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The Role of Digital Technology in Rural Revitalization Development: A Case Study of the Digital Strawberry Demonstration Garden in Changfeng County

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Abstract: On October 18, 2017, Chinese President Xi Jinping proposed the rural revitalization strategy in the report of the 19th National Congress of the Communist Party of China. In May 2019, the General Office of the Communist Party of China Central Committee and the General Office of the State Council issued the "Outline of the Development Strategy for Digital Villages," which clearly stated that digital villages are an endogenous process of agricultural and rural modernization and transformation accompanying the application of networking, informatization, and digitization in the development of agricultural and rural economy and society, as well as the improvement of farmers' modern information skills. Against this background, this paper aims to explore the experience and strategies of empowering rural industrial revitalization through the successful case of the Digital Strawberry Demonstration Garden in Changfeng County, thereby providing reference strategies for relatively poor areas across China to address their challenges. The analysis concludes that the digital economy can significantly promote the revitalization of rural industries by optimizing the production process of rural industries, improving production efficiency, and enhancing the risk resilience of agriculture.

Keywords: Digital Technology, Rural Revitalization, Changfeng County, Digital Strawberry Demonstration Garden

1. Introduction

Nowadays, various regions in China are earnestly implementing the strategic deployment of digital rural development and actively exploring digital rural development models. In this context, a number of replicable and scalable cases have emerged across the nation, and the Digital Strawberry Demonstration Garden in Changfeng County is one of them. Changfeng County is located in Hefei City, Anhui Province, China. It is renowned for its strawberries and has been dubbed the "Capital of Strawberry." Following the idea of digitally empowering the strawberry industry, the county vigorously implemented the "Internet Plus" agricultural products pilot project for selling products from villages to cities. It established a big data platform for disease and pest control of strawberries and developed a number of digital strawberry zones such as Doctor Strawberry Science and Technology Park, Queen Strawberry-Picking Park, and Yanjiutian Strawberry Seedling and Breeding

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Center. With a solid foundation for the development of the Digital Strawberry Demonstration Garden, the county has promising prospects, benefiting approximately 400,000 farmers, with the total income of nearly half of the county's farmers coming from the strawberry economy. Therefore, this paper takes the Digital Strawberry Demonstration Garden in Changfeng County as an example to study the role of digital technology in rural revitalization development. On the one hand, it summarizes the development process and current status of digital rural construction in China, providing valuable experience for subsequent researchers. On the other hand, it helps other regions to gain experience, develop and expand rural economies, promote the sale of agricultural products, and enhance rural industry development, thereby improving residents' income levels through means such as e-commerce, digital payment, and the Internet of Things.

2. Literature Review

The existing literature on digital rural development can generally be classified into three categories: studies focusing solely on digital rural development, studies focusing solely on relative poverty, and studies examining the impact of digital rural development on rural areas.

Regarding the research on digital rural development, Scholars Wang Yaozong and Niu Minglei point out that digital rural development refers to the application of modern information technology in various fields and aspects of rural areas, aiming to achieve digital upgrading and transformation, as well as the development of a new agricultural and rural economy based on new development concepts. It also involves the digitization of rural public services and social governance [1]. Scholars Wang Sheng and Yu Na believe that the essence of digital rural development is not merely the simple addition of digital technologies, but rather a further extension of agricultural informatization [2]. Regarding the construction path of digital rural development, scholar Li Daoliang suggests that the key aspects of digital rural development should focus on strengthening rural information infrastructure construction, developing rural digital economies, and enhancing the digitalization level of rural governance. In addition, improving rural information-based agricultural services and promoting the construction of smart and green rural areas are also essential [3]. Scholars Teng Huan and Li Congcong propose an implementation path for digital rural development, including strengthening publicity and education, scientifically formulating plans, improving information infrastructure, ensuring information technology talents, guaranteeing construction investment, establishing sound cooperation mechanisms, and promoting rural intelligent governance [4]. To promote the high-quality development of digital rural development, scholars Xie Wenshuai and Song Donglin suggest accelerating the improvement of the institutional mechanisms for digital rural development, increasing the supply of rural digital products and services, and adhering to the principle of implementing classified strategies for digital rural development in relation to relative poverty [5].

Regarding research on relative poverty, the concept of relative poverty can be traced back to the discussion of absolute poverty. In 1901, British scholar S. Rowntree first proposed the concept of "absolute poverty" in his book *Poverty: A Study of Town Life* [6]. He calculated the actual value of a hypothetical "basket" containing all the basic consumption items needed to sustain a family for a week, and then estimated the total poverty line by measuring the needed currency. It is generally believed that S. Rowntree's definition of poverty is an absolute and objective concept, more focused on the "primary stage" of poverty, namely absolute poverty. With the rapid development of the economy, people have realized that poverty is not only reflected at the level of survival, and the term "relative poverty" gradually entered the public's view.

Regarding research on the impact of digital rural development on rural areas, scholars Wang Yanan et al. empirically studied the impact of digital rural development on rural residents' online shopping based on provincial panel data. The empirical results show that the development of digital rural areas

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can significantly improve the level of online shopping among rural residents, and the impact effects have significant differences in structure and region [7]. Scholars Gan Xiali and Wang Qianyuan studied how internet use affects the happiness of rural residents based on the 2016 China Family Tracking Survey data. The research results show that internet use can significantly improve the happiness of rural residents, and the impact of the internet on the happiness of rural residents conforms to the law of diminishing marginal utility [8].

In summary, existing literature mostly focuses on measuring multidimensional poverty in rural areas or discusses digital rural development from a theoretical perspective. Few scholars have combined the study of digital rural development with rural relative poverty. The research content of this paper is novel since it attempts to explore the relevant issues of digital rural development and rural revitalization, as well as the poverty reduction effects of digital rural development.

3. Experiential Strategies of the Digital Strawberry Demonstration Garden in Changfeng County

3.1. Optimizing the Production Process Flow

The strawberry cultivation in the Digital Strawberry Demonstration Garden utilizes the world's advanced soil-less cultivation system, also known as "Grass and Lotus Skyfall," which can automatically adjust the height to achieve high-density planting. Li Wei, the Deputy General Manager of the Zhongke Hefei Smart Agriculture Valley Co., Ltd., introduced that the "Grass and Lotus Skyfall" is equipped with an intelligent water and fertilizer integrated system. Through computers and mobile phones, farmers can monitor the growth of strawberry seedlings at any time, control water and fertilizer management, and remotely control the temperature, light, water, and fertilizer in the greenhouse, achieving unmanned operation. By comprehensively utilizing sensors, big data, artificial intelligence, and other means, the collected data is transmitted to the big data center. Through modeling and analysis of the data, a model of the strawberry growth process can be obtained, providing farmers with rational suggestions and plans for cultivation. "To put it more vividly, it's like providing farmers with an instruction manual for strawberry cultivation. Farmers can rely on this manual for scientific strawberry cultivation in the future," Li Wei said. According to calculations, the digital production of strawberries has significantly reduced costs and increased efficiency. Through the intelligent identification system of diseases and pests and the intelligent control system of water, fertilizer, and pesticides, precise fertilization and pesticide application are achieved, reducing fertilizer usage by 30% and pesticide usage by 45% in strawberry production.

3.2. Enhancing Production Efficiency

To enhance the digitalization level of the strawberry industry and thereby improve its production efficiency, Changfeng County has established the nation's first internet platform for the strawberry industry. Following the approach of digitally empowering the strawberry industry, technologies such as the Internet of Things, big data, blockchain, and artificial intelligence are utilized.

The county has constructed a big data platform for the strawberry industry, an intelligent management system for strawberry plantations, and a digital management system for strawberry quality and branding. This digital system integrates the entire strawberry industry into a comprehensive picture covering "industry layout, disease and pest identification, fertilizer and water control, agricultural product quality traceability, and sales network." It enables the visualization and coordinated control of temperature, light, air, soil, fertilizer, and pesticides in strawberry production.

A "five-level" system has been developed, making the strawberry resources digitalized, production intelligent, management precise, services remote, and quality supervision networked. This system is replicable and can be widely promoted as a digital agriculture application model.

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For instance, intelligent inspection robots are installed inside the greenhouse. These robots dynamically collect phenotype information such as strawberry growth, fruit shape, cracking, and ripeness using artificial intelligence recognition sensors and algorithms. Through the agricultural product quality control model, artificial intelligence automatically grades agricultural products. Consumers can scan the blockchain traceability code of agricultural products during purchase to learn about the quality grade and production information.

The production output of the strawberry industry has significantly increased due to the improvement in its digitalization level. Currently, the average strawberry yield has increased by 15%, saving costs such as agricultural resources and labor by 800 yuan per mu (approximately 0.16 acres). This translates to an increase of 3,600 yuan per mu in income, with an overall economic benefit growth of 15.2%.

3.3. Enhancing Agricultural Resilience to Risks

In early 2022, facilitated by the Changfeng County government and the e-commerce platform, salesperson Wu Yeying brought Changfeng strawberries online to the e-commerce platform, embarking on the exploration of online retail channels. "Offline sales were relatively limited and unstable in volume. Online platforms allow us to reach customers nationwide, offering broader sales channels with a larger reach," Wu Yeying explained. Through the online platform, Wu Yeying successfully sold Changfeng strawberries to cities such as Tianjin, Beijing, Jiangxi, and Hunan. To ensure the quality of the strawberries, he also established cloud warehouses in six locations including Hefei, Shanghai, Hangzhou, Fuzhou, Suzhou, and Changsha. Last month alone, he achieved sales exceeding 3 million yuan within just two weeks on the online platform.

The booming e-commerce sales model attracted the admiration of villagers. Wu Yeying immediately collaborated with Liangcao Village in Zuodian Township, Changfeng County, to help more villagers sell strawberries on the e-commerce platform. To further assist villagers in selling strawberries and other agricultural products, in 2022, Liangcao Village established a shared agricultural product cloud warehouse with the support of provincial-level collective economic development funds and municipal economic and information bureau special funds. Here, villagers focus on strawberry cultivation, while designated personnel are responsible for sorting, packaging, loading, and shipping. Wu Yeying takes charge of selling the products on the e-commerce platform.

With blockchain traceability, the coverage rate of agricultural product quality and safety traceability has reached over 99%. The proportion of Changfeng strawberry e-commerce sales has increased from the previous 10.1% to 19.2%, with online annual sales exceeding 70,000 tons of strawberries. This has significantly enhanced the brand influence and reputation of Changfeng strawberries.

4. Conclusion

This paper takes the Digital Strawberry Demonstration Garden in Changfeng County as a case study to explore the role of digital technology in rural revitalization and development. The research findings suggest that experiences such as optimizing production processes, enhancing production efficiency, and strengthening agricultural resilience to risks can aid rural areas in developing agriculture through digital technology. Other relatively impoverished regions can learn from these experiences, adapting universal practices to their local conditions, integrating them with local characteristics, and formulating their own comprehensive solutions.

However, it is acknowledged that this paper only takes the strawberry cultivation technology in Changfeng County as a case study, lacking a comprehensive analysis of the experiences and strategies of digitally empowering rural industry revitalization. Future research could involve the analysis of

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multiple cases to develop a comprehensive set of experiences and strategies, providing feasible solutions for regions across the country.

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