Journal of Innovation and Development
ISSN: 2958-4752 | Vol. 3, No. 2, 2023

Construction Scheme of Precision Service Platform for Smart Farm

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Abstract: The precision service platform of smart farm is based on modern agricultural science, based on technologies such as Internet of Things, cloud computing and big data, and combined with the actual needs of agricultural production, providing agricultural production management and comprehensive services, and using mobile Internet and Internet of Things technology to build an intelligent agricultural production management system. The main purpose of the platform is to realize the informationization, standardization and precision of the whole process of agricultural production through digital and intelligent means, so as to improve the efficiency and quality of agricultural production, reduce costs and realize sustainable development.

Keywords: Smart Farm; Accurate Service; Platform Construction.

1. Introduction

"The 14th Five-Year Plan" outlines the implementation of "Internet+Agriculture" to accelerate the digital, networked and intelligent development of agriculture. Under the impetus of "internet plus" modern agricultural action, smart farm, smart agriculture and other smart applications will become the important direction of modern agricultural development in China in the future. With the deepening application of modern information technology in agriculture, it has brought new development opportunities for traditional agriculture. Through data collection, transmission, analysis and application, the precision service platform of smart farm provides farmers with all-round agricultural production management and services by using advanced digital and intelligent technical means, which is of great significance for exploring the new path of modern internet agriculture development.

2. The Overall Design of Smart Farm Precision Service Platform

The platform is based on creating accurate services for smart farms, aiming at helping rural revitalization, opening a new mode of Internet agriculture, relying on agricultural products, taking the integration of accurate service resources as the carrier, adopting the mode of "platform+ farmers+ resource integration", realizing the sales of farmers' green pollution-free products, opening the functions of land leasing, agricultural adoption and scheduled breeding, and adopting a new mode of combining online and offline. Transform ordinary farms into multi-functional and precise service farms, innovate and carry out the function of "scheduled breeding service", and consumers and farmers jointly manage farms. In the platform, services such as pure green pollution-free agricultural products sales, vegetable planting base, Four Seasons Fruit Garden, pasture, farm recreation and entertainment center, nature education, farmers' technical guidance, real-time remote monitoring and viewing, and online virtual farming are opened. Promote a systematic and accurate service platform to meet customers' healthy demand for green food, while focusing on customer experience.

The platform provides integrated experience services for farms, provides farmers with greater market space, forms an industrial chain, promotes farmers' income, enhances agricultural efficiency and helps rural revitalization. As an accurate service platform for resource integration, it provides accurate services for farmers who settle in the platform and customers who place orders on this platform. First of all, the platform provides farmers with farm reconstruction services, leads farmers to develop intelligent and accurate service farms, and helps farms upgrade to scientific and systematic multi-functional high-value farms. At the same time, we provide customers with services such as booking land lease, agricultural adoption, remote booking of breeding experience, virtual breeding, natural education system courses, etc., to ensure that the needs of customers are met. The platform is committed to ensuring the needs of both farmers and customers, making rational use of the value of farms, innovating Internet agricultural technology, opening up a new model of Internet modern agriculture, creating a precise service platform for smart farms, and helping rural revitalization.

3. The Module Design of Smart Farm Precision Service Platform

The platform mainly includes seven modules: farm upgrade, green product sales of pollution-free food, land lease, adoption, scheduled breeding, pollution-free vegetable planting base, pasture, farm recreation and entertainment center, remote and virtual breeding, and natural education system course, which opens a new mode of modern agriculture in internet plus.

3.1. Farmers Settle in and Rebuild Their Farms

The platform is connected with the farm face to face,

leading farmers to develop intelligent and accurate service farms, upgrading the system for farms and transforming intelligent farms. Implement regional layout, large-scale farming, standardized production and industrialized operation, and at the same time led farmers to learn systematic platform services to provide customers with services such as agricultural adoption, land lease, scheduled farming experience, remote farming, online and offline virtual farming, etc., to ensure that customers' needs are met.

3.2. The Customer Leases the Land and Plans to Breed

In addition to public farming areas, farms also provide land leasing services for customers. Customers who want to open individual farms can lease land and open individual farms. And you can book the fruits, vegetables, or animals you want to grow in advance with the farmers, and set up a private farm breeding area, which can be viewed in real time through remote.

3.3. Virtual Farming, Double Farming on the First Line, and Synchronous Planting on the Real Farm

The platform seeks cooperation with game platforms such as Happy Farm Puzzle, carries out technical innovation on the website, and starts online and offline double farming, so that customers can freely arrange and plan the product planting of the leased land in the online game farm of the website. During the farming process, the system automatically records the growth data of products, and at the same time, customers can monitor and check the actual situation of field farming in real time through the game port of the platform, and can conduct online watering, fertilization and other operations, so that farmers can simultaneously breed online, thereby enhancing the customer's experience and sense.

3.4. Natural Education Courses

The platform seeks cooperation with university teachers, offering systematic nature education courses, providing students with knowledge of popular science and nature education, providing places and platforms for nature education experience, and building ecological service facilities and green infrastructure, so that children can experience farm activities in a healthy and safe environment.

3.5. Cooperation with Agricultural Colleges and Universities

In the process of farm reconstruction, technical experts who apply for smart agriculture will settle in the platform, give farmers more professional guidance on farms, and cooperate with agricultural schools. College students majoring in agriculture are welcome to conduct field research and participate in smart farm projects.

3.6. Farms and Ranch Clubs

The establishment of farm clubs, public breeding areas and public experience areas can provide convenience for company group building and family holidays, so that people of farm clubs can barbecue, fish and pick vegetables and fruits on their own in the farm, and better enhance the customer's experience.

4. The Functional Design of Smart Farm Precision Service Platform

4.1. Real-time Monitoring and Early Warning

The platform collects farmland, meteorology, hydrology and other information in real time through the Internet of Things technology, monitors the key links of agricultural production in real time, including soil, meteorology, plants, water quality, etc., monitors and analyzes the growth environment of crops, diseases and pests, provides real-time monitoring data and analysis reports, timely warns possible problems, and helps farmers take corresponding measures to reduce production risks. And provide early warning services to help farmers take timely measures to prevent disasters.

4.2. Decision Support

Based on big data and artificial intelligence technology, the platform comprehensively and accurately analyzes and predicts the agricultural production process, provides decision support for agricultural production, including suggestions on soil nutrient management, irrigation and fertilization, including planting scheme, fertilization scheme, irrigation scheme, disease prevention scheme and picking scheme, and helps farmers to make scientific and reasonable production plans.

4.3. Production Management

The platform provides production management functions such as crop management, soil management, water resources management, pest management and nutrition management, including planting planning, sowing management, crop growth monitoring, pest control and other services, helping farmers to manage farmland and crops, conduct comprehensive, scientific and standardized production management and improve production efficiency and quality.

4.4. Information Service Function

The platform provides farmers with timely, comprehensive and accurate agricultural-related information and technical services, including weather forecast, agricultural market situation, policies and regulations, scientific and technological information, planting technology, sales information and other technical training, helping farmers understand market trends, master advanced technologies, improve business capabilities, help farmers understand market and technical trends, and improve agricultural production level and economic benefits.

4.5. Financial Services

The platform provides farmers with agricultural financial services, including credit, insurance, wealth management and other services, helping farmers solve the financial problem, reducing business risks and promoting the sustainable development of agriculture.

5. Detailed Internal Functions of the Smart Farm Precision Service Platform

5.1. Data Analysis and Visualization Function

This function deeply analyzes and processes the collected data, and presents the results in a visual way, such as charts, maps, dashboards, etc., to help farmers quickly and accurately

grasp the agricultural production status and development trend.

5.2. Personalized Customization Function

This function provides personalized services and customized solutions for different farmers according to their needs and characteristics, such as brand promotion of agricultural products, expansion of sales channels, technical training, agricultural science and technology innovation, etc., to help farmers achieve accurate, characteristic and efficient production and operation.

5.3. Mobile Application Function

This function integrates all services and functions of smart farm into mobile application, which is convenient for farmers to carry out production management and decision-making anytime and anywhere, such as viewing monitoring data, receiving early warning information, inquiring information and making production plans.

5.4. Application of Artificial Intelligence Technology

Appli This function can deeply learn and intelligently analyze all data of agricultural production through artificial intelligence technology, improve the accuracy and accuracy of forecasting and early warning, reduce farmers' production costs and risks, and improve the efficiency and quality of agricultural production.

5.5. Cation of Blockchain Technology

This function realizes the traceability and certification of agricultural products through blockchain technology, ensures the quality and safety of agricultural products, improves the trust and satisfaction of consumers, and promotes the trade and circulation of agricultural products.

6. The Technical Realization of Smart Farm Precision Service Platform

Smart Farm Precision Service Platform is based on the "cloud-edge-end" architecture, which is based on big data, Internet of Things and other technical means, and realizes intelligent perception, intelligent analysis and accurate management of crop growth environment. Based on intelligent analysis and decision engine technology, the platform can monitor the growth environment of farm crops in real time, and combine environmental factors and crop varieties, crop varieties and growth conditions, and make intelligent analysis by using expert knowledge model to judge the best crop planting scheme. At the same time, based on geographic information system (GIS) technology, a three-dimensional scene model of the farm is established, which can display the topography, facilities layout, surrounding environment and road traffic of the farm in real time. Using the data of real-time monitoring environmental factors and crop variety characteristics, combined with expert knowledge model, intelligent decision support is made for crop planting scheme. Through the "cloud-edge-end" architecture, the platform deeply integrates information technologies such as Internet of Things technology and mobile Internet technology with traditional agriculture, and realizes intelligent perception, intelligent analysis and accurate management of crop growth environment. Using the data of farm environmental factors, crop varieties and growth conditions collected by the platform, combined with expert knowledge model, intelligent analysis and accurate management of farm crop growth environment are realized.

Through the construction of "Smart Farm Precision Service Platform", the intelligent perception, intelligent analysis and accurate management of crop growth environment are realized, which provides information management for crop field management and production operations. Through this platform, the relevant information of crop growth environment can be obtained in time, and according to the growth situation of farm crops, combined with expert knowledge model and experience, the crop planting scheme can be intelligently analyzed and supported by decision. At the same time, the platform can also remotely monitor and warn the growth environment of farm crops, and provide guarantee for agricultural production. By using modern information technology, real-time monitoring, intelligent decision-making and efficient management of farm crop growth environment can be realized, so as to realize visualization, intelligent management and decision-making of the whole process of agricultural production and make agricultural production more efficient and greener.

7. The Role and Feasibility of the Smart Farm Precision Service Platform

The precision service platform of smart farm is a platform that provides farmers with all-round agricultural production management and services by using advanced digital and intelligent technical means. Through data collection, transmission, analysis and application, it can improve the efficiency and quality of agricultural production, reduce farmers' production costs and risks, and realize the sustainable development of agriculture.

7.1. Improve Agricultural Production Efficiency and Reduce Farmers' Production Costs

The smart farm platform collects, analyzes and applies various data of agricultural production through intelligent agricultural production management and services, which can realize precise management of agricultural production, such as precise fertilization, precise watering and precise pest control, so as to improve the efficiency of agricultural production; Reduce pesticide and fertilizer materials and reduce costs.

7.2. Reduce the Risk of Agricultural Production

Through monitoring, forecasting and early warning of agricultural production, the smart farm platform can find and solve problems in agricultural production in time, such as pests and diseases, weather changes, etc., thus reducing the risk of agricultural production.

7.3. Improve the Quality and Safety of Agricultural Products

The smart farm platform can realize the full traceability and certification of agricultural products, ensure the quality and safety of agricultural products, and thus improve the trust and satisfaction of consumers.

7.4. Realizing the Sustainable Development of Agriculture

The smart farm platform can realize the efficient, environmentally friendly, safe and sustainable development of agricultural production through digital and intelligent means, thus promoting the development of agricultural modernization and green agriculture.

8. Problems and Dilemma Faced by the Platform

(1) Influenced by the traditional management concept, some employees have insufficient understanding of the importance of information technology. The farm is an economic organization with the family as the production and operation unit, and the smooth development of its management activities is closely related to the orderly production and operation activities of the farm. In the traditional farm operation, all kinds of information and data in the process of agricultural production and operation are mainly obtained by internal personnel of the farm or by purchasing relevant equipment from outside, which often causes problems such as incomplete and untrue farm production and operation information. Therefore, some employees have insufficient understanding of the importance of information technology. At the same time, due to the influence of traditional production and management concepts, some employees think that information technology is only an auxiliary tool, and they lack the awareness of comprehensively learning and mastering modern information technology.

(2) The application level of modern information technology is not high. At present, China's traditional agricultural informatization construction mainly focuses on the information infrastructure construction, such as the construction of farm computer networks, sensors and other information equipment, but there is a lack of effective management of all kinds of data generated in the process of farm production and operation. At the same time, due to the limitations of traditional information technology, the development level of traditional agricultural informatization is low. At present, China's traditional agriculture is based on household contract management, which restricts the development of smart farms in China to some extent.

9. Summary

The construction of smart farm precision service platform mainly uses modern information technologies such as Internet of Things, mobile Internet and cloud computing to realize the collection and transmission of various data in the farm production process. In the construction of traditional agricultural informatization, due to the influence of traditional management concepts and the lack of understanding of the importance of modern information technology by some employees, the development level of traditional agricultural informatization in China is low. At the same time, due to the limitations of traditional information technology, all kinds of data and information generated in the process of farm production and operation lack effective management and utilization. These problems not only affect the effective operation and popularization and application of the precision service platform of smart farms, but also are not conducive to the improvement of agricultural informatization level.

As a platform for providing farmers with agricultural production management and services by means of digital and intelligent technology, the precision service platform of smart farm has remarkable functions and feasibility. It can improve the efficiency of agricultural production, reduce production costs and risks, improve the quality and safety of agricultural products, realize the sustainable development of agriculture, and meet the needs of farmers and markets. Therefore, the future smart farm platform is expected to be more widely used and promoted.

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