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Study on the Electronic Information Engineering and Intelligent Agriculture Development

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Abstract

Under the background of a large population in China, the land resources available for farming are very limited, and in the process of agricultural production. Only the application of the traditional mode will inevitably limit the development of agriculture and the gradual improvement of farmers' living standards. Based on this, the inevitable measure to be taken in the current agricultural development process is to introduce advanced technology to promote the continuous improvement of China's agricultural development level. On the basis of the continuous development of the Internet of Things, cloud computing, big data, and other technologies, through the integration of a variety of technologies, the new pronoun of smart agriculture in the agricultural field is generated. The realization of green, standardization, intelligence, and other agricultural production links is the purpose of smart agriculture, which is very beneficial to the development of optimized human needs. Therefore, it is very necessary to discuss the development of electronic information engineering and smart agriculture. Through the active introduction of electronic information engineering technology, agricultural production efficiency can be further improved to realize the sustainable development of smart agriculture.

Keywords

Electronic information engineering, Intelligent agriculture, Development, Application

1. Introduction

Electronic information engineering is a comprehensive application of computers and other modern technology for electronic information control and information processing. With the development of network technology and electronic information technology, electronic information engineering is also booming [1]. Nowadays, electronic information engineering has become a new main factor in agricultural development, and it plays an important driving role in our agricultural economic development. Entering the era of "Internet+", the development of "Internet+ agriculture" needs to accelerate the construction of electronic information engineering. Through the design, development, application, and integration of electronic equipment and information systems, we can obtain and process the information needed for the development of agricultural industries to promote the development of rural economies. China's rural areas are speeding up the construction of information technology, vigorously promoting the construction of rural information engineering, and constantly improving the construction of information service systems. Farmers can get more agricultural production information, and related information products are becoming more and more abundant. Therefore, in the context of smart agriculture, electronic information technology has been widely applied in the agricultural field, which has further improved the efficiency of agricultural production and created favorable conditions for agricultural modernization [2].

2. Research Background

Electronic information engineering is a subject of electronic information control and information processing with modern technology such as computers. It mainly studies the acquisition and processing of information, the development, design, integration, and application of electronic equipment and information systems. Rural informatization is an important part of the national economy and society informatization. In our country's vast rural areas, the level of rural informatization development is low [3]. Under the background of the rural revitalization strategy, rural areas should speed up the construction of information technology, use electronic information technology to deeply develop various information resources related to agriculture, vigorously promote the development of smart agriculture, and promote the development of the rural economy [4].

It is pointed out that the application degree of electronic information engineering in rural areas is relatively low, and it needs to be perfected and updated to promote the construction of new countryside. Domestic scholars put forward that with the development of rural areas, electronic information engineering is helpful to realize rural informatization and promote the construction of new countryside. Scholars believe that electronic information technology has penetrated into every field of social life. Electronic information engineering should be applied to promote social and economic development. From the aspects of rural areas, government, and information disclosure, we need to put forward countermeasures for rural informatization construction to achieve precise poverty alleviation and rural informatization construction [5]. The existing research focuses on the significance of rural electronic information engineering construction and briefly discusses some measures of information engineering construction. At present, with the continuous progress of the economy and society, electronic information technology has also developed rapidly. If it is applied to the field of smart agriculture, it can effectively solve problems such as weak information foundation, low quality of agricultural machinery operation, and fragmentation of cultivated land, and finally realize low input and high return of agriculture.

Since entering the new era, our country's agriculture has been stepping forward toward the direction of modernization and intelligentization. In the future, with the emergence and innovation of new technologies, especially electronic information technology, it will fully show its unique advantages in promoting the development of smart agriculture. As an important part of intelligent agriculture, intelligent agriculture should actively enhance its informatization level and realize the transformation and upgrading of intelligent agriculture [6].

3. Basic Theories Related to Smart Agriculture

3.1 Concept of Smart Agriculture

Intelligent agriculture refers to a new type of agriculture that can intelligently control its production mode based on objective actual content or actual operation scenarios and is applied to the whole process of agricultural production by combining with modern information technology. Intelligent agriculture has the characteristics of high efficiency, intelligence, high-level information, and scientific and technological innovation. Compared with traditional agriculture, which has a low information level, low resource integration and utilization rate, and high labor cost, intelligent agriculture realizes efficient information exchange in information link big data, uses modern advanced science and technology to achieve high efficiency and intelligent production, and forms a complete internal circulation system and uses advanced information technology to make decisions, which is the product of the combination of information technology and agriculture. Traditional agriculture mainly relies on artificial farming by agricultural producers, relies on the weather for food, low degree of informatization, and single means of circulation with great limitations, while smart agriculture combines agriculture with the information industry, uses advanced science and technology, from the production process to follow-up management, and finally to the market. The whole process is supported by data and advanced technical equipment, which can accurately locate the data needed at each stage, make correct and effective measures to deal with the problems that occur suddenly at the fastest speed, and complete systematic agricultural activities timely and effectively [3]. We will achieve a series of benefits, including increased agricultural output, increased farmers' incomes, improved crop quality, safe and reliable crops and food, and expanded agricultural markets.

Smart agriculture has experienced four stages in the process of following the development of the agricultural industry and information technology. The first stage is precision agriculture, which is very different from traditional agriculture [7]. Traditional agriculture is the variation generated by positioning space through information technology and implementing a set of modern agricultural technology and management systems in a fixed and quantitative way on this basis. The second stage is digital agriculture; the use of modern information technology can take agriculture as the production target, the modern agricultural production mode information management. Digital agriculture is a kind of agricultural technology that integrates agriculture and information technology on the basis of precision agriculture, which is of great significance for changing traditional agriculture and transforming the production mode in the past. The third stage is "Internet+" agriculture, which is a new concept with the emergence of the Internet. In addition, digital agriculture will

also be upgraded in an all-round way, combining Internet technology with some agricultural essential links, such as agricultural production, processing, and marketing [8]. The mode of production is a scientific, information, and intelligent agricultural technology. The fourth stage is smart agriculture, which is a mature agricultural production mode, including precision agriculture, digital agriculture, "Internet plus" agriculture, and other contents. Figure 1 is a diagram of the development of smart agriculture [9].

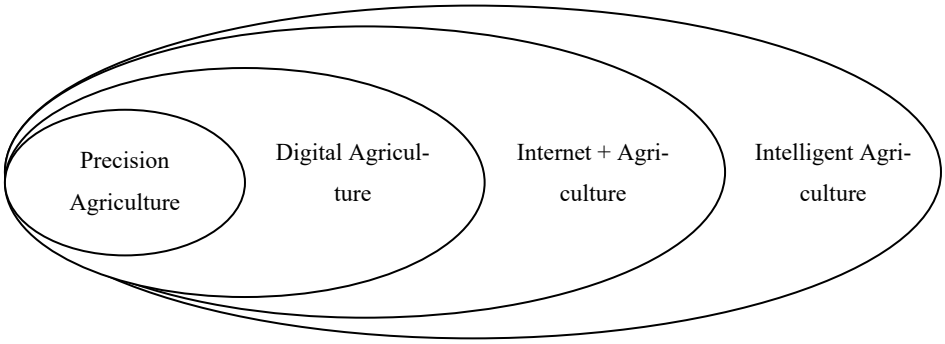

Figure 1. Schematic diagram of the development stage of smart agriculture.

3.2 Composition of Intelligent Agriculture System

It is generally believed that a smart agriculture system includes smart agricultural management, smart agricultural production, and smart agricultural circulation, as shown in Figure 2.

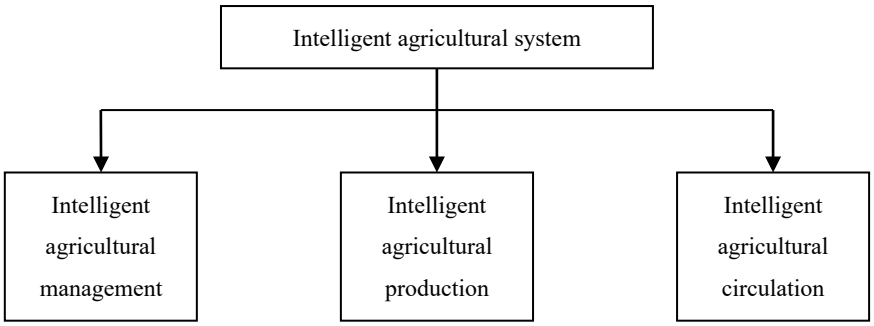

Figure 2. Main contents of the intelligent agricultural system.

3.2.1 Smart agricultural management

Intelligent agricultural management is an efficient large-scale and diversified production management of agricultural production based on information intelligent infrastructure and basic concepts. There are many problems in traditional agricultural management, such as low production efficiency and uneven use of agricultural resources [10]. The continuous development of the information technology industry has promoted the reform of various industries and promoted the change of management mode in many aspects, and so has the development of the agricultural industry. In recent years, the agricultural industry and information technology have continued to integrate, and traditional agricultural management is gradually developing in the direction of intelligent agricultural management. Traditional agricultural production relies more on human management, more on experience, agricultural efficiency is low, and the use of resources is not sufficient. Intelligent agriculture with sensors to detect the agricultural production environment, and through artificial intelligence equipment analysis and calculation, and then control agricultural production equipment to achieve the most conducive to crop production, so as to improve the quality of agricultural products, reduce labor costs, avoid waste of agricultural production resources, the entire process of agricultural management is achieved with the help of information technology industry [11].

3.2.2 Intelligent Agricultural Production

Intelligent agricultural production is an advanced production mode with high efficiency and innovation in agricultural production and management based on the concept of scientific and technological innovation, modern information technology, and high and new technology of intelligence, digitization, networking, and information technology [12]. In the process of intelligent agricultural production management, it is necessary to rely on an agricultural production management system. The system can adjust the growing environment according to the specific meteorological data and real-time data of the crop growing environment combined with the optimal environment of crop growing so that agricul-

tural practitioners can complete agricultural production operations simply and conveniently. The application of an agricultural production management system can also optimize the sales of agricultural products. The sales terminal can obtain the production base information and the sales situation of the terminal agricultural products in real-time. According to the real-time production information and sales situation, the timely integration of marketing programs can increase the operating income. Consumers can know the production environment, growth time, and the use of pesticides and fertilizers for agricultural products in real-time, and choose their favorite agricultural products with safe and reliable quality [13]. In the process of modern agricultural production, the application of high and new technologies has greatly promoted intelligent agricultural production, such as the intelligent optimization of soil by biotechnology, the intelligent seedling cultivation by means of biotechnology and information technology, and the establishment of crop growth data model promoted by information technology. The application of high and new technologies has realized the intelligent management and control of agricultural production and improved the quality and economic benefits of agricultural products. The application of high and new technology in agriculture has promoted the optimization and upgrading of agricultural industry and made agricultural production step forward to intelligent agricultural production [14].

3.2.3 Smart agricultural circulation

Smart agricultural circulation refers to the combination of network technology, information technology, and the management aspects of smart agriculture, so as to carry out the circulation of agricultural products conveniently and efficiently. At present, smart agricultural circulation is mainly used in the agricultural field of mechanized harvest, automatic packaging, and whole-process logistics monitoring and traceability of agricultural products. Smart agricultural circulation is an integrated mode focusing on agricultural business processes, which improves the efficiency of the industrial chain and establishes a brand-new complete system of production, sales, management, and processing processes [15]. In addition, smart agriculture circulation can also use whole-process logistics monitoring and traceability to build a comprehensive supervision system for agricultural production, circulation, and marketing, so as to make agricultural products produced by smart agriculture safer and more reliable. In addition, smart agricultural circulation can use information technology and Internet platforms to break the limitations of traditional markets, grasp the trading information at all times, optimize the trading process, provide real-time agricultural product information for users, and compress the trading time limit, so as to build a new systematic and three-dimensional agricultural product marketing system and help agricultural practitioners obtain greater economic benefits [16].

4. The Development Status of Electronic Information Engineering in Rural Agriculture

4.1 Application in agricultural production

At present, electronic information engineering has been applied to a certain extent in the agricultural production field. Some areas have begun to use electronic information technology to monitor the growth of crops, such as the use of wireless data acquisition systems for real-time monitoring of the agricultural production environment, through the sensor collection of crop environment temperature, humidity, soil temperature, and light intensity data, and wireless transmission of data through the GPRS network, so as to obtain real-time data of agricultural production, help optimize agricultural production decisions [17].

4.2 Application in agricultural machinery

In the process of agricultural mechanization development, a lot of agricultural machinery and equipment need to be applied. The application of electronic engineering technology in agricultural machinery and equipment has greatly improved the level of automation and intelligence of agricultural machinery. For example, if wireless communication technology is applied to machinery and equipment, managers can schedule and process remote data, improve the efficiency of information collection, analysis, and processing, effectively improve the production efficiency of machinery and equipment, and ensure the safety of agricultural production [18].

4.3 Application in Agricultural Information Service

We will promote the construction of projects such as "golden agriculture", "three-electricity integration", demonstration of IT applications in rural areas, and rural business information services, and actively explore ways and means of providing information services to villages and households. It can be seen that electronic information engineering promotes the development of rural informatization.

First, we need to provide more intelligent agricultural services. Big data can realize data search, comparison, classification and induction, and dig out the connection of historical data through the analysis of massive data. The application of big data in the agricultural field can integrate years of agricultural management information, soil information, environmental information, meteorological information, market circulation information, etc., and provide various data

services for intelligent agriculture through data statistics, data comparison and data analysis; second, improve agricultural emergency management capacity. At present, there are many problems in the field of emergency management in Chinese agriculture, which have a great negative impact on agricultural production, and also caused serious losses to the agricultural economy. Therefore, in the process of promoting the development of smart agriculture, strengthening agricultural emergency management should be taken as an important aspect. With the continuous development of network information technology, big data, cloud computing and artificial intelligence technologies have played a more positive role in agricultural emergency management. The application of big data can effectively integrate information resources, and then provide targeted information support for agricultural early warning, agricultural emergency treatment and agricultural disaster assessment. At the same time, the mining and sharing of agricultural data resources can also better predict the negative impact of natural disasters on agricultural production, so as to improve the intelligent level of agricultural emergency management [19].

5. Suggestions on the Application of Electronic Technology in the Development of Intelligent Agriculture

With the continuous application of digital information technology in the future, digital information and intelligent visualization of agricultural development will be realized. Therefore, in promoting agricultural modernization, the country should strengthen the top-level design of the integration of electronic information technology and smart agriculture, make full use of the advantage of electronic information technology, provide escort for the development of smart agriculture, and further enhance the level and level of agricultural modernization of our country.

5.1 Strengthen planning and guidance

At present, the construction of smart agriculture in our country is still in the initial exploration stage. Although under the strong support of the state, the development of smart agriculture has made some stage achievements, there are still some practical problems in the development process of smart agriculture, such as high maintenance cost, incomplete use of information technology, and poor ability of efficiency. Therefore, in the process of promoting the development of smart agriculture, we should not only introduce modern information technology but also need reasonable planning and correct guidance from the government. We need to further clarify the specific strategies and plans for the development of smart agriculture, introduce various measures to support the deep integration of modern information technology and smart agriculture, and increase the investment in scientific research of smart agriculture. We will encourage and guide scientific research institutions and leading agricultural enterprises to participate in the construction of smart agriculture. At the same time, the government should increase the construction of agricultural infrastructure, take broadband, cloud servers, and mobile communication networks as the focus of infrastructure construction, build regional smart agriculture public service platform and big data center, and provide solid hardware facilities for data storage, processing, calculation and analysis in the process of smart agriculture development.

5.2 Build a multi-party linkage system

In order to give full play to the function and role of electronic technology in the development of smart agriculture, it is necessary to construct more diversified participants. The government will take the lead and work with large agricultural enterprises, research institutions, and industry associations to speed up the formulation of development standards for smart agriculture, so as to provide a more complete system and mechanism for the integration of electronic technology into smart agriculture. We need to ensure that all kinds of smart devices in different scenarios and situations can work closely together to achieve rapid data transmission and sharing, and further promote the development of smart agriculture in the direction of efficiency, standardization and standardization. According to the actual needs of the development of smart agriculture, we need to formulate exchange and sharing standards, equipment standards, metadata standards, data security standards, etc., to further enhance the technical capabilities of agricultural intelligent equipment, and improve the quality and rate of agricultural Internet of Things data acquisition, and ensure comprehensive, systematic, targeted and reliable data collection. At the same time, we should vigorously develop intelligent robots, agricultural autonomous driving and other technologies, accelerate the popularization of agricultural intelligent equipment in different agricultural production scenarios, and further improve the development level of smart agriculture through multi-linkage.

5.3 Expand the depth of integration of electronic technology and smart agriculture

In the process of promoting the development of smart agriculture, the application level of electronic information technology directly affects the development level of smart agriculture. Therefore, for smart agriculture, it is necessary to

take the initiative to introduce modern information technology, and constantly expand the depth of integration of electronic technology and smart agriculture. Therefore, on the one hand, it is necessary to establish an agricultural big data platform, further improve the agricultural data processing capacity and emergency response capacity, and add technical wings to the development of smart agriculture through the introduction of big data, cloud computing, artificial intelligence, and other technologies. On the other hand, blockchain technology, Internet of Things technology, and label recognition technology should be used to build a more comprehensive traceability system for the whole process of the supply chain of agricultural products, effectively solving the problem of information asymmetry between the production end and the consumption end of agriculture, and realize the whole process of agricultural information can be queried and traced.

6. Conclusion

In short, at present, Chinese agriculture is in the direction of an intelligent and modern development stage, along with the application of more and more advanced technologies. Chinese agricultural modernization construction enters a new stage, constantly promoting the all-round development of Chinese agriculture. The continuous maturity of electronic information technology in the future will reflect its unique advantages and characteristics in promoting the development of smart agriculture. As an important link of agricultural intelligence, smart agriculture should improve the level of information technology and realize the transformation and upgrading of smart agriculture.

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