

Research on the Path of Digital Agriculture Enabling Rural Revitalization in Quanzhou City

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ABSTRACT

Digital agriculture is an important practice of digital economy in the field of agriculture, and an important content of implementing the digital rural development strategy and comprehensively promoting rural revitalization. Since the 13th Five-Year Plan, Quanzhou City has paid attention to the development of digital agriculture and actively promoted the strategy of rural revitalization. This study sorted out the achievements of Quanzhou digital agriculture in rural digital infrastructure construction, facility agriculture construction, township and rural e-commerce, agricultural products network marketing model, and the establishment of smart agriculture platform. It is pointed out that there are still problems such as low standardization of agricultural and rural information, lack of overall planning for the construction of agriculture-related information systems, incomplete information resource standards and management system, and shortage of digital personnel. Furthermore, the development trend of empowering rural revitalization in Quanzhou with digital agriculture is further analyzed. On this basis, five suggestions are put forward to strengthen the construction of digital agriculture in Quanzhou. It provides a new way of thinking for studying digital agriculture to promote rural revitalization.

Key words: Digital Agriculture; Rural Revitalization; Agricultural Informatization

1. Introduction

The report of the Twentieth Party Congress clarified the development path of our agriculture and

rural areas as well as the need for high standards, and, at the same time, emphasized the attention paid to the modernization of agriculture, the development of the countryside and the improvement of the quality of life of farmers. If these aspects are neglected, the modernization of our country will be incomplete, inadequate and even unstable. Industrial revitalization is seen as the cornerstone of comprehensive rural revitalization, while the construction of a strong agricultural country cannot be separated from the support of scientific and technological innovation. Specifically, digital agriculture has become a key indicator for assessing the development of agricultural science and technology, and the successful implementation of the rural revitalization strategy cannot be separated from digital agriculture (Shen.et al., 2023). As a coastal region of China with excellent economic development, Quanzhou has made remarkable achievements in the field of agricultural economic development. During the 14th Five-Year Plan, Quanzhou City plans to actively adapt to the era of big data, increase the application of rural digital science and technology, and make every effort to promote the process of rural digitization. To this end, Quanzhou City has formulated the Work Program for Digital Agricultural and Rural Development in Quanzhou City (2021-2025), issued the Notice on Accelerating the Construction of Digital Agricultural Demonstration Bases, and implemented the Implementation Plan for Implementing the Key Work Deployment of the Municipal Party Committee and the Municipal Government in Comprehensively Promoting Rural Revitalization in 2022. In addition, relevant incentive policies have been released to promote the reform and upgrading of the entire agricultural industry chain in the city. Therefore, the development of digital agriculture has become the core content of Quanzhou City to promote the modernization of agriculture, in which digital agricultural empowerment is more regarded as a key strategy to promote the rural revitalization strategy in Quanzhou.

2. The effectiveness of the construction of digital agriculture in Quanzhou City

2.1 Upgrading rural digital infrastructure development

At this stage of the ongoing digital transformation, Quanzhou City has invested huge efforts in the construction and extension of the 5G network. By the end of May 2023, the number of 5G base stations in Quanzhou has exceeded 19,000, leading the scale of base stations in the province, while 10G-PON ports exceeded 124,000, accounting for the third largest in the province. In addition to this, 5G signals have been covered in township centers and 70% of administrative village areas. Especially in Quanzhou Fengze District, the new infrastructure construction has been accelerated to empower the digital industry, and 1,400 digital points have been built to achieve initial results. These achievements are expected to give more impetus to the digital transformation of Quanzhou City in the future, and ultimately drive high-quality socio-economic development.

By 2024, Quanzhou City has the potential to be transformed into a digital government with an advanced digital infrastructure that is collaborative and efficient, a comprehensive application of digital technologies across all sectors, and a region where cyber and information security are self-managing. In terms of infrastructure development, the city has completed the revamping of its e-government network, scaled up the deployment of urban sensing facilities and improved its capacity for online monitoring and management.

2.2 The construction of agricultural facilities is beginning to show results

Quanzhou City has realized remarkable development in terms of brand-new infrastructure, and has established advanced intelligent agricultural parks and agricultural IoT application bases. By 2023, the total construction area of Quanzhou City's facility agricultural greenhouses has exceeded 70,000 acres, while the scale of intelligent greenhouses has reached more than 8,000 acres. Meanwhile one plant factory and three facility chicken farms have been set up. These facilities help Quanzhou City, guided by the new concept of development, rely on information networks, stimulate scientific and technological innovation, and realize the digital transformation, intelligent upgrading and convergence and innovation of agriculture.

Quanzhou City is vigorously promoting the digitalization of facility agriculture, aiming to build a new infrastructure system integrating digitalization, intelligence, intensification and greening, and the rapid implementation of new technologies and applications has been realized. In order to accelerate the development of modern facility agriculture, Quanzhou City is a large-scale implementation of agricultural technology to enhance the action plan, which includes "100 guidance, thousands of action" and other projects, and strive to enhance the capacity of refrigeration and preservation and sorting equipment, and on this basis, to expand the technology demonstration and promotion of facility agriculture.

2.3 Rapid development of rural e-commerce in townships

Quanzhou has achieved remarkable results in the field of e-commerce, with the total number of Taobao towns and Taobao villages amounting to 77 and 335 respectively by 2022, accounting for 38% and 52% of the province's share. Fujian Province ranks fifth and sixth in the national rankings for Taobao towns and Taobao villages, respectively. Moreover, the city has successfully built 55 township e-commerce service stations as well as 724 village-level e-commerce service stations. In addition, as of September 2022, 39 counties have been awarded the honor of national-level rural e-commerce demonstration counties, and the province's total scale of e-tailing ranks 6th nationwide, while the scale of rural e-commerce is ranked 3rd in the country.

Quanzhou has also seen significant growth in online retailing of agricultural products. In the first

quarter of 2022, the city's total rural e-tail sales improved to \$35.318 billion, while e-tail sales of agricultural products totaled \$2.887 billion, a 5.5 percent increase. On the “Double Eleven” e-commerce event in 2022, the total value of online sales in townships in Fujian Province exceeded 16.93 billion yuan, and the total value of sales in Quanzhou City amounted to 12.08 billion yuan, with a ratio of 71.4%, making it the largest sales market in the province. In addition, Shishi City, Jinjiang City and Nan'an City within Quanzhou City are at the forefront of rural online retail sales. These figures further validate the strong driving force of e-commerce development in Quanzhou.

2.4 Continuous innovation in the network marketing model of agricultural products

With the “Internet Plus” agriculture out of the village into the city project plan to carry out, Quanzhou City has been in a variety of levels of efforts to promote the construction of agricultural infrastructure, agricultural branding, agricultural sales methods continue to innovate, in-depth promotion of the reform of the agricultural network marketing methods, and improve the agricultural network marketing system to promote the agricultural products into the major e-commerce market deployment has been rapidly advancing. At present, Anxi, Yongchun was included in the national agricultural products out of the village into the city demonstration counties, the city has established 13 “Quanzhou countryside good goods hall”, attracting more than 2,000 agricultural products production and processing enterprises stationed (times), which can be online and offline to promote sales of agricultural products of nearly 100 million yuan.

2.5 Smart agriculture platforms take the lead

In recent years, Quanzhou City continues to accelerate the “digital farmland”, “rural production factors flow platform” and other digital information platform construction. At present, the agricultural products display platform, agricultural products information dissemination system, soil data analysis system, pest control and other agricultural facilities such as Internet of Things platform has been completed. These platforms lay a solid foundation for Quanzhou City to build a comprehensive integrated system of agricultural informatization, aiming at centralized integration of supervision, service, investment promotion, production and sales, and providing comprehensive services for governmental decision-making and decision-making, agricultural research, agribusinesses, agricultural associations, consumers of agricultural products, and other main bodies, including retrieval and querying, commodity trading, scientific and technological consulting as well as data utilization, and so on.

3. Problems of Digital Agriculture Enabling Rural Revitalization in Quanzhou City

3.1 Low degree of standardization of agricultural and rural information

In the construction of agricultural and rural informatization, information standardization is regarded as a basic and extremely important link. At present, Quanzhou has some problems in the process of standardization of agricultural and rural information. First, there is a lack of agricultural information standards, which limits the order and coherence of agricultural and rural informatization. Secondly, in the field of agriculture, there is still a lack of a unified norm and standard for various aspects such as information collection, preservation, analysis and sharing, which greatly reduces the efficiency of information management and use. Third, in the process of building agricultural and rural informatization, various local government departments tend to operate on the basis of their own interests, resulting in a large amount of data and information that is disorganized, dispersed and fragmented. This creates the phenomenon of “information silos”, which makes information resources wasted, and also brings great difficulties for future data sharing (Luo.et al., 2022).

3.2 Lack of integrated planning for the construction of agriculture-related informatization platforms

At present, Quanzhou still exists in the agricultural production base network broadband is not enough, the signal is not stable and other problems, at the same time, in rural areas, 5G base stations, fiber broadband and IoT facilities and other emerging infrastructure configuration and number of urgent need to make further optimization and enhancement. Because of this, the current situation of agricultural and rural informatization construction is basically in the “blossoming of a hundred flowers, a hundred schools of thought” situation. Such a situation reveals the lack of top-level design, the exclusive possession of many information resources, and the independence of each information platform, which leads to many difficulties in resource sharing. Another important problem lies in the lack of comprehensive planning for the construction of agricultural big data, which makes it impossible to determine the specific content of the construction in accordance with the needs of serving the entire agricultural industry chain, while the division of responsibilities and powers for the subject and participants in the construction of agricultural big data is not clear. For these reasons, some sectors and social agents are troubled in understanding how to establish the construction of agricultural big data. This situation is clearly detrimental to the promotion of the overall development of agricultural and rural informatization and needs to be improved and optimized.

3.3 Technical standards and systems for data resource management are not yet complete

Among the data resources in agriculture and rural areas, Quanzhou has a situation of decentralized data distribution, and the degree of sharing and openness of public data needs to be further improved. At the same time, the collection capacity and coverage of sky-land integration data are slightly insufficient, while the realization of the value of data elements has not yet

reached the desired level. In addition, in the construction process of agricultural big data, due to the large amount of data in agriculture and rural areas that are widely distributed and large in scope, existing in different departments, institutions and agricultural enterprises related to agriculture and rural areas, these data are not shared in an all-round way among various departments in view of the restriction of permissions and security concerns, and a unified standard system on the generation and utilization of agricultural big data has not been established, and there is a lack of effective integration, which not only affects the efficiency of data utilization, but also hinders the comprehensive development of agricultural big data.

3.4 Lack of digital talent

The role of IT professionals is exceptionally important in the process of rural revitalization. Talent is the main driver of an autonomous development model for rural revitalization. In this process, it is necessary for government departments to actively cooperate with scientific research institutions, institutions of higher learning and commercial enterprises, and to nurture professional and technical talents with information technology skills and high-level teams of rural management, with the aim of providing sustainable impetus for rural revitalization.

However, current practice shows that the number of agricultural and rural informatization talents in Quanzhou is significantly insufficient, which slows down the pace of digital village construction to a certain extent. In addition, due to the relatively remote geographical location of villages, factors such as low wages, poor living environment and limited development opportunities make it difficult for villages to attract and retain information technology professionals and technicians. In addition, constrained by their self-education level, rural grass-roots officials need to make progress in their ability to understand and utilize information technology.

At the same time, rural residents are severely under-trained in digital technologies, leading to a relatively low level of understanding and acceptance of digital management. Although digital management platforms have been established in villages, the vast majority of them remain “formally present but underutilized”. All these factors reflect that the lack of IT personnel has hindered the high standard of rural revitalization. Therefore, how to deeply integrate digital technology with rural revitalization has become a challenge of a series of uncertainty issues triggered by the personnel situation (Chen&Wang, 2023).

4. Countermeasure Suggestions for Promoting Digital Agriculture Enabling Rural Revitalization in Quanzhou City

4.1 Strengthening agricultural and rural informatization infrastructure and building a “digital base” for rural revitalization.

4.1.1 Promote the transformation of 5G communications from “town to town” to “village to village”.

While considering the current situation of 5G network coverage in rural areas of Quanzhou City and the development characteristics of local industries, we need to accurately determine the needs of network coverage construction in rural areas and improve the construction plan of 5G network for specific situations. Efforts to carry out the Telecommunications Universal Service Pilot are an ongoing process, with the aim of accelerating the construction of 5G base stations in rural areas, realizing the “village-to-village 5G” in administrative villages as soon as possible, and ensuring that the broadband network access rate of natural villages and groups of more than 20 households reaches more than 90 per cent. For the specific situation of Quanzhou City, there is a need to further improve the quality and speed of services and to ensure that all users can enjoy high-quality 5G services. It is also important to use 5G technology to better promote the development of the agricultural economy and rural revitalization.

4.1.2 Upgrading rural broadband networks

In order to keep promoting infrastructure such as fiber optic networks, 5G, and mobile IoT in rural areas, we need to consider synchronizing them with urban network facilities during the planning and construction process. In addition, telecommunication networks, the Internet and radio and television networks in rural areas need to be integrated and built in a unified manner. In this way, OLT equipment as well as network aggregation nodes can be set up in administrative villages or administrative village tracts in order to build more stable rural broadband services. The goal is to be able to basically synchronize rural networks with urban networks at the same speed.

4.1.3 Implementation of upgrading of traditional infrastructure

The use of new-generation information technology, such as “Big Intelligence, Cloud, Mobility and Object Area”, can accelerate the digitalization of rural water conservancy, electricity and other living infrastructures. This will require further promotion of the use of clean energy sources, such as natural gas and solar energy, as well as continued improvement of water infrastructure in the main agricultural production areas and the implementation of efficient water-saving irrigation. Traditional farmers' markets also need to be improved and upgraded in order to standardize and modernize the management of farmers' markets, which requires us to rapidly upgrade the technology of cold-chain logistics facilities and equipment so as to promote the intelligent and efficient transportation of agricultural products. At the same time, agricultural facilities need to be upgraded. This includes increasing subsidies for greenhouses for agricultural facilities, encouraging support for the construction of intensive nursery (seedling) centers, and

also the need to promote the upgrading of edible mushroom processing plants.

4.1.4 Establishment of an agricultural data sensing network

Focus on the city's characteristic advantageous industries such as fruit and vegetable cultivation, tea cultivation, livestock and poultry breeding, edible fungus cultivation, aquaculture, etc., and combine the characteristics of these industries, the need to make full use of the city's agricultural meteorological observation sites, farmland water conservancy monitoring stations of the information resources. IoT devices for various environmental monitoring and individual sensing including soil moisture, field soil conditions, seedling stage, pest and disease conditions, and disasters should be widely used. In addition, a smart terminal information submission network should be constructed to improve the uploading efficiency of manual data collection.

4.2 Improving the construction of an agricultural and rural data resource system and enriching the “digital connotation” of rural revitalization.

4.2.1 Sorting out and compiling a catalog of rural data resources

The city's ongoing survey of agricultural and rural data resources and the compilation of a data catalog is in order, which includes the collection and organization of data on the city's agricultural natural resources, agricultural meteorology, agricultural land resources, agricultural state-owned resources, the agricultural and rural economy, as well as agricultural business entities. While carrying out this work, information such as the type of relevant data, type, responsible department, data source, data description, data content, data format, and the time of data collection are also being documented in detail, which provides a direction for further mining of these data (Tan et al., 2023).

4.2.2 Strengthening basic agricultural and rural databases

Relying on geographic information technology, the development of an information system for agricultural land management was realized for the first time in the city (Qiao et al., 2022). Under this structure, a panorama of agricultural data including agricultural production entities, agricultural products, agricultural tools, agricultural production and management, agricultural land, rural environment and collective property is created. At the same time, it is also necessary to optimize the spatial layout of land, make clear decisions on the amount of arable land to be occupied, the scale of land to be used for construction, and specify the areas where farming is prohibited, among other points, and, on that basis, to unify the planning of land for the construction of agricultural infrastructure and public facilities. In addition, we have categorized and established a database of intermediary service units for village construction projects by means of an open call to the community and shared it with the streets.

4.2.3 Implementation of the project to optimize the allocation of agricultural and rural data resource elements

Actively promote accurate collection of agricultural and rural data so that it can be dynamically alerted, modeled and analyzed, assisted in decision-making, and shared publicly (Dong, 2021). Real-time data interfaces are also opened on demand in order to support cross-recognition and sharing of agricultural and rural data resources across regions, levels and sectors. At the same time, attempts are being made to explore how to summarize, analyze and integrate the loose agricultural regulatory structures, regulatory elements and regulatory platforms in a multi-dimensional manner.

4.3 Strengthening the innovative use of digital agriculture and expanding the “digital space” for rural revitalization.

4.3.1 Promoting digital agriculture pilot demonstration projects

The construction of digital agriculture demonstration sites is actively promoted throughout the city (Li et al., 2011). Pilot demonstrations will be conducted in key industries such as grain, fruits and vegetables, tea, livestock and aquaculture, and a series of digital agricultural complexes based on IoT technology will be built in a systematic manner. At the same time, it will also build digital models of collective cooperatives and “smart farms” to provide all-round support for the digital transformation of the city's agricultural production, rural operations, farmers' lives and rural governance.

4.3.2 Promoting the construction of model application scenarios for digital agriculture in rural areas

It is actively promoting the deep integration of new information technologies, such as the Internet of Things, big data, artificial intelligence and blockchain, with the management of agricultural production. At the same time, efforts are also being made to promote the expansion of “Internet Plus” government services to the rural front line. The construction of digital farms, digital fields, digital orchards, digital ranches, digital factories, digital towns, and rural smart communities and other demonstration application scenarios has begun across the city (Xu et al., 2016) as a way to improve the digitalization of agricultural and rural development, to make the application of agricultural resources more sensible and the management of agricultural operations more efficient, and to further enhance the level of rural governance and services.

4.3.3 Planning for the construction of the agricultural industrial brain

Carry out the work in the mode of "Agricultural Industry Brain, Digital Map and Digital

Agricultural Factories (Bases)", the work will be carried out, combined with the city's fruits and vegetables, tea, edible fungi, livestock, aquatic products, forest and bamboo, flowers and seedlings and other rural special industries, to promote the agricultural industry brain such as the brain of the fruits and vegetables industry, the brain of the tea industry, the brain of the fishery industry, the brain of the forestry industry, and the construction of "one brain for one place". The construction of "one brain for one place". At the same time, the identification of municipal digital agriculture factories has been initiated to provide sustained momentum for the creation of digital agriculture factories and the digital transformation of breeding bases.

4.3.4 Improvement of the traceability marketing system for agricultural products

Actively strengthen the construction of rural intelligent Internet of Things and improve the quality traceability system of agricultural products (Xiu & Tian, 2019). Relying on the "one product, one code" traceability system, efforts are being made to develop a regional public information service platform that integrates the functions of network trading, location tracking, origin tracing and analysis of industry dynamics. The aim is to expand the scope of traceability of agricultural products, improve the utilization rate of facilities and circulation efficiency, and enable the entire process of agricultural production, from cultivation, farm management, fertilizer application, medication, harvesting, to market sales, to be traced. The aim is to provide comprehensive services for new agricultural management models such as agribusinesses, specialized farmers' cooperatives and family farms, and to expand to individual farmers in the future.

4.3.5 Accelerating the digital transformation and upgrading of agricultural machinery operations

According to the guidance of "Quanzhou City Intelligent Agricultural Machinery and Equipment Application Standard Specification", the transformation of agricultural operation methods to digitalization and intelligence is being rapidly promoted (Wu, 2023). Its main goal is to promote the practical application of scientific and technological equipment such as agricultural IoT devices, big data, 5G, unmanned vehicles, agricultural robots, intelligent sensing as well as control, etc., and endeavor to build a series of demonstration and practice bases of intelligent agricultural machinery and equipment covering a wide range of fields including grain, vegetables, livestock and aquaculture. In addition, it also actively promotes the "Internet for agricultural machinery management" service and supports the construction of an integrated agricultural mechanization management service information system (Guo, 2021). It is exploring the industrial application of intelligent scientific and technological equipment, and experimenting with new modes of industrialized production and intelligent management in such industries as vegetable cultivation, animal husbandry and aquaculture, with a view to realizing

the green, ecological, intelligent and efficient development of agriculture.

4.4 Innovating the digital agricultural industry service model and stimulating the “digital vitality” of rural revitalization.

4.4.1 Establishment of specialized modern agricultural service platforms

Create a number of specialized modern agricultural service platforms in the city in order to carry out the most basic intelligent management of agricultural production. In the process of agricultural production, these platforms are not only responsible for data collection, but also carry out specialized program settings, in order to provide farmers with precise service solutions. Actively introduce digital agricultural hosting service teams to provide specialized, standardized, systematic, integrated, precise and digital agricultural services for agricultural production.

4.4.2 Building the “Internet Plus” agricultural marketing service system

Focusing on key tasks such as the construction of origin infrastructure, the supervision of the quality of agricultural products sold online, the building of agricultural product brands, the enhancement of farmers' level of online application, the promotion of new rural Internet businesses and models, and the leadership of diversified market players, we are actively promoting Anxi County and Jinjiang City to become the “Top 100 Counties for Digitization of Agricultural Products We are actively promoting Anxi County and Jinjiang City to become “Top 100 Counties for Digitization of Agricultural Products” and Anxi County, Dehua County and Nan'an City to become “National Comprehensive Demonstration Counties for E-commerce in Rural Areas”. Actively incentivize returning college students and entrepreneurs to participate in the promotion of innovative agriculture, crowdfunding agriculture, and sharing agriculture, and promote new e-commerce modes such as live broadcasting and marketing (Wang, 2023). Actively cooperate with third-party platforms such as Alibaba, Qicai E-commerce, Jingdong, Xiangyang Creative Space, Pinduoduo, and Postal Agricultural Products, etc., with the intention of creating a platform for agricultural products such as “Quanzhou high-quality agricultural products” and “Jintong Premium”, and then establishing brand influence.

4.4.3 Make up the short board of cold-chain logistics facilities for storage of agricultural products

Strengthening the construction of pre-cooled warehouses and cold chain storage at important logistics nodes, especially in the main production areas of vegetables, fruits, edible fungi and livestock in Jinjiang and Hui'an. Accelerating the construction of cold-chain infrastructure for agricultural products and encouraging and supporting the construction of terminal low-temperature facilities by agricultural product retailers, with the aim of completing the “first

kilometer” and “last kilometer” of agricultural products from villages to cities. Construction of core facilities for cold chain logistics in storage compartments to streamline the process of storing and preserving bulk agricultural products, fresh fruits and meats, etc. Implement a comprehensive business strategy which involves enterprises, cooperatives, bases, farmers, agricultural products wholesale markets, cold-chain transportation centers and agricultural products e-commerce platforms. It offers all-round services to consumers, including the storage, processing, transportation and sales of agricultural products.

4.4.4 Exploring new agricultural digital fintech solutions

Focusing on Quanzhou City's fruit and vegetable, tea, edible fungus, livestock, aquaculture, forest and bamboo, flowers and seedlings, and other specialty industries, it utilizes smart technology, big data analysis, chain block network, Internet of Things, and artificial intelligence aids to digitize the agricultural production environment and build a set of biological asset monitoring platforms. The platform has the ability to fully monitor the planting and farming processes of the bioresources, thus building a dynamic and traceable blockchain bioresource. At the same time, agricultural financial institutions in Quan are encouraged and supported to transform production data into indicators of interest to financial institutions on the basis of the biological asset monitoring platform, so as to solve the regulatory challenges and financing problems of biological assets. This will help financial institutions to control risks, enabling them to provide financial services to farmers more quickly and efficiently, thus promoting rural revitalization.

4.5 Building a high-level agricultural and rural digital talent team and bringing together “digital farmers” for rural revitalization.

The state has issued a series of important policy documents, such as the Digital Agriculture and Rural Development Plan (2019-2025), the Outline of Digital Rural Development Strategy, and the Action Plan for Digital Rural Development (2022-2025), aiming to accelerate the digital transformation of agricultural production and agricultural technological innovation, and to promote the sustainable digital rural development (Fu & Tang, 2023). Agricultural digital talents are the main force in the construction of agricultural modernization and digital countryside. In this context, the education of agricultural digital talents should be continuously strengthened in order to better lead the development of agricultural modernization and realize rural revitalization.

4.5.1 Enhancing digital literacy among farmers

In order to strengthen the quality and skill training of farmers, it is necessary to coordinate the use of educational and training resources such as universities, agricultural science research institutes, and agricultural machinery extension organizations in Quanzhou City, so that all kinds

of market players, including agricultural enterprises and farmers' cooperatives, can give full play to their roles and participate in the training of farmers' quality and literacy (Yang, 2024). At the same time, with the help of Internet platforms such as the "Farmer Education and Training Reporting System" of the China Rural Distance Education Network or the cell phone "Smart Farmer on the Cloud" APP, as well as online educational resources, we provide digital competence training for key groups such as large-scale agricultural practitioners, family farm operators, leaders of farmers' cooperatives, and entrepreneurs returning to their hometowns. For key groups, such as large-scale agricultural practitioners, family farm operators, leaders of farmers' cooperatives and entrepreneurs returning to their hometowns, digital competence training is provided to promote the basic theories and practical skills of digital agriculture, as well as new concepts, technologies and applications of digitization, such as cell phone apps, Internet services, e-commerce logistics and live broadcasting and sales.

4.5.2 Promote the cultivation of digital agriculture professionals in colleges and universities

According to the digitalization needs of the city's agriculture and rural areas, higher education institutions such as Overseas Chinese University, Quanzhou Teachers College, Quanzhou Agricultural School and other institutions will be promoted to carry out majors related to artificial intelligence, data science and big data technology, big data application and management, Internet of Things engineering, and agricultural informatization(Zhu, 2020). The aim is to cultivate more talents in agricultural science and technology, and agricultural product marketing in a hierarchical and categorical manner; and to cultivate excellent talents in digital agriculture, so as to inject sufficient human resources for rural revitalization. At the same time, it strengthens the partnership between universities and agribusinesses and rural local organizations, promotes the integration of industry and education, and cultivates high-quality professionals for digital agriculture and rural development.

4.5.3 Bringing in agricultural digital talent

Focusing on the digital development of agriculture and rural areas, it has implemented the "Harbor Plan" and the "Creators Introduction and Nurturing Project" to gather a group of high-quality industrial and professional talents standing at the forefront of agricultural science and technology, with an international vision and industrialization strength. Innovative attempts have been made to introduce talents, evaluate and utilize them, incentivize and distribute them, as well as provide services and protection, and to formulate targeted measures to actively create a sound institutional environment for talents. Key policies prioritized include housing, children's education, employment opportunities, incentives and continuing education, etc., in order to attract and retain the professional talents needed by leading industries.

5. Conclusion

The progress of digital agriculture is crucial to the development of modernization of agriculture and the countryside, as well as a major element in enhancing farmers' profitability, improving their quality of life and realizing the rural revitalization strategy. Quanzhou City, in the process of promoting digital agriculture to help revitalize the development of the countryside, whether it is the reform and upgrading of infrastructure, the application of scientific and technological innovation, policy and financial assistance, the cultivation of talent teams and other aspects of a comprehensive promotion. Against the backdrop of improving digital technologies such as 5G and artificial intelligence, the agricultural digital economy is steadily growing and gradually transforming into a key driver of rural revitalization. As an element that will have a key impact on the future growth of the countryside, it is important to take advantage of the diversified applications of the digital economy, uphold the principles of greening and sharing, promote the emerging vitality of the agricultural economy and build a whole with the entire process of revitalization of the countryside, so as to nurture a new model of rural development while more effectively supporting rural governance and deeply exploring the potential of rural development.

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