** As a new agricultural development method, digital agriculture uses information technology to improve the efficiency and quality of agricultural products. Traditional farming methods are human-centered and prone to problems such as low output, large fluctuations, and unstable quality. Digital agriculture relies on advanced technology and data, implements precise management, and improves the efficiency of the entire industry chain and reduces costs through big data and artificial intelligence. This transformation is one of the classic cases of the development of digital traditional industries, which will bring new models and opportunities for the development of modern agriculture.

**Keywords:** Chengdu City; Digital Agriculture; development mode; optimization path.

## 1 Introduction

Agriculture is one of the industries where the contradiction between the rapidly expanding and changing population and the global resource market in the increasingly serious shortage is concentrated <sup>[1]</sup>. Under the background of the world's agricultural modernization and the current environment of the sustained and rapid development of the digital economy industry Under the background, digital agriculture is used as one of the new models of economic development. Digital agriculture is a new agricultural development method that uses information technology to improve the efficiency and quality of agricultural products. It mainly uses visual performance, digital technology and intelligent management methods to improve the efficiency and quality of agricultural products. This approach is also one of the classic examples of developing digital traditional industries <sup>[2]</sup>.

## 1.1 The Development Process of Digital Agriculture at Home and Abroad

### Research on the Connotation of Digital Agriculture.

Digital agriculture was first formally proposed by academicians of the American Academy of Sciences and Engineering<sup>[3]</sup>. What is now recognized as an official concept refers to the organic combination of high and new technologies such as 3S system, crop production management and decision support system, IT technology, network communication technology and agricultural science. Through real-time monitoring, we can manage crops and the environment at the micro and macro levels. We regularly collect elemental and environmental information required during crop growth and use this information to generate a dynamic spatial information system. Digital agriculture includes four dimensions: agricultural Internet of Things, agricultural big data, precision agriculture and smart agriculture. It is a concept based on data-driven. Through the intersection of the four parts, we have gradually established a complete data collection and classification., Application and mining system to provide services for agricultural production.<sup>[4]</sup>

### Development Process of Foreign Digital Agriculture.

Arslan A(2015) studied the impact measures of intelligent agriculture and proposed that informatization is a breakthrough to solve the problem of agricultural development, in which the application of cloud computing, Internet of things and other technologies is an important driving force.<sup>[5]</sup>The application and development stages of foreign computer and information technology in agriculture are mainly divided into five stages<sup>[6]</sup>. In 1960, scientific calculation of agricultural data was used to promote the quantification of agricultural science and technology. The agricultural database was developed in 1970. From 1980 to 1990, it focused on the establishment and development of agricultural knowledge engineering and expert systems. After 1990, the focus was on the research and development of agricultural information service networks. Entering the 21st century, it has reached a new stage of standardized networking of agricultural information services. With the help of IT technology and 3S technology, the application technology of obtaining, processing and transmitting all kinds of agricultural information in developed countries has entered the practical stage.

### Development Status of Domestic Digital Agriculture.

In recent years, China has made great progress in using digital technology to promote the transformation of traditional agriculture, and has become one of the countries with the largest investment in digital transformation in the Asia-Pacific region.<sup>[7]</sup> At present, a series of databases have been established, including China's agriculture and forestry literature database, agriculture, animal husbandry and fishery science and technology achievements database, China's animal husbandry comprehensive database and agricultural cooperative economy database. In addition, we have also introduced embedded handheld agricultural IT products, realized intelligent control of greenhouse environment, established a digital agricultural macro-monitoring system, and achieved important results in agricultural bioinformatics research and application.

## 1.2 Development Status of Digital Agriculture in Chengdu

Pujiang County, Chengdu attaches great importance to the application of Internet information technology in the agricultural field, vigorously supports leading enterprises in agricultural industrialization to carry out digital agricultural construction pilot projects, and applies information technology to agricultural production, operation, management, service and other fields. At present, Sichuan Sunshine Taste Fruit Industry Co, Ltd. has established a traceability system for agricultural products (fruits) in Pujiang by combining the construction of the Internet of Things and integrating planting link data to control quality and safety from the source. That is, the production end starts from recording raw material batches, and records all operation information such as fruit storage, delivery, sorting and packing. Relying on its own fruit planting demonstration base, the company has established an intelligent Internet of Things system integrating Internet, Internet of Things, wireless communication and cloud computing technologies to realize the comprehensive management of big data; it has established an information storage management system for agricultural products to realize the visual management of agricultural production; it has established an intelligent warehouse management system to realize accurate material control.

### **The Institutional System is Becoming More and More Perfect.**

The Digital Agriculture Rural Development Plan (2019-2025) calls for promoting the development and application of digital technologies in the agricultural and rural areas. By 2025, the proportion of national agricultural digital economy in agricultural added value, the proportion of online retail sales of agricultural products in total agricultural products transactions will reach 15%, and the Internet penetration rate in rural areas will further increase to 70%. As a guiding document for promoting agricultural and rural modernization in Sichuan Province during the 14th five-year Plan period, the Plan for promoting agricultural and rural modernization in Sichuan Province outlines the "road map" for promoting agricultural and rural modernization in Sichuan in the next five years ". Chengdu, as the experience area of national urban and rural reform and development, the first batch of contemporary agricultural technology areas, the second wave of national rural rectification demonstration area and innovation and reform experimental area, Chengdu has always believed that the construction of intelligent agriculture is the accelerator of agricultural development mode.

### **Development Direction of Digital Agriculture.**

Chengdu will strengthen the development of modern agricultural seed industry, modern new agricultural equipment, modern agricultural technology drying and cold chain logistics center three major modern leading strategies to support new industries, regional classification focus on promoting the construction of new agricultural technology modernization key demonstration area base, strive to ensure that by 2025, the province's modern agricultural development "10+3" new industrial system is basically fully formed, build and support a batch of modern ecological agricultural park cascade development and management systems that are in line with the actual situation of the

Sichuan project of the Ministry of Agriculture, drive farmers into the track of the development of modern agricultural parks, and form a new development of the deep integration of the rural economy trend.

## **2 Analysis on the Development Model of Digital Agriculture in Chengdu**

### **2.1 The Policy Environment Continues to Optimize and Improve**

As an agricultural leader in Sichuan, Chengdu attaches great importance to the three rural issues, and the development of digital agriculture is the key point of Chengdu. The Chengdu Municipal Government attaches great importance to the promotion of agricultural technology at the grassroots level, taking it as a basic government work project, and at the same time puts forward the policy of benefiting farmers and the people, which promotes the innovation and development of digital agricultural technology. The Chengdu Municipal Government's policy guidance and support for digital agriculture-related industries is increasing year by year. In recent years, Chengdu has implemented the construction and display of digital agricultural experimental zones in the city, and provided relevant training for practitioners. It is proposed that in the requirements of the entire digital agricultural development, various technologies must promote each other and coordinate, such as the Internet, Logistics, communication technology, etc., give play to their respective advantages in the industrial chain structure and reduce production costs. The Chengdu government also fully affirmed these achievements. For these achievements, the subsidy for each experimental area also reached 2 million yuan.

### **2.2 Vigorously Develop Yinong Information Society**

Since 2015, Chengdu has paid attention to the work of digital access to villages and households, and through the construction of Yinong Information Society, farmers can enjoy the convenience of online services. The construction of Yinong Information Society mainly includes the support of hardware equipment and the integration of resources, carrying forward the spirit of science and innovation, and further improving the big data planning and construction of agricultural and sideline industries in order to achieve the goal of agricultural informatization. Through Yinong Information Society, farmers can obtain technical advice and guidance and agricultural technology information training through the network distance education information platform, understand the market information of agricultural products, and can realize the direct online sales of agricultural materials through the platform. In addition, through the establishment of an intelligent order analysis application system, collection, accumulation and mining of farmer data, and gradually realize that farmers can scientifically guide the standardized production of agriculture in Chengdu by mastering agricultural big data, and promote the transformation and upgrading of agriculture.

### **2.3 Actively Constructing Agricultural Information Base and Information System**

According to the requirements of Chengdu big data office, through repeated demonstration and formulation of Chengdu information system integration plan, it is planned to take Chengdu agricultural and sideline products geographic information system as the basic platform, and strive to promote the integration of information system and realize the co construction and sharing of information. At present, the major intelligent agricultural parks are also piloting the establishment of a number of intelligent agricultural platforms supported by the operation freedom system, For example, the "SkyGround" integrated electromechanical agriculture field intelligent monitoring and processing system, the agricultural field production intelligent precision production management decision support service system, and the "Timely Rain" mobile app for intelligent agricultural cloud services in Dayi Smart Agriculture Industrial Park.

### **2.4 Support Entrepreneurship and Development of Agricultural Brand**

Through the sharing of network resources and the efforts of professionals, the future of the smart agricultural and sideline products industry will become brighter. In general, the popularity of smart agriculture in Chengdu is relatively high, but there are still some problems in the specific implementation process. In terms of the cultivation and recruitment of smart forces, Chengdu vigorously develops the recruitment of high-level talents in smart agriculture and the cultivation of innovative subjects. Taking the Chengdu Agricultural Maker Center in Dayi County as an example, it aims to strengthen the linkage of the primary and 2. industries and promote agricultural development. It is the country's first agricultural innovation and entrepreneurship carrier to stimulate rural economic growth.

## **3 Chengdu Digital Agriculture Optimization Path**

### **3.1 Analysis on Regional Layout of Digital Agriculture Development**

Digital production technology is applied in various industries such as facility factory cultivation, aquaculture, field planting, livestock and poultry aquaculture, agricultural deep processing technology, etc. The cost performance, input and output benefits of the application of the results affect the comprehensive promotion of each related industry. Different policies should be proposed for targeted promotion. Due to the large differences in the degree of investment, the establishment of institutions, the allocation of personnel and institutions, and the investment of funds, the overall level of development is uneven. The government should further balance the development between counties, optimize weak industries, and develop Strong industries drive weak industries.

### **3.2 Strengthening the Sustainability and Stability of Digital Agriculture Inputs**

Through the research and development of high-tech industries, intelligent agriculture can increase the level of market competitiveness and better put into market operation. The cost of sensor devices and other related agricultural digital production equipment is very high, especially the construction cost of the Internet of Things system in field agriculture is relatively high, and the input is not proportional to the input-output rate, resulting in the continuity and investment of many production and business activities. The enthusiasm for production is not high either. It should be planned and prepared to reduce input costs, increase the proportion of output, and maintain the sustainability of subsidy policies. We should optimize and improve the distribution conditions and standards of the general special budget funds of the central departments and relevant provincial finance, balance the scientific distribution, improve the efficiency, improve the proportion of local financial investment in digital agriculture, attract social capital investment, ensure the stability of digital agricultural development, and improve the enthusiasm of social funds to invest in digital agriculture.

### **3.3 Standardize the Deep Development of Digital Agricultural Technology Application**

Digital agriculture project portfolio is not enough, smart agriculture and Internet of things technology used to serve as a single science and technology project is difficult to set up. Generally, there are few projects that integrate modern digital agricultural technology content into traditional agricultural project schemes, and it is difficult for the development and innovation of digital agricultural science and technology to form industrial synergy as a whole. The government leads the industry to formulate relevant standards for digital agriculture, and the government can take the lead to assist the industry to self-regulate and formulate various relevant norms and standards for the operation of digital agriculture in China, further standardize and unify the regulatory technical standards and service regulatory standards for the application of basic data, and ensure the follow-up and operation safety maintenance of digital agriculture projects in China, at the same time, the value of data application services established by the big data application analysis and prediction model of China's large agricultural data resources and collected data will be further improved.

### **3.4 Effective Transformation and Promotion of Digital Agricultural Technology**

The application space of digital agriculture related technology in China is narrow, and the speed of new technology promotion and selection can not keep up with the speed of "laboratory" technology upgrading. Let scientific researchers enter the field, help digital agricultural technology to land, promote the integrated development of "indus-

try, university and research" in the front line of smart agriculture, transform "laboratory" research into "field" research, and effectively promote digital agricultural technology.

## 4 Conclusion

Based on the above conclusions, this paper puts forward the future path of digital agriculture in Chengdu:(1) to further balance the development of digital agricultural technology (2) to strengthen the sustainability and stability of digital agricultural input (3) to standardize the deep development of digital agricultural technology application (4) to effectively transform and promote digital agricultural technology.

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