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Analysis on the Transformation of Geographical Indication Agricultural Products Based on Digitalization—Take the Orchid in Wengyuan County as an Example

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Abstract: *With the continuous advancement of agricultural modernization and digital transformation in the new era, the protection and development of agricultural products have significant implications for promoting local economies. This paper focuses on the orchid industry in Wengyuan County, exploring how digitalization technology can provide new impetus for the industry's development by collecting data, conducting field research, and conducting systematic analysis. The paper analyzes the current situation, challenges faced by the orchid industry in Wengyuan County, and digitalization technology application cases, summarizing specific strategies for promoting the development of the orchid industry in various aspects using digitalization technology, and providing reference for the development of orchid industries in other areas.*

Keywords: *Digital technology, Orchid industry, Wengyuan orchid*

1. Introduction

Against the backdrop of the rapid development of the digital economy, the agricultural sector is undergoing a revolution in digital transformation. The brand value and market competitiveness of agricultural products are increasing with the advancement of digitalization. This article explores how digital technologies can revitalize the agricultural industry, focusing on how modern information technologies can improve the efficiency of agricultural product production management, strengthen brand building and marketing promotion, and promote the high-quality development of the agricultural industry.

Relying on its superior transportation location and mountain climate conditions, Wengyuan County has vigorously developed the orchid specialty industry and is known as the "Hometown of Chinese Orchids", it is one of the largest orchid production bases in the country [1]. The region not only grows traditional orchid varieties, such as “Chinese orchids” and “Exotic orchids”, but also actively develops and breeds new orchid varieties. In addition, Guangdong (Wengyuan) Orchid Research Institute is committed to developing and cultivating new orchid varieties with independent intellectual property rights, and has successfully bred and promoted 200 of orchid hybrid varieties, such as Golden Phoenix, Golden Peony, Wengshan Fairy, etc., through continuous research and development of new varieties. Through the promotion and cultivation of Wengyuan orchids, they are not only well-known in China, but also exported overseas, becoming a driving force for local economic development.

2. Analysis on the Current Status of Orchid Industry Development in Wengyuan County

2.1. Development of Orchid Industry in Wengyuan County

2.1.1. Variety Resources

The orchid species resources in Wengyuan are becoming increasingly abundant, with 24 genera and 42 native species of orchids discovered. And continue to introduce and cultivate new varieties. Among them, "Golden Phoenix" as a new scientific and technological variety in 2023, with its unique flowering control ability and high quality, quickly became the new darling of the market. At present, Wengyuan

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orchid varieties have more than 1000 species, including traditional famous products such as "Yu butterfly", "Cymbidium kanrani", etc., these varieties enjoy a high reputation in the orchid world and have become the golden signboard of Wengyuan orchids.

2.1.2. Planting Scale

The scale of orchid cultivation in Wengyuan continues to expand, with the planting area increasing to 35,000 mu and the annual output value exceeding 30.3 billion yuan, accounting for more than 60% of the national orchid market. The number of enterprises in the plantation area has increased to 418, including 22 Taiwan-funded enterprises and 308 local enterprises, forming a large-scale and intensive production mode. These enterprises not only grow traditional orchid varieties, but also actively introduce and cultivate new varieties with high value-added, which has promoted the rapid development of the orchid industry. In addition, relying on scientific research platforms such as Guangdong (Wengyuan) Orchid Research Institute, through tissue culture, precision cultivation and other modern scientific and technological means, Wengyuan orchid has achieved a full technological upgrade from breeding to cultivation. In particular, the successful cultivation of new varieties such as "Golden Phoenix" not only breaks the limitation of the traditional flowering cycle of orchids, but also significantly improves the quality and yield of orchids. At present, the Wengyuan orchid industry has the capacity to cultivate 30 million orchid seedlings per year and the technical level is in the leading position in the country.

2.1.3. Sales

The sales situation of Wengyuan Orchid continues to improve, the sales network continues to expand, and actively build an e-commerce platform to provide traffic support and guarantee for the e-commerce live broadcast of Orchid enterprises. Through online sales, Wengyuan Orchid's market coverage continues to expand, and sales continue to grow. According to the data, the total online sales of Wengyuan Orchid have exceeded 1 billion yuan, of which the proportion of e-commerce live sales has increased year by year. In addition, Wengyuan has also participated in various domestic and foreign orchid Exhibition, enhance brand awareness and attract more customers to purchase.

2.1.4. Agricultural Linkage

In the process of the development of the orchid industry in Wengyuan, it actively promotes the establishment of a joint agricultural mechanism, which effectively drives the surrounding farmers to increase their income and become rich. Through the "enterprise + cooperative + base + farmers" model, the orchid industry base will be radiated and promoted. Farmers from the border area grow orchids in their own families [1]. With the full industrial chain model of "orchid breeding - planting - sales", Wengyuan orchid production has attracted more than 20,000 rural laborers to find jobs at home, and per capita disposable income has increased significantly. At the same time, orchid cultivation has also driven the development of related industrial chains, such as agricultural material supply, logistics and transportation, injecting new vitality into the local economy. Through the mechanism of joint agriculture and agricultural belt, Wengyuan has created "one village, one product, one county, one industry", and achieved the deep integration of orchid industry and rural revitalization [2].

2.1.5. Brand Building

Wengyuan has continuously enhanced its brand awareness and reputation by holding activities such as orchid Expo and Orchid Cultural Tourism Festival. At the same time, Wengyuan also actively promotes the integration and development of orchid industry with tourism, culture and other industries, and creates a number of orchid cultural tourism projects with local characteristics. These measures not only enrich the connotation and extension of the orchid industry, but also enhance the added value and market competitiveness of Wengyuan Orchid brand.

2.1.6. Construction of Smart Market Information Platform

The smart market information platform of Wengyuan Orchid Industrial Park (Characteristic Town) is a comprehensive platform integrating digitalization and intelligence, aiming to promote the efficient and sustainable development of orchid industry. The platform has focused on promoting the construction of key digital trading systems such as the orchid industry chain big data platform, orchid Exchange, and orchid electronic trading platform [1]. Through the use of advanced cloud computing, big data, Internet of Things, the platform realizes the information management of the whole chain of orchid planting, production, and sales. This initiative not only improves the operational efficiency of the orchid industry, but also enhances the market competitiveness.

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2.2. Current Status of Digitalization of the Orchid Industry

2.2.1. Construction of "Three Parks and One Platform

Wengyuan County actively promotes the construction of "three parks and one platform", namely the seed industry park, e-commerce park, science park and orchid digital park. The orchid industry chain will be further specialized and the orchid industry will be integrated with the tertiary industry. It will be used for the protection and development of orchid seed resources, laying a solid foundation for Wengyuan orchid varieties to stand at the commanding heights. The e-commerce park aims to build a highland for the orchid e-commerce industry, while the science park integrates science education, team building experience, party building activities and integrity education, and has become a popular check-in spot. The digital trading platform opens up the upstream and downstream data channels of the chain realize the integration of big data of the primary, secondary and tertiary industries and improve market competitiveness.

2.2.2. Development of Orchid E-commerce

Wengyuan County has introduced a series of support policies, such as the "Wengyuan County Support Measures for Promoting the Development of Orchid E-commerce" etc. to support the development of Lanhua e-commerce enterprises. At the same time, the three-level logistics distribution system of counties, towns and villages has been upgraded, especially the orchid express line has been opened to promote the further development and optimization of the orchid industry. In addition, Wengyuan County has also established the first Rural E-commerce Industry College in Guangdong Province. Through the cooperation mechanism of "government-school-industry-enterprise," it has achieved a "two-way interaction" between e-commerce talents and the orchid industry.

2.2.3. Establishment of Guangdong's First Rural E-commerce Industry College

Wengyuan County established the first rural e-commerce industry college in Guangdong Province, relying on the characteristics and advantages of the sub-business professional group will promote the deep integration of Wengyuan County's orchid industry and modern information industry. The college adopts the forms of theoretical teaching, project training, rotation internship and entrepreneurship incubation to integrate vocational education classroom with rural areas and provide e-commerce talents for orchid enterprises. Through the implementation of the "industrial chain Party committee + enterprise + cooperative + farmer" model, Wengyuan orchid industry has driven more than 7,700 local farmers to participate in the operation and absorbed more than 20,000 rural labor forces to achieve employment near their homes.

2.2.4. Prosperity of the Park through Science and Technology and Brand Development

Wengyuan County has established scientific research institutions such as Guangdong (Wengyuan) Orchid Research Institute and Wengyuan Expert Workstation of the Provincial Academy of Agricultural Sciences, cultivated 6 expert teams, guided 16 enterprises to establish seed and seedling tissue culture laboratories, cultivated and introduced more than 1,000 varieties, 200 orchid germplasm resources, and stored 300 new strains. Wengyuan also insisted on the combination of "please come in" and "go out", learned from the advanced agricultural management concepts and agricultural technologies of Taiwan and the "Guangdong-Hong Kong-Macao" Greater Bay Area, and strengthened the scientific research efforts of the orchid industry, obtained 33 invention patents, and transformed 65 scientific and technological achievements, achieving a coverage rate of 99% of the orchid industry's improved varieties. At the same time, Wengyuan County took the orchid brand marketing and promotion project as a starting point to expand and strengthen the public brand of Wengyuan orchid and enhance the industry's brand value and market influence.

2.2.5. Orchid Digital Trading Platform

Wengyuan County actively builds the Wengyuan Orchid smart agriculture big data platform, through opening up the orchid industry chain upstream and downstream data channels, from production, trading, logistics, information release, customer service and other links of interconnection, to achieve the primary, secondary and tertiary industries big data integration, to solve the problem of orchid trading difficulties, improve market competitiveness. The construction of the platform not only improves the efficiency and transparency of orchid trading, but also provides strong data support for the modern management of the orchid industry.

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2.3. Problems in the Digital Development of the Orchid Industry

The popularity of traceability certification needs to be improved. Wengyuan Orchid industry is gradually establishing and improving the system in terms of traceability certification to ensure the quality and safety of products. Currently, some large companies have begun to implement traceability certification, and use digital means to record the entire process of orchid planting, maintenance, picking, processing, and other digital means to provide consumers with transparent and traceable product information.However, the popularity of traceability certification still needs to be improved. In particular, the participation of small and micro enterprises and individual farmers is relatively low.This limits consumers' trust in orchid products to a certain extent, and also affects the market competitiveness of products [3].

Wengyuan Orchid Industrial Park has made some progress in scientific and technological innovation, but it still faces challenges. It has established a number of scientific research platforms, such as the Orchid Research Institute and expert workstations, and has cooperated with universities and scientific research institutions to promote the development of new varieties and technology application, the scope of cooperation is still relatively limited, and scientific research cooperation above the provincial level is less. The existing scientific and technological innovation system focuses on the development of applied technology and lacks integration with basic theoretical research, which affects long-term competitiveness. In terms of breeding and promotion, there are more than 1,000 varieties of orchids planted in Wengyuan, but there are only more than 100 varieties, lack of sustainability of scientific and technological innovation, and lack of large-scale seedling cultivation center bases and equipment to enhance industrial capacity.

Infrastructure and related talents are in short supply. Although the government has increased its investment in infrastructure construction in recent years, compared with developed areas, Wengyuan's infrastructure level still needs to be improved, especially in information technology and transportation logistics, there are still bottlenecks. With the continuous expansion of the orchid industry, the demand for all kinds of talents is also increasing, but the local professionals in e-commerce, marketing, strategic planning and comprehensive management are relatively scarce, especially those who understand orchid planting and are proficient in e-commerce and digital operations. This problem is reflected in the single talent structure, the unsound training system, coupled with the attraction of big cities, leading to a serious outflow of local outstanding talents. Moreover, with the intensification of market competition, the orchid industry's dependence on technology continues to increase, and the difficulty of technology breakthrough has become a bottleneck restricting the further development of the industry. Even though Wengyuan orchid industry has made some achievements in the cultivation of seedlings and research and development of new varieties, there is still a big gap compared with the advanced level at home and abroad [4].

The orchid industry in Wengyuan has a strong momentum in the field of e-commerce, but it also faces challenges in logistics and sales. The development momentum of Wengyuan Orchid industry in the field of e-commerce is strong, and a number of enterprises have successfully settled in major e-commerce platforms and expanded the market through online sales. The convenience and efficiency of the e-commerce platform have opened up a broader market space for orchid products, and also improved the shopping experience of consumers. However, with the intensification of competition in the e-commerce market, Wengyuan Orchid industry is also facing many challenges, such as logistics distribution, after-sales service and other problems.

Orchid cultivation has a long history, but brand awareness and market recognition have not met expectations. The brand of the product "Wengyuan Orchid" is not prominent and not well-known. Wengyuan County is known as the "Hometown of Chinese Orchids". The county has a long history of orchid cultivation and is also rated as the city flower of Shaoguan. However, the results show that although some orchid brands have a certain degree of popularity and influence, overall, the popularity and reputation of the Wengyuan Orchid brand still needs to be improved, and the market recognition of the brand "Wengyuan Orchid" has not met expectations.The public's understanding of Wengyuan Orchids is limited, and even in the academic field, there are few relevant results in searches with the keyword "orchid supply chain". In addition, some orchid products are still sold in primary form, lacking deep processing and high value-added products, resulting in insufficient product competitiveness [5].

2.4. Development of Orchid Industry in Sihui City

Shigou Town, Sihui City, is the largest orchid planting base in the Guangdong-Hong Kong-Macao Greater Bay Area, with a rich variety of orchids, with the development orientation of "agriculture-based

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town, tourism-strong town, e-commerce-driven town" as the development orientation, with orchid support core, by vigorously promoting the unique and superior conditions for the development of the orchid industry in Shigou Town, many orchid companies have been attracted to invest.

2.4.1. Variety Resources

According to data from Shigou Town, Sihui City, the orchid planting area in Shigou Town is more than 5,000 mu, with an annual seedling production of 33 million. There are more than 230 varieties in four series, including Chinese orchids, hybrid orchids, Exotic orchids and butterfly orchids. Among them, there are traditional orchids and newly cultivated varieties, such as "Paphiopedilum Series", "Cymbidium 'Red Dragon'","The Monkey King (also known as 'Father Orchid')", etc. These new varieties have unique flowering period regulation ability and high quality, and their orchid variety diversity provides a solid foundation for their industrial development.

2.4.2. Planting Scale

Shigou Town of Sihui City orchid planting scale continues to expand, the current planting area has reached nearly 10,000 mu, has the ability to cultivate more than 33 million orchid seedlings, the technical level is in the leading position in the country, the annual output value of about 550 million yuan, and has 62 orchid enterprises, including a number of Taiwan-funded enterprises and local enterprises. These enterprises not only grow traditional orchid varieties, but also actively introduce and cultivate new varieties with high value-added, which has promoted the rapid development of the orchid industry.

2.4.3. Sales

In 2022, through the implementation of the "12221" marketing action, Shiguo Town successfully transformed the Sihui orchid from a limited product of the Spring Festival to a product with no off-season sales throughout the year, making Lannon's income more stable. In addition, Shiguo Town has also created a "father love such as orchid" IP with cultural empowerment, which has promoted the upgrading of orchid marketing and regional public brand construction.

In terms of sales channels, orchid enterprises in Shidog-town, Sihui City, actively expand online sales, and achieve sales growth through live broadcasting on e-commerce platforms. For example, Wanluxing Flower Planting Co., Ltd. regulates the phalaenopsis flowering period through technology, and can ship according to orders every day, with online sales accounting for more than 70%. The orchid industry in Shiguo Town has not only achieved success in sales, but also achieved remarkable results in brand building. Through a series of marketing activities, the brand awareness rate and recognition of Sihui Orchid are improving, successfully transforming it from agricultural products to hand-letter gifts. These activities include orchid script control, flash mob, micro film, meta-universe, etc., which effectively promote the development of orchid industry.

2.4.4. Agricultural Linkage

Shigou Town has established an orchid industry poverty alleviation demonstration base through the "company + base + poor households" business model, and implement various interest linkage mechanisms, such as dividends for capital investment, rent for land transfer, and remuneration for working on the base, etc., to ensure that poor households have a stable and continuous source of income.

Local orchid enterprises provide orchid planting technology training to local farmers to improve their planting skills. By providing high-quality seedlings, planting techniques, pricing and underwriting services, we encourage farmers to participate in orchid planting. It provides a lot of employment opportunities for local villagers.

2.4.5. AI "Mr. Orchid" Orchid Planting Technology Application Tool

The orchid planting base in Shiguo Town adopts advanced greenhouse control systems, such as automatic spray system and blast air conditioning system, to achieve accurate control of the temperature, humidity and light of the orchid growing environment, which provides ideal growth conditions for orchids and improves the scientific and standardized level of planting. Secondly, it also actively promotes the use of AI "LAN Sheng" orchid planting technology application tools, which is an intelligent platform based on new technologies such as big data, artificial intelligence, the Internet, and cloud computing. AI "Mr. LAN" can provide orchid growers with a full chain of intelligent solutions from planting, management to sales, which greatly improves the technical level of orchid planting and the digital ability of the industry.

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2.5. Summary

2.5.1. Similarities between the Orchid Industries of Wengyuan County and Shigou Town, Sihui City

Wengyuan County and Shigou Town, Sihui City are important orchid industry bases in Guangdong Province. Both Wengyuan County and Shigou Town boast abundant orchid species resources. By continuously introducing and cultivating new varieties, they meet the diversified needs of the market. With considerable planting scales, these areas have formed large-scale and intensive production models. With numerous orchid enterprises, they generate high annual output values and contribute significantly to the local economy. In terms of the joint agriculture and belt agriculture mechanism, the two places have actively promoted the "enterprise + cooperative + base + farmer" model to drive the surrounding farmers to increase income and become rich. Brand building is also a common aspect of the two places, through the holding of orchid expo, cultural tourism festival and other activities, constantly enhance brand awareness and reputation.

In terms of technology application, relying on the scientific research platform, the two places use modern scientific and technological means to improve the quality and production of orchids. The use of cloud computing, big data, the Internet of Things and other information technology means to achieve orchid planting, production and sales, improved the industry's operational efficiency and market competitiveness, and realize the technological upgrading of the whole process from breeding to cultivation.

2.5.2. Differences between the Orchid Industries in Wengyuan County and Shigou Town, Sihui City

In terms of sales channels, orchid sales in Wengyuan County have gradually shifted from mainly relying on wholesale and retail to equal importance with e-commerce, while Shigou Town in Sihui City has successfully transformed orchids from Spring Festival limited products to year-round sales without off-season products through the implementation of "12221" marketing actions. In terms of industrial integration, the orchid industry in Wengyuan County has integrated with tourism, culture and other industries, creating a number of orchid cultural tourism projects with local characteristics, while Shigou Town in Sihui City has promoted "one village, one product, one town, one industry" through the leadership of party construction, and has made characteristic agricultural industries such as orchids bigger and stronger. In terms of science and technology application, Shigou Town of Sihui City launched the AI "Mr. LAN" orchid planting technology application tool, which is an intelligent platform based on big data, artificial intelligence, Internet, cloud computing and other new technologies to provide orchid growers with a full chain of intelligent solutions, while Wengyuan County relies on the Guangdong (Wengyuan) Orchid Research Institute and other scientific research platforms to upgrade technology.

3. Data Analysis

Considering the relatively sluggish development of the orchid industry in Wengyuan County, we will delve into how digital technology can facilitate the transformation and upgrading of the industry. Following an in-depth exploration of the impact of digital technology on the development of Wengyuan's orchid industry, we will employ Canonical Correlation Analysis to systematically organize and analyze the statistical data and field survey data from Wengyuan Orchid Industrial Park.

3.1. Determination of Sample Size

The targets of this survey is the growers in the orchid industrial Park of Wengyuan County with Jiangwei Town and Bazai Town as the core, as well as people outside Wengyuan County. According to the relevant information, the permanent population of Weng Yuan County, Shaoguan City is 322,400, among which there are about 1300 farmers in the orchid industrial park with Jiangwei Town and Bazai Town as the core, and the overall parameter is 1300(N=1300).

Since the population is large and contains a large amount of information, the sample capacity formula for estimating the population proportion is used to calculate the initial sample capacity, and the relative error limit is kept within 7.5%(Absolute error d=0.15), Assuming p=0.5 as the worst-case estimate, so that the maximum sample capacity can be obtained, the confidence level is chosen to be 99%, and the calculated initial sample capacity is:

$$n_1 = \frac{z^2_{\alpha/2} p\cdot(1-p)}{d^2} = 73.77 \quad (1)$$

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According to the effective rate of the questionnaire in the pre-survey is

$$r_1 = \frac{53}{60} \times 100\% = 88.75\% \quad (2)$$

the sample capacity was adjusted:

$$n = \frac{n_1}{r_1} = 83.12 \quad (3)$$

In the actual investigation, a total of 206 questionnaires were issued, and 203 effective questionnaires were recovered, with an effective rate of 98%.

3.2. Questionnaire Reliability and Validity Test

3.2.1. The Reliability Analysis

Reliability analysis is used to study the reliability and accuracy of answers to quantitative data, that is, whether the sample has answered the questions truthfully. The Cronbach's Alpha reliability coefficient is used for testing. If it is lower than 0.6, it means that the scale needs to be redesigned. From Table 1 and Table 2, we can see that the Reliability Coefficientt is 0.934, which is greater than 0.8, indicating that the reliability of the research data is high. This proves that the data can be used for further analysis.

Table 1: Results of Cronbach reliability analysis of the questionnaire.

Cronbach Reliability Analysis		
Number of Item	Sample Capacity	Cronbach's α Coefficient
9	203	0.934

3.2.2. Validity Analysis

Validity analysis is used to study the design rationality of quantitative data, and to analyze whether the research items are reasonable and meaningful. The validity test was conducted using factor analysis, including KMO Value, Bartlett's test of Sphericity, Communality, Variance Explained and other indicators are analyzed comprehensively. First, the KMO Value is analyzed. If the KMO Value is < 0.6, it means the validity of the data is average. The KMO value of this survey questionnaire is 0.897, which is greater than 0.6, indicating that the data can be effectively used for information extraction. Table 2 shows that the questionnaire passed the Bartlett test, that is, the corresponding P Value is less than 0.05. level, the Cumulative Variance Explained after rotation is 65.975% greater than 50%, which means that the information of research items can be effectively extracted.

Table 2: The test results of KMO and Bartlett.

KMO's Test and Bartlett's Test		
KMO Value		0.897
Bartlett's Test of Sphericity	Chi-square Value	832.766
	Degree of Freedom	36
	P Value	0.000***

Note: *** represents the significance level of 1%

3.2.3. Empirical Analysis

According to Figure 1, among the indicators that respondents believe that digital technology is helpful to the development of orchid industry in Wengyuan County, big data analysis is recognized by the highest proportion of about 80.34%, followed by Internet of Things technology and cloud computing, which are 73.03% and 71.35% respectively. Similarly, among the indicators that respondents think which digital technology is most conducive to the orchid industry in Wengyuan County, big data analysis has also been recognized by the highest proportion of 86.93%, followed by artificial intelligence and Internet of Things technology, respectively, 76.97% and 80.63%.

Overall, most technologies have received high support in various application scenarios. Data analysis has the highest support rate in improving marketing efficiency, improving production management and improving product quality. Artificial intelligence also performed well in these aspects, while blockchain

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technology accounted for the majority of the "not very familiar" options. The highest ratio is 66.67%, which may indicate that blockchain technology is less well-known among the public than other technologies and the degree and understanding need to be improved.

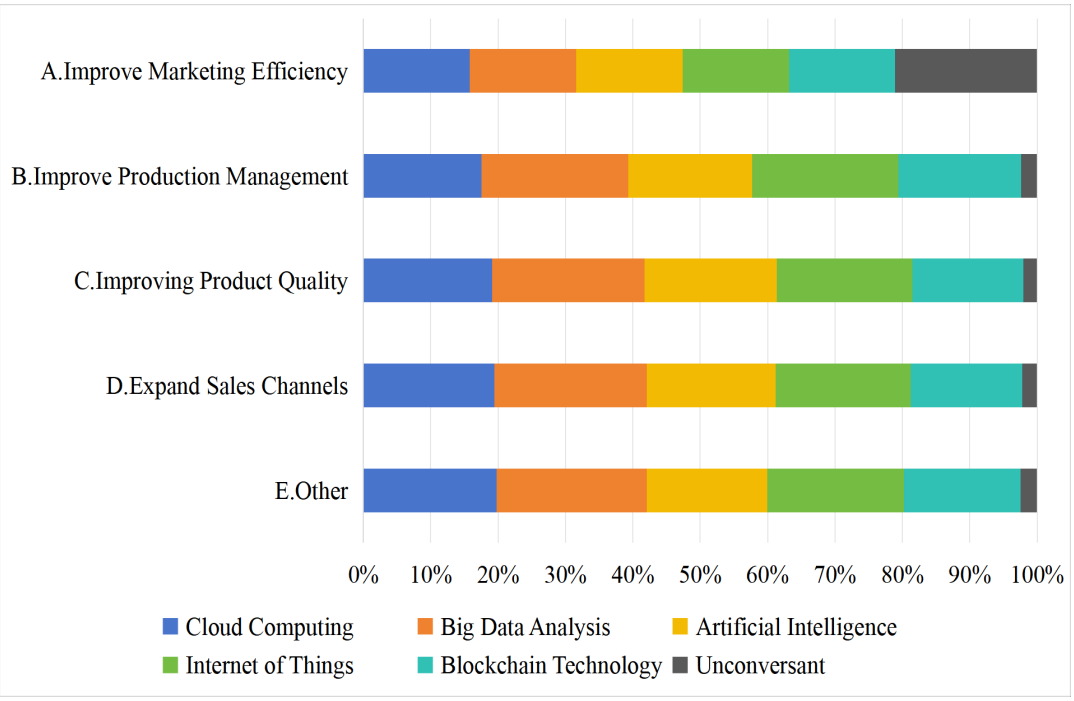

Figure 1: The impact of Digital Technologies on Orchid Industry.

From Table 3, regarding the advantages of digital platforms in the sales of Wengyuan orchids, most respondents believed that "buying is more convenient", followed by "more choices" and "more transparent prices"; according to the number and percentage of response cases, respondents believe that digital platforms provide convenience, diversity and transparency, and also key factor in improving consumers' purchasing experience and increasing sales. Therefore, sellers of Wengyuan orchids should leverage the advantages of digital platforms to enhance user experience. For instance, they can increase the diversity of choices by optimizing search and filter functions, simplify the purchase process to enhance convenience, and ensure transparency in pricing information.

Table 3: Digital Platform on Wengyuen Orchid Sales Advantage of Multiple Frequency Response Analysis Table.

		Response		Percentage of Cases
		The Case Number	The Percentage	
The Advantage of Digital Platform in Wengyuan Orchid Sales	More Transparent Prices	152	24.4%	73.8%
	More Choices	157	25.2%	76.2%
	Easier to Buy	166	26.6%	80.6%
	Get More Product Information and Reviews	146	23.4%	70.9%
	Others	2	0.3%	1.0%
Total Amount		623	100.0%	302.4%

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3.2.3.1. Linear Regression Analysis

Linear regression is used to study the linear relationship between independent variables and dependent variables. The significance P value of the F test is 0.000***, showing significance at the level, rejecting the null hypothesis that the regression coefficient is 0, that is, there is a regression between variables. For the collinearity of variables, VIF is 1, so the model has no multicollinearity problem and the model is well constructed. The model formula is as follows:

$$Y = 0.841X + 0.385 \quad (4)$$

Among them, Y has purchased Wengyuan orchid or related products through digial platform, and X has learned about Wengyuan orchid through digital flat platform.

The model is overall significant and the independent variables have significant predictive power on the dependent variables. From Table 4, individuals who bought Wengyuan orchids through the digital platform were more likely to buy Wengyuan orchids or related products through these platforms, and this effect was significant. Therefore, it can be considered that knowing Wengyuan orchids through digital platforms is a key factor influencing the purchase of orchids from digital platforms.

Table 4: The results were analyzed by linear regression.

	Unstandardized Coefficients		Standardized Coefficients	t	P	VIF	R^2	Adjusted R-squared	F
	B	Standard Error	Beta						
Constant	0.385	0.235	-	1.641	0.104	-	0.704	0.701	F=233.303 P=0.000***
Explanatory Variable X(Have you ever known Wengyuan Orchid through digital platform?)	0.841	0.055	0.839	15.274	0.000***	1			
Explained Variable Y(Have you purchased Wengyuan Orchid or related products through digital platforms?)									

Note: *** represents 1% significance level

3.2.3.2. Pearson correlation analysis

Pearson correlation analysis is used to measure the strength and direction of the linear relationship between two continuous variables. The value of is between -1 and 1, where 1 indicates a perfect positive correlation, -1 indicates a perfect negative correlation, and 0 indicates no correlation.

$$r = \frac{\sum(X-\overline{X})(Y-\overline{Y})}{\sqrt{\sum(X-\overline{X})^2}\sqrt{\sum(Y-\overline{Y})^2}} \quad (5)$$

Where X and Y are two variables, and the sum is the mean of X and Y respectively.

The purpose is to explore the correlation between three questions: the impact of digital technologies on Wengyuan Orchid brand trust and purchase intention, the understanding of the application of digital technologies in Wengyuan orchid planting, and the views of these digital technologies on improving orchid yield and quality. Table 5 lists the correlation coefficients between the three variables. The correlation coefficients are all positive, and the P values between the three variables are all less than 0.05, indicating that the correlation between the two variables is significant, indicating a positive relationship. At the same time, the impact of digital technology on brand trust and purchase intention had the strongest correlation with the perception of improving orchid yield and quality (r=0.729). Consumers' awareness

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and understanding of digital technology will help enhance their trust in the Wengyuan Orchid brand and their willingness to purchase, and may also increase their willingness to buy orchids and their evaluation of the effects of these technologies on improving orchid yield and quality. This shows that digital technology is not only a tool to improve production efficiency and product quality, but also a key to enhance consumer trust.

Table 5: Correlation Matrix.

		Whether digital technology has affected the trust and purchase intention of Wengyuan orchid brand	Whether to understand the application of digital technology in Wengyuan orchid planting	How effective are these digital technologies in improving the yield and quality of orchids
Whether digital technology has affected the trust and purchase intention of Wengyuan Orchid brand	Pearson Correlation	1	.494**	.729**
	P-value (two-tailed)		.000	.000
	N (number of cases)	206	206	206
Whether digital technology has affected the trust and purchase intention of Wengyuan Orchid brand	Pearson Correlation	.494**	1	.523**
	P-value (two-tailed)	.000		.000
	N (number of cases)	206	206	206
How effective are these digital technologies in improving the yield and quality of orchids	Pearson Correlation	.729**	.523**	1
	P-value (two-tailed)	.000	.000	
	N (number of cases)	206	206	206

Note: **. The correlation is significant at the 0.01 level (two-tailed).

4. Policy recommendations for the development of orchid industry

Wengyuan County should deepen the construction of the orchid industry chain and strive to create a full ecological chain development model. Given the unique historical and cultural value and wide application of orchids, development should not be limited to planting and selling, but should be comprehensive. To enhance "Orchid Technology," we should take advantage of collaborations with scientific research platforms and universities to optimize orchid varieties and improve cultivation techniques. For "Orchid Marketing," we can make use of emerging channels like e-commerce live streaming to integrate online and offline promotion. In expanding "Orchid Derivatives," we should develop products such as orchid-infused tea, daily chemical products, food, and cultural and creative items to discover additional value. Lastly, to deepen "Orchid Art," we should fully display the aesthetic beauty of orchids, promoting a deep integration of agriculture, tourism, homestays, and orchid culture.It will promote the "orchid art", fully display the aesthetics of orchids, and promote the deep integration of agricultural tourism, homestays and orchid culture [5][6].

To enhance the digital transformation of the Wengyuan orchid industry, it is recommended that we leverage collaborations with scientific research platforms and universities. This would help us optimize the display of our products on e-commerce platforms and analyze the characteristics of our target users through social media.We should also consider selecting appropriate platforms for content creation and interactive exchanges, providing valuable information to capture users' attention and enhance the user

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experience. Furthermore, introducing innovative marketing strategies that align with holidays could effectively stimulate purchasing behavior. In addition, we could promote the digital circulation of agricultural products by enabling online trading and order-based production, which would help reduce transaction costs and risks. Moreover, by relying on or establishing e-commerce industrial parks, improving infrastructure, and attracting cold chain logistics services, we could significantly enhance our overall operational capabilities. Through precise positioning, personalized service, optimized user experience and innovative marketing strategies, combined with a sound digital network platform and the support of e-commerce industrial park, Wengyuan Orchid industry is expected to stand out in the digital transformation and achieve brand upgrading and market expansion [7][8][9][10].

The Wengyuan County Party Committee and the County Government should strengthen leadership and scientifically plan the development of the orchid industrial park. Based on regional advantages and resource conditions, formulate a detailed overall construction plan and e-commerce and industry support policies, and clarify the layout of "one district, two centers, three cores, four axes, one corridor and multiple bases". Digital technology is used to build a supply chain information sharing platform. The platform can realize real-time resource allocation and risk warning, optimize capital allocation and reduce operating risks. By leveraging big data analysis, we can accurately predict and mitigate supply chain risks. This approach will facilitate the deep integration of the orchid industry with e-commerce and tourism, creating a synergy that enhances the overall value chain. Furthermore, establishing a modern complex that integrates planting, trading, and tourism will not only foster the sustainable development of the orchid industry but also contribute to a “three-in-one” industrial integration, promoting the healthy and continuous growth of the sector.[11].

Faced with the dual challenges of talent and technology, the government and enterprises should work together to establish diversified talent training system. The system not only focuses on the training of agricultural technical talents, but also needs to strengthen e-commerce, marketing, and strategic planning and comprehensive management. By engaging in school-enterprise cooperation, internship training, and targeted education programs, we can optimize the talent structure and enhance our training systems. By regularly organizing industry seminars and technical exchanges, we foster communication and collaboration among professionals, thereby stimulating innovative thinking. To promote technological innovation, we increase investment in research and development (R&D) and utilize modern information technologies such as big data and cloud computing to build a smart agricultural system, which elevates the level of intelligent industrial management. Furthermore, we encourage enterprises to establish long-term and stable partnerships with universities and research institutions to jointly address technical challenges, enhancing the technological content and market competitiveness of the orchid industry.[12][13][14].

In the digital transformation process of Wengyuan orchid industry, digital traceability has become a key factor in enhancing brand value and enhance consumer trust. Given consumers’ high demands for food safety and transparency, Wengyuan orchid industry needs to make digital traceability a top priority, using technical means such as purchasing or building digital traceability system realizes information recording and intelligent control of each link from planting, picking, testing, transportation, etc., so that consumers can clearly see the growth and circulation process of orchids, so they can buy them with confidence. At the same time, due to the funding constraints of households and farmers, local governments should play a coordinating role and uniformly build and manage digital traceability system, reduce farmers' costs, and promote the popularization of digital traceability; expand the main body of agricultural products traceability, incorporate all links of the supply chain into the traceability system, and ensure the transparency and safety of agricultural products circulation through the combination of process traceability and safety traceability. In the process of digital transformation, Wengyuan orchid industry should also make full use of digital elements, such as the use of digital platforms for crop recommendation, soil measurement and fertilizer measurement, and through the "Internet +" model to achieve precision planting, intelligent processing and order agriculture, forming a low-carbon, low-consumption, circular and efficient green development model of the whole industrial chain. This model propels the advancement of Wengyuan’s orchid industry towards superior quality and greater efficiency[15][16].

5. Conclusion

As the "Hometown of Orchids in China", Wengyuan County is using agricultural AI as a powerful engine to empower orchids with technology, and leading it to an intelligent and high-end development road. The county has deeply integrated digital technology and traditional breeding technology accelerates

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the research and development and cultivation of new orchid varieties, injecting continuous innovative vitality into the market; deeply explore the cultural connotation of orchids, carefully create unique brand IP, and significantly enhance market competitiveness [17]. Actively building science and technology parks and research centers not only provides strong scientific and technological support for the orchid industry, but also becomes an important base for the accumulation of orchid knowledge and the inheritance of orchid culture, and has effectively increased the exposure and popularity of the orchid industry. However, it faces challenges in digital transformation, such as insufficient popularization of traceability certification, limited scope of scientific and technological innovation cooperation, shortage of infrastructure and professional talents, problems in the e-commerce field, and the fact that brand awareness and market recognition did not meet expectations.

To deal with these problems, Wengyuan County needs to deepen the construction of the entire industrial chain, strengthen scientific and technological support, optimize marketing strategy, and expand orchid derivatives to achieve full ecological chain development. Meanwhile, we will focus on strengthening digital transformation and establishing traceability systems, refining product presentations on e-commerce platforms, analyzing the demographics of social media users, offering tailored services, and crafting innovative marketing strategies. Our aim is to digitize agricultural product circulation, thereby minimizing transaction costs and risks, enhancing brand value, and fostering stronger consumer trust. In addition, the government and enterprises need to work together to establish a diversified talent training system, increase investment in research and development, promote technological innovation, build a smart agricultural system, and enhance the intelligent level of industrial management.

References

[1] YU Jiayu. Research on the Development of Provincial Modern Agricultural Industrial Park in Shaoguan City — Taking Wengyuan Orchid Industrial Park as an Example[D]. Zhongkai University of Agriculture and Engineering, 2023.

[2] XIE Qin. Construction of supply chain management model of Wengyuan orchid in Northern Guangdong Province[J]. South China Agriculture, 2023, 17(16): 147-149.

[3] CHEN Jian-ru, ZENG Yan, FANG Kai, et al. Study on the Development Status and Countermeasures of Orchid Industry in Jiangwei Town, Wengyuan County, Guangdong Province[J]. South China Rural Area, 2021, 37(04): 16-19+28.

[4] SU Xiaolei. Research on digital strategy of agricultural product brands in Guangdong Province[J]. Shanxi Agricultural Economy, 2023(5):83-85.

[5] WU Nanqing. Game Analysis of Orchid Planting Entities in Jiangmei Town of Wengyuan County[D]. Zhongkai University of Agriculture and Engineering, 2019.

[6] YANG Ziqiang. Research on the problems and countermeasures of e-commerce operation of orchid industry in Wengyuan County[J]. Shanxi Agricultural Economy, 2023(5):167-169.

[7] ZHAO Hairong. Research on the Realization Paths of the implementation path of the Digitalization of the Circulation of Agricultural Products Boosting the High-quality Development of the Agricultural Economy [J]. China Journal of Commerce, 2023(16):51-54.

[8] ZHOU Yulinlang. Research on the digital communication path of local specialty agricultural product brands under the background of rural revitalization[J]. Shanhai Business, 2023(6):55-57.

[9] DU Chunmei, QIU Qian, SUN Nan. Research on New Media Marketing Path of Agricultural Products in the Contents of Digital Economy: Evidence from Xuzhou City[J]. China Circulation Economy, 2024(15):48-51.

[10] HUANG Mengxia, GAO Yang, HUANG Yanting, CAO Xiaofang, MA Zhongmin. Research on Innovative Strategies of Agricultural Product Circulation Models Based on Digital Transformation: A Case Study of Dashahe Apple in Fengxian County[J]. China Circulation Economy, 2023(15):20-23.

[11] Xu M .Exploration of Strategies for Improving Brand Competitiveness of Agricultural Products in the Context of Digitization[J].Applied Mathematics and Nonlinear Sciences,2024,9(1).

[12] ZHANG Yudi, HAN Yue, TANG Yingjie, LI Bingying. Research on Countermeasures to Promote the Digital Transformation of Landmark Agricultural Products under the Digital Background[J]. China Fruit & Vegetable, 2023, 43(12): 88-92.

[13] TAN Xiaoping, LI Yiling, LIN Zihan. Development of Geographical Indications of Agricultural Products fromr the Perspective of Digitalization[J]. China Journal of Commerce, 2024(3):142-145.

[14] Gautam S .Antecedents of E-Marketing of Agriculture Products in This Digital Era: An Empirical Study[J].International Journal of Technology and Human Interaction (IJTHI),2022,18(7):1-17.

[15] LIU Jiayu. Research on the digital development path of agricultural product marketing under the digital rural strategy[J]. Rural Economy and Science-Technology, 2024, 35(5): 260-263,275.

ISSN 2616-5902 Vol. 6, Issue 12: 90-102, DOI: 10.25236/AJBM.2024.061212

[16] Xu H .Rebranding and SWOT Analysis of Geographical Indication Agricultural Products in Jilin Province under Digital Transformation[J].Applied Mathematics and Nonlinear Sciences,2024,9(1).
[17] WU Jianhuan, SONG Yixiong, ZHANG Leishuai. Analysis on the development of orchid characteristic town in Wengyuan County under the background of rural revitalization[J]. China Market, 2024, (06): 29-32. DOI: 10.13939/j.cnki.zgsc.2024.06.008.