Research on the Development of Digital Agriculture Platforms

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Keywords: Digital Agriculture Platform, High-quality Development, Value Chain

Abstract: The digital agriculture platform model is an agricultural economic development model based on bilateral or multilateral platform economy, which has attracted much attention because of its important role in agricultural efficiency, farmers' income increase, and rural revitalization. At present, China has developed a variety of models such as agricultural product e-commerce platform, comprehensive service platform for agriculture, agricultural industry chain service platform, and composite digital agriculture platform, but there are still problems such as insufficient production capacity empowered by digital technology, weak agricultural digital service capacity, industrial integration development and outstanding shortcomings of the value chain. Based on the theoretical framework of the "three systems" of high-quality agricultural development, this paper proposes a specific innovation path, and optimizes the supply mechanism of agricultural production factors by strengthening the positive externalities of digital technology and data elements in the production system. In terms of the management system, we will build a high-quality platform agricultural service system by improving the service level of the platform and the cultivation of digital technology talents. In terms of industrial system, we will build a platform agricultural ecosystem by innovating platform design and value creation logic.

1. Characteristics and Model Analysis of Digital Agriculture Platform

1.1. Features of the Digital Agriculture Platform Model

The digital agriculture platform model is an agricultural economic development model based on bilateral or multilateral platform economy [1]. Different from the traditional unilateral agricultural economic model, digital agriculture makes full use of modern information technology conditions such as the Internet, big data, artificial intelligence, and cloud computing to create a gathering place for agricultural demand and supply side, rationally allocate various agricultural resources, effectively match supply and demand, and realize the integrated development of production, supply and marketing of agricultural products through the integration of multilateral resources, so as to create value for multilateral subjects such as demand side, supply side, platform enterprises, and platform supporters. This new model of agricultural economic development can maximize the interests of all parties and ultimately achieve a win-win outcome for all parties. Different from traditional platform companies, the digital agriculture platform has the following characteristics. First, the platform is supported by internet technology, bringing together the supply and demand sides of products, services and social capital on the platform, and the multilateral subjects in the platform are directly matched, zero-distance interactive transactions, and the restrictions of the traditional economic model on commercial organizations are broken [2]. Second, the platform economy is mainly characterized by sharing, and each participant on the platform can achieve the purpose of sharing, disseminating and improving idle resources, personal knowledge and skills through personalized innovation, so as to form a more complete ecosystem and generate greater value. Third, under the empowerment of technology, the digital agriculture platform model is not limited by time and space, and the supply and demand transactions can be completed quickly, and it is easy to achieve significant scale and scope economic effects. Fourth, data, as a new factor of production and a core resource element, has shown a strong enabling role and released a huge value

  DOI: 10.25236/eeha.2024.038

potential far beyond traditional factors. Through the platform, agriculture-related enterprises continue to innovate, which greatly improves the utilization efficiency of idle social resources and promotes the efficient flow of resource elements.

1.2. Digital Agriculture Platform Model

1.2.1. E-commerce Platform for Agricultural Products

The main role of the agricultural product e-commerce platform is to connect the supply and demand sides and provide them with transaction services, so as to form a set of service system cantered on agricultural product trading [3]. It mainly includes the following modes. The first is the integrated platform e-commerce model, represented by Alibaba, JD.com, etc. The second is the matchmaking platform e-commerce model, which is developed from the agricultural product wholesale market, represented by one acre of land and Huinong network. The third is the vertical e-commerce platform model, which is mainly deeply involved in the agricultural product circulation industry chain, represented by COFCO Womai and Daily Youxian. The fourth is the social platform e-commerce model, which mainly relies on various social media to achieve fan marketing or live streaming, represented by WeChat, Douyin, etc. The fifth is the new e-commerce model of "e-commerce + cooperatives", which realizes the close connection of cooperative supply information and consumer demand information with the help of data cloud, represented by Pinduoduo's order-based agriculture of "agricultural cloud spelling + direct delivery of origin" and "e-commerce + cooperatives" of Duoduo Orchard.

1.2.2. Comprehensive Service Platform for Agriculture

Through the integration of various agriculture-related service resources, the comprehensive service platform for agriculture has formed a market trading platform, an infrastructure platform, a common technical service platform, an intermediary service platform, a financial service platform, and a digital agricultural comprehensive service platform around the production and living needs of farmers. Among them, the market trading platform is an important carrier for enterprises in the cluster to develop markets and establish marketing networks. The infrastructure platform mainly refers to various production and living service facilities, policy and legal environment and public service facilities that serve the growth of agricultural industrial clusters. With the goal of providing common technical support, the common technical service platform carries out cooperation and exchange platforms in the fields of agricultural product safety, ecological environmental protection, and biodiversity conservation through industry-university-research platforms, industry alliances, industry associations, etc., so as to build a connection between enterprises and the external environment [4]. The function of the intermediary service platform is to provide various third-party services for the company's trading activities, R&D activities and internal business activities. The function of the financial service platform is to provide financial products and services such as credit and guarantee for the development of farmers and agricultural industrial clusters. The digital agriculture comprehensive service platform is a systematic service platform integrating the above types of platforms, integrating technical guidance, agricultural planting, skills training, agricultural material supply, production and processing, personalized service, brand operation, information release, agricultural testing, agricultural product quality and safety management, financial services and other functions, and digital technology penetrates into agricultural production until sales activities.

1.2.3. Agricultural Industry Chain Service Platform

The agricultural industry chain service platform is a service system formed by farmers, cooperatives, enterprises and other enterprises that provide a variety of service functions in the pre-production, production and post-production of production. For example, the Beidahuang digital agriculture intelligent service platform uses the Beidahuang algorithm as a means to innovate the supply-demand industrial chain of pillar industries such as rice, flour, oil, milk, seeds, medicine, poultry, water, potatoes and meat from the aspects of planting, harvesting, management, processing,

warehousing, transportation and sales. In the pre-production stage, the use of cloud computing, blockchain and other information technology combined with genetically modified biotechnology and other biotechnology to carry out the digitization and automatic management of agricultural production databases; Apply artificial intelligence technology to build a digital agricultural machinery factory to realize the mechanization and precision operation innovation of agricultural machinery; In production, the whole process information of intelligent production is applied to realize the visual innovation of the whole process; In the postpartum period, big data, Internet, geographic information system and GPS and other technologies are used to achieve the O2O circulation market, accurate logistics positioning and meet the diversified needs of consumers. At the same time, we will vigorously develop leisure agriculture, cultural tourism, health preservation, green agriculture, general aviation, etc., from the front end to the terminal, forming a whole industrial chain layout covering primary, secondary and tertiary industries.

1.2.4. Composite Digital Agriculture Platform

With the rapid development of modern agriculture, a composite digital agriculture platform based on biotechnology, intelligent agricultural machinery and information technology has emerged with the empowerment of digital technology. These composite digital agriculture platforms provide new production and operation ideas and means for agriculture, promote the upgrading and transformation of the agricultural industry, and become an important part of the current agricultural informatization construction. For example, the digital agriculture base in Litang County, Sichuan, uses massive data to analyze the local planting environment, find the most local characteristics and the most popular vegetable varieties according to consumer preferences, and carry out large-scale planting in the base, and then cooperate with new media such as Douyin and Kuaishou to develop the "Internet celebrity + agricultural products" marketing model, and the products are directly supplied to the power supply business Hema and Taocaicai, etc., to promote the transformation of agricultural products from the field to the table.

2. Obstacles to the Development of Digital Agriculture Platform Model

2.1. Digital Technology-enabled Production Capacity is Insufficient

From the perspective of production system, the transition from traditional agriculture to digital agriculture is relatively lagging behind. At present, on the production side, it is difficult for digital technology to be directly applied in the agricultural field, and the overall originality of digital technology research and development is weak, especially the lack of innovation in key digital technologies such as precision sensors, big data technology, and wireless communication, and the adaptability of digital technology needs to be further improved, which hinders the integrated development and collaborative innovation of digital economy and agriculture and rural areas. In addition, there are also problems in agricultural data collection and application, such as few data sources, inaccurate data, and insufficient standardization of data collection. The reasons are: first, the high cost of data collection and the lack of large-scale application; Second, there is an "island" phenomenon in data transmission, resulting in poor data integrity and real-time performance; Third, the means of data acquisition are single; Fourth, the data sharing mechanism is not yet perfect; Fifth, the level of data analysis and management is not high. It can be seen that there are still many deficiencies in the application of digital technology in production, which restricts the digital transformation of agriculture.

2.2. The Capacity of Digital Services in Agriculture is not Strong

From the perspective of the management system, the agricultural digital service system is not perfect, the service capacity is not strong, the digital integration and continuous investment guarantee are not in place, the rural information and digital talents are lacking, and the farmers' demand for digital technology has not been fully developed. On the one hand, at this stage, China's agricultural operators are still dominated by small farmers, and the informatization and digital

application capabilities and experience of traditional farmers are generally insufficient, resulting in the difficulty of promoting and applying agricultural digital platform transactions, and at the same time, the information collection and distribution of digital agricultural platforms are "fragmented", and the utilization efficiency of information resources is declining. On the other hand, the existing agricultural digital technology is mainly for large agricultural enterprises, and the digital technology services for the majority of rural households are insufficient. At the same time, due to the level of agricultural development and other reasons, digital agriculture is not very attractive to talents, resulting in a relative lack of talents to drive the high-quality development of agriculture empowered by digital technology, especially in those work teams that understand agriculture, love the countryside, and love farmers, it is difficult to find talents who understand digital technology, which restricts the role of digital technology in promoting the modernization of agricultural production systems.

2.3. The Development of Industrial Integration and the Shortcomings of the Value Chain are Prominent

From the perspective of the industrial system, China's agricultural digital technology and agriculture have a low degree of coordinated development and integration, and the structure is unbalanced, and there is a lack of an enabling mechanism for digital technology to create value for all parties in the industry. First, the standard of the whole industrial chain is not high, and the pre-production, production, and post-production retail planting (raising) has led to large fluctuations in the output and quality of China's agricultural products, which has hindered the industrialization and commercialization of agricultural products. The advantage of agricultural products in the digital age is not low price, but high quality. However, at present, the production and processing of high-quality agricultural products in China mainly rely on traditional farmers or cooperatives, and such organizations are small in scale and low in organization, making it difficult to ensure product quality and safety. With the improvement of living standards, consumers have put forward higher requirements for the quality and safety of products, but the existing production technology system is more focused on how to improve the output of agricultural products, and there is a dislocation and imbalance between supply and demand with consumers' demand for high-quality agricultural products. Second, compared with the industry and service industry, the application level of agricultural digital technology is relatively lagging behind, and the integration degree of agriculture-related catering, tourism, tourism, culture, health and other industries is low, resulting in the value and benefits of the whole agricultural industry cannot be fully exerted.

3. The High-quality Development Path of the Digital Agriculture Platform

3.1. Optimize the Supply Mechanism of Factors in the Agricultural Production System

At the heart of the production system is the enhancement of agricultural productivity. The digital agriculture platform should support the penetration of digital technology into the production and living fields by establishing digital infrastructure, and realize the seamless connection between "people, places, and things" in rural areas, so as to accelerate the process of agricultural modernization. The first is to apply information technology to the whole process of agricultural production management and give full play to the positive externalities of digital technology. Through the artificial intelligence, scientific monitoring and dynamic management of the digital agriculture platform, we will promote the informatization, refinement and intelligence of agricultural production, improve the level of agricultural modernization, and promote the transformation of digital technology achievements. Second, pay attention to the combination of data elements and traditional resource elements. Through the digital agriculture platform, we will increase the empowerment of digital technology, realize the close integration of data elements with traditional resource elements (labor, land, seeds, machinery, etc.) and environmental elements (pesticides, fertilizers, agricultural films, etc.), promote the digital transformation of platform agriculture, release the huge value potential of data production factors, accelerate the pace of

modern agricultural construction based on smart agriculture, and realize the transformation and upgrading of traditional agriculture to modern agriculture.

3.2. Build a High-quality Agricultural Management Service System

The core of the agricultural management system is to improve the relationship between agricultural production, which requires improving the digital service capacity of agricultural platforms and the digital literacy of agricultural talents. The first is to accelerate the application of a new generation of information technology in the field of agriculture and promote the digital transformation of agricultural operation and management services. From the perspective of agricultural operation, it is necessary to strengthen the construction of infrastructure such as rural artificial intelligence and the Internet of Things, vigorously develop digital agricultural software and agricultural e-commerce, and promote the transformation and upgrading of agricultural product production, circulation and trading channels; From the perspective of agricultural management, it is possible to strengthen the collection and analysis, sharing, openness, development and utilization of agricultural and rural big data, establish an inclusive service mechanism for agriculture-related information, and promote the digitalization of rural management services. The second is to strengthen the construction of digital talent team, and make effective and rational use of local resources to promote the development of digital agriculture. It is suggested that more efforts should be made to guide college students, migrant workers and veterans to return to their hometowns to start businesses, accelerate the cultivation and expansion of a new type of professional farmers who "love agriculture, understand technology, and are good at management", continuously improve the level of farmers' use of digital technology, accelerate the resolution of the "digital divide" between urban and rural areas, and enhance the role of digital technology in rural development.

3.3. Create A Platform Agricultural Ecosystem in the Industrial System

The core of the industrial system is to integrate efficiency and value creation, and it is necessary to strengthen the application and function expansion of digital technology in the integrated development of agriculture. First, it is necessary to innovate in platform design, highlight the vertical integration of the agricultural industry chain, and accelerate the establishment of a digital platform agricultural industry system. The digital platform is used to integrate the resources of upstream and downstream enterprises in the agricultural industry, improve production, processing, warehousing, logistics, scientific research and other links, form a coordinated development pattern of the upstream and downstream of the agricultural industry and multi-industry and multi-subject, and effectively improve agricultural efficiency and increase farmers' income. The second is to build a digital agriculture platform ecosystem based on value creation and ecological platform empowerment. Based on the ecological platform, a large number of heterogeneous and complementary manufacturers on the supply side are connected with countless consumers and external partners on the demand side, and through value creation, value distribution, power and constraint mechanisms, the platform participates in the reorganization of various subjects, forming a symbiotic, mutually beneficial, and renewable digital agricultural ecosystem for value creation and value acquisition.

4. Conclusion

The digital agriculture platform model has the characteristics of networking, decentralization, disintermediation, sharing, etc., which brings producers and consumers together through resource integration and agricultural industry chain closure, information collection, matching transactions, etc., and gives full play to the scale effect of the platform. The digital agriculture platform enables the integrated development of agricultural production, supply and marketing, and forms a new value chain network and agricultural industry ecosystem with efficient, rapid, intelligent and green development, which is considered to be an important way to promote China's agricultural efficiency, farmers' income and rural revitalization. This paper theoretically clarifies the development law mechanism and innovation path of digital platform agriculture, and proposes an overall framework

for the digital transformation and upgrading of traditional agriculture, in order to provide reference for the smooth implementation of the digital platform agriculture model.

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