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Role of Digital Empowerment in Developing Farmers' Green Production by Agro-Tourism Integration in Xichong, Sichuan

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Abstract: Minimal participation in green agricultural development may be achieved via the conventional integration of agriculture and tourism, which has a minimal impact on farmers' green output. New traits have emerged as a result of agro-tourism integration with digital empowerment. It was shown that agro-tourism integration with digital empowerment had a stronger impact on farmers' green output than traditional agro-tourism integration, based on the construction of the dynamic information game model and the case of Xichong, Sichuan. The integration of agriculture and tourism from the perspective of digital empowerment is characterized by "data traceability" and "information diffusion", which restrains opportunistic farmer impersonation. The feature of "knowledge sharing" promotes the progress of agricultural technology, reduces the cost of green production and increases the probability of farmers producing high-quality agricultural products. The "information matching" feature promotes the symmetry of quality information, and production and sales information at both ends of supply and demand, and raises the prices of high-quality agricultural products. The latter two features jointly enhance the willingness of honest farmers to produce green items by reducing the cost of green production and increasing the prices of high-quality agricultural products. From the perspective of digital empowerment, the integration of agriculture and tourism can further promote farmers' green production by effectively suppressing opportunistic farmers' fake behavior and promoting honest farmers' green production to a greater extent.

Keywords: digital empowerment; integration of agriculture and tourism; green production; rural revitalization

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1. Introduction

Increasing agricultural green development is a key strategy for accelerating agricultural modernization and promoting agricultural sustainable development. It is also an inevitable choice for realizing the strategy of rural revitalization. Farmers are the main body of agricultural green production, and their willingness to participate in green production determines the effectiveness of agricultural green development. However, farmers' revenues from agricultural productivity are steadily declining. The fact that agricultural production expenses are growing while earnings are decreasing must be considered while supporting green growth in agriculture. Achieving green agrarian development is a challenge. As a result, directing industrial integration and implementing agricultural diversification is a key step toward achieving efficient green agrarian growth. China's rural tourism generated operational revenue of more than 850 billion yuan (122 billion Euro) in 2019. There were 3.3 billion visitors, accounting for 6.86 percent of the country's total agricultural output value, demonstrating that the integration of agriculture and tourism is an important symbol of diversified agricultural production and the main starting point for promoting rural economic development. As a result of integrating agriculture and tourism, farmers' ecological consciousness will be raised, and their green output will be encouraged [1,2].

Farmer green production is hampered, however, by the lack of innovation in conventional agriculture–tourism integration attempts and the difficulties of properly monitoring and disciplining farmers who pretend to be green.

Central government policy for 2021, dubbed the "No. 1 paper", calls for a tighter linkage between the digital economy and agriculture. Agricultural green development requires digitally enabled integration of agriculture and tourism to be a significant strategic key factor in China, since conventional integration of agriculture and tourism lack the driving power for farmers' green output. Thus, the following questions are the focus of our investigation. Compared to the conventional integration of agriculture and tourism, has the digital empowerment of farmers further encouraged green production? In addition, what new vigor and qualities do digital empowerment have in the integration of agriculture and tourism compared to conventional agriculture and tourist integration to help farmers achieve green production? How can green production be encouraged among farmers after providing them with new vigor and characteristics?

The key to implementing the rural revitalization plan is the green growth of agriculture. Farmers' green practices directly impact the development of agriculture as a whole. The research on farmers' green production behavior mainly focuses on the following four aspects. Firstly, scholars research the impact of farmers' characteristics and perceived value on farmers' green production. The per capita income of rural residents, the productive characteristics of farmers, human capital and other factors play important roles in agricultural technological progress and agricultural green production [3,4]. The heterogeneity of ecological compensation affects farmers' green production behavior [5], and farmers' green production behavior largely depends on their perceived value of green agricultural production [6]. Secondly, existing research examines the impact of government support on farmers' green production. Agricultural technology training, economic stimulus, confirmation of land and other policies can reduce the use of chemical inputs by farmers [7–9], and grass-roots public agricultural technology extension services affect the adoption of agricultural technology by farmers [10]. Thirdly, research investigates the impact of social networks on farmers' green production. The exchange between villagers and neighbors is an important channel for farmers to obtain agricultural technology information [11]. Whether it is a circle of friends or a clan network, it promotes the dissemination of information, thereby contributing to the promotion of agricultural green technology [12]. Fourthly, scholars focus on researching the role of organization in promoting the green development of agriculture. Joining a cooperative organization can help farmers overcome the limitation of the farmland scale of a single farmer, lead more small farmers adopting the soil testing formula fertilization and plant protection UAV technology [13], significantly reduce the application amount of pesticides [14] and promote the green production of farmers.

The Agricultural Internet of Things system may be used to precisely monitor the environmental impact of environmental operations and create the strategy, organization, execution and control methods of agricultural activities to minimize the negative influence on the environment [15]. The application of digital technology in agriculture is an important measure to realize agricultural modernization [16]. The digital transformation of modern agriculture can provide key production factors for the development of digital agriculture, thereby promoting the construction of precision agriculture and the research of smart agriculture [17]. Scholars mainly study the impact of figures on agriculture from the macro level but rarely from the micro subject of farmers. The research on the impact of digital empowerment on tourism is mainly from the perspective of the impact of informatization on tourism. Informatization is an essential element to promote the development of the tourism industry [18,19]. Information technology affects the organizational change, service innovation and tourism flow prediction of tourism enterprises [20,21].

In general, digital technology can promote the development of the tourism industry, and such technology plays an important role in the sustainable development of agriculture. The existing research on the impact of agricultural tourism integration on agriculture mostly focuses on the effect of this integration on agricultural quantity [22]. Few studies

have been conducted from the perspective of the impact of agricultural tourism integration on agricultural quality. Furthermore, few studies have been conducted from the perspective of the differences in external characteristics between agricultural tourism integration and traditional agricultural tourism integration from the perspective of digital empowerment, especially on the green production behavior of farmers, a microsubject. Some scholars use a Markov chain to describe the probability transfer process of an uncertain phenomenon [23–26], and some scholars use Bayesian network models to integrate the characteristics of graph theory and probability theory to diagnose and analyze the causal relationship [27,28]. However, this paper mainly studies the problem of farmers' green behavior strategies under different conditions, so the incomplete information dynamic game mode is more suitable. Existing literature has explored the promotion effect of agrotourism integration on agricultural green development from a macroperspective [1], but few scholars have explored the impact of agrotourism integration on farmers' green production from the perspective of digital empowerment. Therefore, this study has some innovations from that perspective. Thus, on the basis of analyzing the mechanism of the impact of agricultural tourism integration on farmers' green production behavior from the digital empowerment perspective by using the dynamic signal game model, the paper tries to make innovations in the following ways. Firstly, this work explores the differences between agricultural tourism integration and traditional agricultural tourism integration under the digital empowerment perspective. Secondly, it analyses the promotion mechanism of agricultural tourism integration into farmers' green production from the perspective of digital empowerment. Thirdly, it explores the role of agricultural tourism integration in promoting farmers' green production from the perspective of digital empowerment, expands the path of farmers' green production and enriches the existing research on agricultural tourism integration.

2. Basic Model Analysis

2.1. Basic Model Settings

Farmers are divided into two types: honest farmers (HP) and opportunistic farmers (OP). The type of farmer is private information and remains unchanged throughout the game. Honest farmers will never pass off inferior agricultural products as high-quality agricultural products, regardless of green production. Meanwhile, opportunistic farmers are motivated to pass off inferior agricultural products as high-quality agricultural products; that is, they promise that high-quality agricultural products may come from green production or non-green production. Honest farmers and opportunistic farmers choose green production or non-green production to maximize their own interests.

The total scale of farmers is abstracted as one. Each farmer produces the same amount of agricultural products. The proportion of honest green farmers in the market is $\theta(0 < \theta < 1)$, the proportion of honest non-green farmers is $\beta(0 < \beta < 1)$ and the proportion of opportunistic farmers is $1 - \theta - \beta$. The quality difference in agricultural products market is assumed; when farmers opt for green production, they may produce high-quality agricultural products. Meanwhile, when farmers opt for non-green production, the probability of producing high-quality agricultural products is 0; that is, all the agricultural products are low-quality agricultural products. The value of high-quality agricultural products to consumers (C) is $v_h(v_h > 0)$, and the value of low-quality agricultural products to consumers is 0. The cost of farmers' green production is $c(0 < c < p$ or $c > p)$. If $0 < c < p$, the honest farmers choose green production; if $c > p$, the honest farmers give up green production. The cost of non-green production is standardized to 0. However, opportunistic farmers who pretend to produce high-quality agricultural products need to pay fees $u(0 < u < c)$. If the government and other regulatory agencies discover opportunistic farmers' impostor behavior, they will punish the farmers. The probability of being discovered and investigated by the regulator is assumed to be σ, and the punishment intensity is f. Moreover, agricultural products produced by the same farmer are assumed to have the same quality in the same period, and the output probability α_h and cost of

high-quality agricultural products in green production c are affected by ecological environment, technological level, farmer capital and other factors. Consumers do not know the type of farmer but judge the probability of high-quality agricultural products in the market with prior beliefs η_0. Prior beliefs are consumers' initial judgments on the probability of high-quality agricultural products in the market. All consumers are assumed to have the same prior beliefs, η_0.

The model makes the following assumptions. Firstly, both farmers and consumers are risk-neutral. Secondly, in each stage of the game, each consumer and the farmer trade once. After each stage of the game, the farmer and the consumer rematch, regardless of the repeated transactions between the consumer and the same farmer. Thirdly, different transactions are independent of each other.

The game process of each stage is as follows: (1) natural (N) selects the type of farmers, honest farmers (HP) and opportunistic farmers (OP). The types of farmers remain unchanged in the next game process, but honest green production farmers (HPB) and honest non-green production farmers (HPN) can be converted to each other, and the price of high-quality agricultural products is p. (2) Consumers opt to buy high-quality agricultural products or not. If they decide to buy and their products are high-quality agricultural products, the profit is $v_h - p$. Meanwhile, if they decide to buy but their products are non-high-quality agricultural products, the profit is $-p$. Opportunistic farmers choose green production or non-green production. If opportunistic farmers choose green production, the profit is $p - c$. If they choose non-green production, the profit is $(1 - \sigma)(p - u) - \sigma f$. For honest green production farmers, the income is $p - c$, and the profit of honest non-green farmers is 0. The game tree is shown in Figure 1.

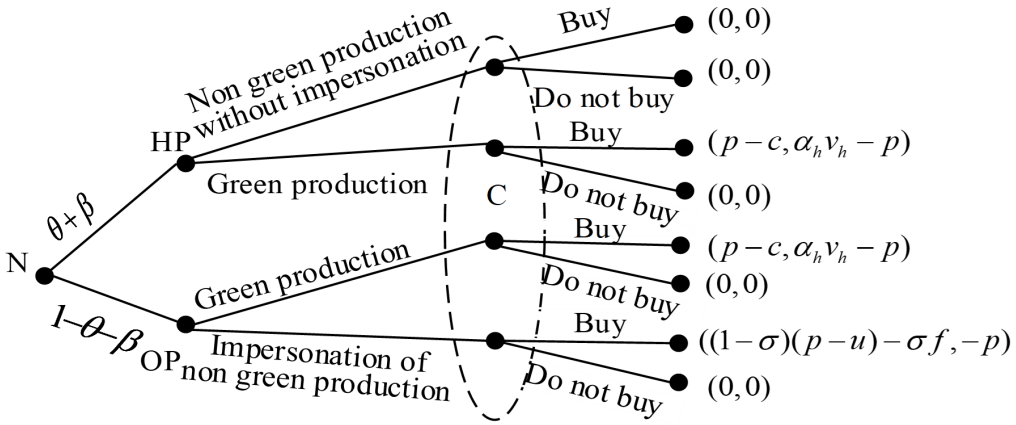

Figure 1. Game tree between farmers and consumers in each period.

The selection strategies of honest farmers and opportunistic farmers (honest farmers choose green production or not, and opportunistic farmers choose green production without impersonation or non-green production and impersonation) are to pursue the maximization of longterm profits, and consumers pursue the optimization of short-term utility. When consumers opt to consume high-quality agricultural products, they think the probability of purchasing high-quality agricultural products is η_{t-1}. However, they cannot judge the quality level of agricultural products before purchase, and the quality level can only be determined after purchasing. As such, third parties, such as the court, also cannot verify the quality level.

2.2. Basic Model Equilibrium

In traditional agricultural production, the ecological characteristics of agricultural products have not been integrated into the new business mode of agro-tourism integration. Thus, the value of high-quality agricultural products produced by farmers is difficult to reflect in this type of production, and the price of high-quality agricultural products is low. The price of agricultural products with high quality and non-high quality production

remains the same because the cost c of producing high-quality agricultural products is higher than that of producing non-high-quality agricultural products. Thus, in traditional agricultural production, farmers will not choose high quality production [1].

The integration of agriculture and tourism can better reflect the value v_h of high-quality agricultural products, which are re-priced. In the period $t = 1$, consumers believe that the probability of purchasing high-quality agricultural products $\theta\alpha_h/1-\beta$ is based on a priori belief η_0. In the period $t > 1$, consumers' belief η_{t-1} in the probability of purchasing high-quality agricultural products is updated based on the probability of purchasing high-quality agricultural products in the process of agricultural tourism integration. Although they do not know the private information of opportunistic farmers, they know the probability of high-quality agricultural products being in the market in the previous period. In the traditional integration of agriculture and tourism, the game has a static perfect Bayesian equilibrium, and the opportunistic farmers have the same strategy in each period. In the period $t > 1, \eta_{t-1}$ does not change with t. For the convenience of expression, under $\eta_t \equiv \eta_{t-1}$, consumers can judge the probability of high-quality agricultural products in the market according to a priori belief η_0, that is, $\eta_{t-1} = \eta_0$. Consumers do not know the exact quality of agricultural products at the time of purchase. Nevertheless, they know the probability of high-quality agricultural products.

The premise that consumers choose to buy high-quality agricultural products is that the benefits outweigh the costs, so consumers choose green consumption to meet:

$$(v_h - p)\eta_0 - p(1 - \eta_0) > 0 \tag{1}$$

The pricing of opportunistic farmers is the same as that of honest green production farmers. The premise of honest farmers choosing green production is that the benefit of green production is greater than that of non-green production, so honest farmers choose green production to meet:

$$p - c > 0 \tag{2}$$

Meanwhile, opportunistic farmers choose to pretend as long as the pretend income is greater than the pretend total payment. Opportunistic farmers choose non-green production and impersonation to meet:

$$(1 - \sigma)(p - u) - \sigma f > p - c \tag{3}$$

Therefore, under the conditions of (1), (2) and (3), the game has a perfect Bayesian equilibrium. Honest farmers opt for green production, and opportunistic farmers opt for non-green production and impersonation.

Among them, $p < \frac{\theta v_h \alpha_h}{1-\beta}$ is obtained from Formula (1); that is, consumers opt to consume high-quality agricultural products when the price of high-quality agricultural products is less than p. The price of high-quality agricultural products that consumers can accept is affected by the value of high-quality agricultural products, the output probability of high-quality agricultural products and the proportion of green farmers. $p - c > 0$ is obtained from Formula (2), as long as the price of high-quality agricultural products is higher than the cost of green production c, and honest farmers choose green production. Developing the integration of agriculture and tourism can promote the green production of honest farmers through the following ways. Firstly, the ecological value of agricultural products v_h must be improved, and the output probability α_h of high-quality agricultural products must be raised to increase the price p of high-quality agricultural products. Secondly, technological progress has reduced the cost c of green production.

However, $p - c < \frac{(1-\sigma)(c-u)-\sigma f}{\sigma}$ is obtained from Formula (3). The left side of the inequality is the current profit of opportunistic farmers when they decide to engage in green production, and the right side is the impersonation expected profit. When the individual reputation is not formed, the opportunistic farmers only consider the maximization of the current profit, that is, impersonation cost u. The probability σ of being investigated

and punished after impersonation and the punishment intensity f determine whether the opportunistic farmers impersonate sellers of high-quality agricultural products in the current period. China has a large demand base for agricultural products, and relying solely on government supervision is difficult, resulting in "failure to check out' and inadequate punishment [29]. The traditional integration of agriculture and tourism cannot track the production behavior of farmers and has no information diffusion function. In reality, opportunistic farmers often pretend to have high-quality agricultural products because of the low cost of pretending, the great difficulty of investigation and the small punishment after investigation. To sum up, the traditional integration of agriculture and tourism can enhance the value of high-quality agricultural products and reduce the cost of green production to stimulate the willingness of honest farmers to produce high-quality products to a certain extent. However, such integration cannot effectively restrict the behavior of opportunistic producers, which limits the effectiveness of the integration of agriculture and tourism in promoting green production of farmers.

3. Extended Model Analysis

3.1. Extended Model Setting

Traditional agriculture-tourism integration cannot track the data. Thus, opportunistic farmers' impostor behavior is difficult to curb. Digital empowerment of agro-tourism integration, which is characterized by "data traceability", increases the risk of opportunistic farmers being investigated after their non-green agricultural products are disguised as high-quality agricultural products. Assuming the integration of agriculture and tourism through digital empowerment, the production process of farmers can be tracked on the platform, and the quality information of agricultural products purchased by consumers can also be reported on the platform. Whether they are honest farmers or opportunistic farmers, historical records show the quality of agricultural products sold in the past on the platform. At this time, the selection strategy of farmers should consider not only the current income but also the impact of reputation on future income. The number of agricultural products produced by farmers in each period remains the same, which is abstracted as 1. At $t > 1$, consumers' belief in the probability η_{t-1}^{SL} of high-quality agricultural products came from information SL. SL refers to no historical record of opportunistic farmers pretending to be high-quality agricultural products on the platform, in the integration of agriculture and tourism through digital empowerment. Assume that farmers choosing green production is also likely to produce non-high-quality agricultural products, but based on the following two reasons. Firstly, digital empowerment makes the production process of agricultural products traceable. Secondly, the quality of non-high-quality agricultural products in green production is still higher than that of low-quality agricultural products in non-green production. Thus, consumers can forgive farmers who provide non-high-quality agricultural products in green production. However, the probability that consumers will forgive opportunistic farmers pretending to sell high-quality agricultural products is 0.

3.2. Extended Model Equilibrium

Considering that opportunistic farmers choose green production:

$$\eta^{SL} = \alpha_h \tag{4}$$

Consumers choose high quality agricultural products as long as they expect revenue to be greater than expenditure. Consumers choose green consumption to meet:

$$(v_h - p)\eta^{SL} - p\left(1 - \eta^{SL}\right) > 0 \tag{5}$$

$p < \alpha_h v_h$ is obtained from (4) and (5), which indicates that consumers choose green consumption when the price is lower than $\alpha_h v_h$.

Under the information transmission mechanism, opportunistic farmers consider their total income in all periods. Assuming the discount rate is δ, according to the dynamic programming [30], the income I_m can be expressed as:

$$\frac{I_m}{1-\delta} = \pi_s + \frac{\delta E(I(q) \mid OP_s)}{1-\delta} \tag{6}$$

Among them, π_s is the current income of opportunistic farmers' green production, OP_s means the opportunistic farmers' green production, $I(q)$ is the follow-up income caused by different quality signals and $E(I(q) \mid OP_s)$ is the average expected follow-up income when opportunistic farmers choose green production.

$$E(I(q) \mid OP_s) = \alpha_h I_m + (1-\alpha_h) I_m \tag{7}$$

The following can be obtained from Equations (6) and (7):

$$I_m = (1-\delta)\pi_s + \delta\{\alpha_h I_m + (1-\alpha_h) I_m\} \tag{8}$$

Formula (8) shows that if opportunistic farmers choose green production, a probability α_h of producing high-quality agricultural products exists. The average income from the next period is the same as the average income from the current period. Moreover, the probability of producing low-quality agricultural products is $1-\alpha_h$. Given that customers can forgive non-high-quality agricultural products in green production, the average income from the next period is the same as the average income from the current period.

If opportunistic farmers choose non-green production, they can only "cheat' once, and then they will be seen through by consumers and filled in on the platform. After that, consumers will never forgive them. Therefore, the total income of opportunistic farmers impersonating is $(1-\delta)\{(1-\sigma)(p-u)-\sigma f\}$. Opportunistic farmers choose green production under the premise that the expected return of green production being greater than the total return of sham. The conditions for opportunistic farmers to not deviate from green production are:

$$I_m > (1-\delta)\{(1-\sigma)(p-u)-\sigma f\} \tag{9}$$

$p - c > \frac{(c-u)(1-\sigma)(1-\delta)-\sigma f(1-\delta)}{\sigma+\delta-\delta\sigma}$ is obtained from Formula (9); the left side of inequality (9) is the expected income of opportunistic farmers discounted for the current period, and the right-hand side is the expected income with fake high-quality agricultural products discounted in the current period.

By further calculating the partial derivatives of u, f and σ for $p - c > \frac{(c-u)(1-\sigma)(1-\delta)-\sigma f(1-\delta)}{\sigma+\delta-\delta\sigma}$, the partial derivatives are all less than 0, which indicates that the expected income of counterfeiting high-quality agricultural products gradually decreases with the increase in the cost of counterfeiting, the strengthening of the punishment for counterfeiting and an increase in the risk of being investigated.

The lack of information weakens the green production power of farmers. In recent years, high-quality agricultural products promoted by rural tourism have been counterfeit and shoddy, indicating that the problems of information asymmetry and moral hazard in the supply of high-quality agricultural products cannot be ignored. The above model analysis shows that when the opportunity cost of impersonation is higher than the income of green production, opportunistic farmers may give up impersonation and turn to green production. The result of this model is the same as the research conclusion of Kreps et al.; that is, when information transparency increases, the reputation mechanism can effectively inhibit opportunistic farmers' impersonation [31]. Digital empowerment of agro-tourism has enhanced the convenience of information dissemination, and the big data processing capability of the information platform has provided new possibilities for the tracking and recording of farmers' production and transaction information. Through these scientific and technological means, on the one hand, opportunistic farmers' impersonation

is easier to identify and verify. On the other hand, it is easier to build a multilateral punishment mechanism for opportunistic farmers' impersonation, which makes it possible for opportunistic farmers to conduct green production.

Honest farmers' decision making is consistent with the basic model. As long as the price of high-quality agricultural products increases and the cost decreases, honest farmers will choose green production. According to the above mechanism model, compared with the traditional agricultural tourism integration, the agricultural tourism integration under the digital empowerment perspective can restrict the opportunistic production behavior, further stimulate honest farmers' willingness to green production, promote the farmers' green production and promote the green development of agriculture.

4. Case Analysis

4.1. Research Design

4.1.1. Method Selection

The reasons for adopting the case study method are as follows. (1) This part mainly discusses how the integration of agriculture and tourism can promote farmers' green production from the perspective of digital empowerment, which belongs to the "how to" problem. Hence, the case study is applicable. (2) The integration of agriculture and tourism under the digital empowerment perspective is a new type of business that has emerged in recent years. No mature theoretical discussion has been established yet. This part does not test the existing assumptions but attempts to reveal the mechanism and path of the integration of agriculture and tourism under the digital empowerment perspective to promote farmers' green production through cases. The case study helps to explore the potential laws behind the phenomenon [32].

4.1.2. Case Selection

The case of "Xichong County in Sichuan Province, China, relying on digital economy, developing rural tourism to help farmers' organic agricultural production" (Xichong Agriculture) was selected as the subject of the study, "Integration of agriculture and tourism to promote farmers' green production under the perspective of digital empowerment", in accordance with the purpose, representativeness and theoretical sampling principles. The reason for choosing Xichong agriculture as a case study is mainly based on the following three reasons. Firstly, the Xichong agriculture case meets the research purpose of this paper. Xichong agriculture is a typical model of "digital + rural tourism" that aims to help farmers' green production, which is helpful to understanding how the integration of agriculture and tourism can promote farmers' green production under the perspective of digital empowerment. Farmers' green production is troubled by the prices of high-quality agricultural products, production costs of high-quality agricultural products and production probabilities of high-quality agricultural products. Solving the above problems can effectively stimulate farmers' willingness to engage in green production, thereby being suitable for analysis in the research framework constructed in this study. Secondly, the successful development of Xichong organic agriculture is representative. Xichong has been awarded honorable titles for "national demonstration projects of ecological civilization pioneer", "the first national organic product certification to create a demonstration county", "national pilot reform and the construction of modern agriculture demonstration area", "national circular economy demonstration county", "national leisure agriculture and rural tourism demonstration county' and "national green model county". Moreover, Xichong has been observed and studied by other provinces and cities. It has developed a relatively mature mechanism in the implementation process of "agriculture and tourism integration promoting farmers' green production under the perspective of digital empowerment", which has high reference value. Finally, the case selection follows the theoretical sampling principle. High-quality agricultural development is the main component of rural revitalization. Under the situation that Xichong is poor and farmers are in deep poverty, relying on the existing resources in rural areas, Xichong has found a way to achieve high-quality

agricultural development and rural revitalization. Taking Xichong agriculture as a case is consistent with the current research theme of high-quality agricultural development.

4.1.3. Data Collection

The data mainly came from interviews, field observations and informal communication. The people involved in the interviews included relevant personnel of the county government, agricultural technicians, farmers, village cadres, etc., based on which, first-hand information was formed. Information from portal websites, such as Sina, Sohu and the government website, was collected, and much attention was given to the latest developments of Taobao, JD, Youtian Youjia and other APPs. During the investigation, the author went to Xichong many times to experience rural tourism services and informally communicated with local tourists to form second-hand information. Finally, the author checked the data from different channels to ensure that the relevant information is accurate and reliable.

4.2. Case Description

4.2.1. Case Overview

Xichong, a typical hilly agricultural county under the administration of Nanchong City in Sichuan Province, China, has 44 towns and 621 villages (communities), and a total population of 480,000. The location map is shown in Figure 2. By the end of 2013, the county had 79 poverty-stricken villages with registered cards at the provincial level, 50 non-poverty villages with more than 20 poverty-stricken households, 22,622 poverty-stricken households, 49,800 poor people and a poverty incidence rate of 9.54%. Its vast rural area, good ecological endowment and accessible transportation provide the basic conditions for the development of agricultural tourism integration.

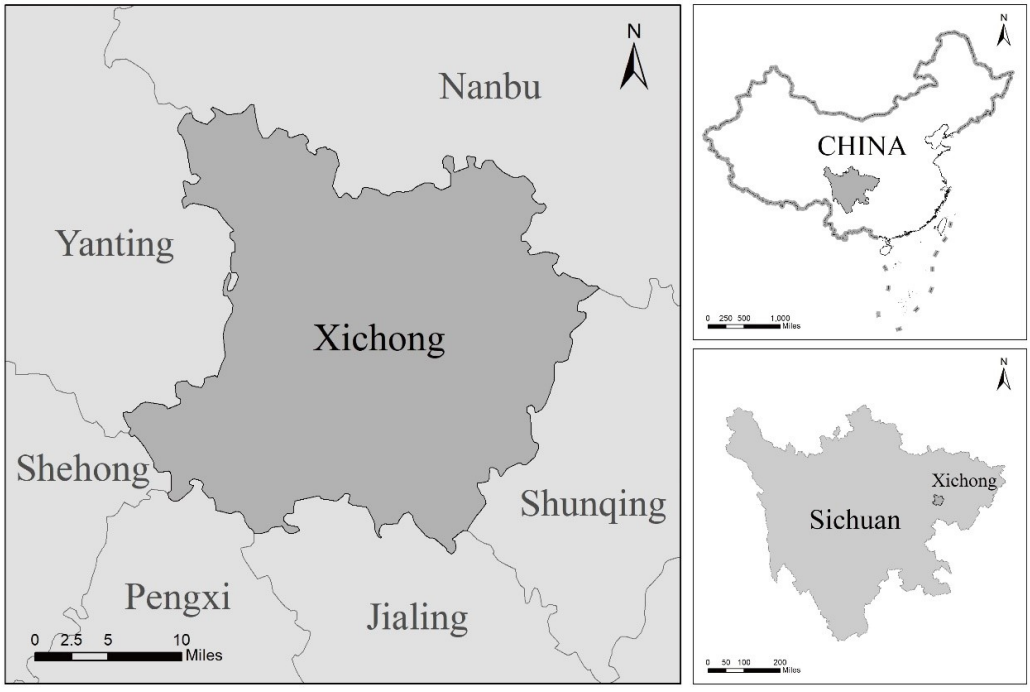

Figure 2. The location map of Xichong.

4.2.2. Development Strategy and Implementation Mode

Development Strategy

Xichong focuses its rural revitalization and development strategy on the supply side structural reform of rural tourism. It takes misplaced development and out-of-position development as the key to solving the dilemma. Moreover, it established the development

goals of building a rural tourism destination, being a strong county with ecological economy and being the first county with organic food in Western China. The overall strategy of enriching people and strengthening the county has been formulated to build the image of the Western Green Valley in China. Moreover, the county aims to drive modern agriculture characterized by organic agriculture, the new industry characterized by the intensive processing of agricultural products and the tourism culture industry characterized by rural tourism. In doing so, the strategy aims to realize the deep integration and development of the three industries.

Implementation Mode

Xichong connects the development of rural tourism, the development of modern agriculture and the construction of happy and beautiful villages, which closely adheres to the goal of building a rural tourism destination, and pursues the development path of ecological economy and economic ecology. The county systematically improves its scenic spots and the service facilities of rural tourist attractions. Moreover, it pays close attention to the construction of cultural tourism brands, and vigorously implements the protection and utilization of cultural heritage, the creation and performance of literary and artistic works, the inheritance and innovation of historical celebrities' culture and the cultivation of cultural tourism featured towns. It also maintains the branding of festival and event activities; cultivates the "five major projects'; accelerates the integrated development of agricultural tourism, cultural tourism and business tourism; and forms a development model of "agricultural foundation, cultural guidance and tourism drive".

The Xichong government has attracted investment to break the bottleneck of infrastructure construction funds for the integration of agriculture and tourism. It has integrated more than 1 billion yuan of funds for agriculture related projects. In addition, it has focused on key tourist attractions and built a national 4A scenic spot, the hometown of Zhang Lan, the first village of the Shuanglongqiao organic ecological cycle, the Qinglong Lake National Wetland Park, the Chongguoxiang Taoyuan tourist area, the Yixing China Organic Life Park, etc. The local government has deeply tapped the potential of tourism resources. Moreover, it has vigorously held various events, such as the Plum Blossom Festival, the Peach Blossom Festival, the Peony Flower Festival, the Rose Festival, the Lotus Festival, the Fruit Festival and other festival events. With the help of rural tourism and relying on information technology, the government has widely promoted and recommended organic agricultural products, created the Xichong organic agricultural product brand and privatized Xichong's organic agricultural product brand, a public good, to retain reputation and retain customers.

4.2.3. Development Status

Xichong has been rated as the "national leisure agriculture and rural tourism demonstration county". It has created 12 national and provincial agricultural product brands, and the Xifeng navel orange, Chongguo fragrant peach, Xichong erjingtiao pepper and Xichong yellow heart sweet potato have won the national geographical indication protection of products. By 2020, Xichong has built a modern agriculture demonstration base of 350,000 Mu and 12 modern circular agriculture demonstration parks worth 100 million yuan. In addition, 106 organic agricultural production bases covering an area of 230,000 Mu have been built, of which 140,000 Mu have been certified for 102 varieties in five categories. The total output value of organic agriculture has exceeded 4 billion yuan. The scale of organic agriculture ranks first in Western China. It has become a national agricultural county with product quality safety and is among the first batch of national organic product certification demonstration counties. Nearly 100,000 people in the county have started to eat organic rice. Furthermore, the income of farmers is increasing, and the enthusiasm for green production is rising. In 2017, 45 poor villages in Xichong withdrew from the poverty program, and in 2018, 34 poor villages withdrew from the poverty implementation program.

4.3. Research Findings

The model analysis in Sections 2 and 3 shows that the effect of agricultural tourism integration on farmers' green production is affected by the opportunistic farmers' impersonation behavior and the honest farmers' green production willingness. This part confirms the relevant conclusions of the model through a typical case in Xichong County, Sichuan Province, China.

4.3.1. The Characteristics of "Data Tracing" and "Information Diffusion" Are Used to Increase the Impersonation Fees u, Punishment Probability σ and Punishment Intensity f of Opportunistic Farmers

In China, which is dominated by a small-scale peasant economy, the production and operation entities are too scattered. Thus, the reputation of high-quality agricultural products produced by farmers exhibits a strong attribute of public goods. High-quality agricultural products are difficult to identify only by appearance, thereby inclining opportunistic farmers to pretend to be motivated to maximize short-term personal profits. To implement the reputation governance mechanism for high-quality agricultural products, the responsibility must be assigned to specific farmers, and the punishment must be increased. Firstly, the "data traceability" feature of agricultural tourism integration from the perspective of digital empowerment enables the production responsibility of agricultural products to be implemented for specific business entities. Xichong County requires farmers to engage in agricultural production in strict accordance with the production standards of "four haves and one can" with standardized operation, documented process, product identification, market supervision and quality traceability. Agricultural enterprises must truthfully fill in agricultural records on the online traceability platform. Only after the agricultural records are filled in can the QR code and certificate be automatically generated on the Internet. Xichong County traces the overall information chain of the production, processing, transportation, inspection and quarantine of organic agricultural products. Then, the county assigns the responsibility to each production and operation entity. Consumers take out their mobile phones and scan the QR code to know the specific plot of agricultural products; who is responsible for the production; information on the whole process of sowing; fertilization; insect killing and picking time; and even information on seed source, fertilizer manufacturer, etc. The responsibility of Xichong organic agricultural products is given to the individual and the whole process of production, which increases the probability σ that opportunistic farmers will be punished for impersonating. At the same time, opportunistic farmers need to enact more covert impersonation behavior to avoid punishment, thereby increasing the impersonation cost u.

Secondly, from the perspective of digital empowerment, the integration of agriculture and tourism has the characteristics of "information diffusion", which has increased the punishment on agricultural product operators. Xichong traces the quality of digital agricultural products back to the existing e-commerce platform, on which consumers can obtain commodity review information. If they buy low-quality agricultural products, they can evaluate them on the platform so that they lose the trust of consumers and their reputation is damaged. Alternatively, they can trace the origin, producers, use and detection of agricultural inputs through QR code. Then, they can report and protect their rights. Xichong's regulatory authority has implemented the system of circulating a notice of criticism and elimination for the opportunistic acts investigated and dealt with, which has damaged its reputation and interests. Through information diffusion, regulatory agencies effectively punish the opportunistic farmers' impersonation, thus increasing the punishment effect of their impersonation f.

Xichong has a large number of agricultural products and heavy government supervision tasks. In addition, opportunistic farmers' impersonation behavior is hidden. Thus, the quality of supervision is difficult to ensure by simply relying on government sampling inspection. Data tracing solves the dilemma of government quality supervision by opening up the black box of agricultural product production, processing and circulation. Data

tracing is an effective measure to ensure the quality of agricultural products [33]. Compared with the traditional integration of agriculture and tourism, which mainly promotes the value of high-quality agricultural products and stimulates honest farmers' green production willingness, the integration of agriculture and tourism can effectively supervise opportunistic farmers from the perspective of digital empowerment. From this viewpoint, the integration of agriculture and tourism can effectively manage opportunistic farmers by establishing and improving the traceability system of agricultural products, thus making the public goods an attribute of organic agricultural products as private goods.

4.3.2. "Knowledge Sharing" Is Used to Promote Agricultural Technology Progress, Reduce the Production Cost c of High-Quality Agricultural Products and Improve the Production Probability α_h of High-Quality Agricultural Products

The knowledge spillover, capital accumulation and the knowledge sharing characteristics of the integration of agriculture and tourism are three important paths to promote agricultural technology progress. The first two are the action paths of the traditional integration of agriculture and tourism to promote agricultural technology progress, while the latter is the important action path of the digital integration of agriculture and tourism to promote agricultural technology progress. A very important feature of digital economy is that it carries a large number of knowledge resources. As knowledge is an intangible asset, it is non-exclusive and non-exclusive in use. Hence, it can be learned, shared and innovated. Given the spillover and strong penetration of the digital economic utility, it has positive economic externalities. In addition to using private knowledge for production, farmers can also use the existing knowledge achievements and resources of the platform. From the perspective of digital empowerment, the integration of agriculture and tourism has the feature of "knowledge sharing", which realizes the improvement of the green technology level through the leap of three stages: knowledge acquisition, knowledge transfer and knowledge creation.

Knowledge Acquisition

In traditional agricultural production, farmers rely on individual experience for agricultural production, and the technology is backward. The development of traditional agricultural tourism integration has promoted the improvement of agricultural technology to a certain extent. However, the information resources obtained are still limited, and the innovation power is insufficient. After the digital empowerment of agriculture and tourism integration, farmers can obtain relevant knowledge through the digital platform. The open-loop and group intelligence of the Internet platform make it an open information base, thus increasing the source of knowledge acquisition. Xichong County has made great efforts to develop digital technology facilities. The construction of a digital village has broadened the sources of knowledge for farmers. Advanced Internet technology has promoted the improvement of farmers' skills. A farmer in village B of Yixing town said:

In the past, farming was based on old experience and tradition. Now, when you encounter problems, you can click on your mobile phone and get professional guidance from specialized technicians.

Knowledge Transfer

The integration of traditional agriculture and tourism has promoted knowledge transfer through mutual exchange and collaborative learning between agricultural departments and tourism departments. From the perspective of digital empowerment, the integration of agriculture and tourism has the characteristics of extensive connection and real-time interaction, thus providing a more convenient and efficient communication channel for the integration of agriculture and tourism and making the channel more collaborative and efficient. The digital platform plays the role of knowledge transfer, enabling farmers to show their tacit knowledge in the process of agricultural production, promoting the dominance of farmers' tacit knowledge and accelerating knowledge transfer. For example, farmers in Village C of Daquan town share their experience of planting erjingtiao online.

In doing so, other farmers can learn from it. In the development of agricultural tourism integration, Xichong County has always taken scientific and technological innovation as the key to promoting the upgrading of organic agriculture. It has built scientific research platforms, such as the Asian organic demonstration village, the Asian organic agricultural product R&D centre and the national agricultural science and technology park. It has also held regional development forums on organic industry, seminars on organic product certification and various agricultural technology trainings. Moreover, the county has encouraged farmers to share technical experience through digital platforms to improve the level of agricultural technology.

Knowledge Creation

The knowledge spillover effect of the agricultural sector and the tourism sector in the traditional integration of agriculture and tourism promotes knowledge creation. The data-driven integration of agriculture and tourism from the perspective of digital empowerment ensures the reliability and convenience of knowledge creation from the source. Xichong has cooperated with more than 20 universities and scientific research institutes, including the Chinese Academy of Sciences, Sichuan Agricultural University and Southwest University, to establish an talent pool of organic field expert that covers more than 100 academicians from the two academies and well-known experts and scholars at home and abroad. It aims to become an "Organic Silicon Valley" and attract top international and domestic talents. Xichong farmers input and transmit the relevant problems in the process of agricultural green production through the digital platform. Moreover, they jointly solve various difficult problems with organic experts. Xichong interacts with "Organic Silicon Valley" to build an international stage for organic agricultural technology research and development.

In short, compared with the traditional integration of agriculture and tourism, the integration of agriculture and tourism under the vision of digital empowerment has richer knowledge sources, breaking through the traditional geographical restrictions. In addition to exchange between farmers, knowledge sources can also be exchanged within the platform. Moreover, apart from learning from internal employees, they can also seek help from artificial intelligence. Knowledge creation can be driven by agricultural tourism resources and data. Compared with traditional agricultural tourism integration, it plays a greater role in promoting agricultural technology progress. Furthermore, information technology promotes mutual learning among farmers in Xichong and makes Xichong organic agriculture develop in the direction of "scale, intensification and standardization". Knowledge sharing has improved the level of agricultural tourism integration technology from the perspective of digital empowerment, reduced the production cost c of high-quality agricultural products and increased the production probability of high-quality α_h agricultural products. Thus, farmers' willingness to engage in green production is stimulated.

4.3.3. Information Matching Is Used to Promote Information Symmetry between Supply and Demand, Solve the Dilemma of the "Lemon Market" and Increase the Demand for High-Quality Agricultural Products, Increase the Price p of High-Quality Agricultural Products

The main factors affecting the price of agricultural products are quality and demand. The asymmetric information between supply and demand inhibits the price p increase of high-quality agricultural products [34]. From the perspective of digital empowerment, the integration of agriculture and tourism improves the quality and efficiency of agricultural products through technological progress. However, consumers need to recognize high-quality agricultural products to achieve price increase. At present, most agricultural production adopts a specialized division of labour. Consumers do not know who is responsible for the production of agricultural products, that is, whether green production is implemented in the production process of agricultural products. Moreover, farmers do not know to whom agricultural products are sold. Asymmetric information in the agricultural production process leads to the lack of trust between consumers and high-quality agricultural products. The lack of trust makes consumers only willing to buy

high-quality agricultural products at a lower price, thus squeezing the high-quality agricultural product market and falling into the lemon market dilemma of "low price-non green production-low quality".

Solving the dilemma of the lemon market is the key to the price increase of high-quality agricultural products. Xichong government requires organic farmers to input agricultural operation records into computers regularly to form electronic production files and generate QR codes after the agricultural products are qualified. The QR code records in detail the whole process of inspecting agricultural products, from sowing, fertilization, insect killing to picking, as well as information on seed sources and fertilizer manufacturers. Consumers can trace the origin of agricultural products, producers, use and detection of agricultural inputs as long as they scan the QR code on their mobile phones. Xichong Youtian Youjia agricultural products have achieved quality traceability, and its app shows that the price of Jinke organic agricultural products is four to five times higher than that of ordinary agricultural products.

To sum up, the quality traceability of Xichong organic agricultural products has reshaped the trust relationship between consumers and producers, broken the dilemma of high quality and low price of high-quality agricultural products and realized the price increase of high-quality agricultural products. In addition, increasing the demand for organic agricultural products can effectively increase the price of organic agricultural products, while the asymmetric information of production and marketing demand affects its price increase. Consumers have difficulty in understanding the market information fully due to the existence of search resistance. To alleviate this issue, firstly, Xichong organizes tourists to pick and taste fruits by holding various festivals and events, such as the Peach Blossom Festival and Lotus Festival on site, so that tourists can be deeply impressed with the good ecological environment of Xichong and understand the organic agricultural products of Xichong. Secondly, with the help of online media, tourism activities are promoted, such as "when the peaches are ripe, we will call you back to pick peaches" and "meet you in the lotus", to generate the popularity of Xichong organic agricultural products. Moreover, online media effectively reduce the search resistance of consumers and alleviate the problem of poor information on the needs of farmers and consumers.

Facing the position resistance, Xichong is committed to the innovation of sales model and has created a diversified sales model. The first is to reduce intermediate suppliers and shorten the supply chain by using sales modes, such as agricultural supermarket docking and agricultural enterprise docking. The second is to make full use of Internet information technology and use direct sales channels, such as e-commerce and live broadcasting, to reduce the location resistance while shortening the supply chain. Finally, live Internet broadcasts are used to arouse nostalgia among consumers, which realize non-tradable trade in services through activities such as adopting a peach tree or a chicken.

Through the integration of agriculture and tourism enabled by the digital economy, we will enrich consumers' information and access to high-quality agricultural products and reduce consumers' search costs and location costs of high-quality agricultural products. Xichong's organic agricultural products have won the favour of the market in the process of going global. The products are not only sold to Hong Kong, Macao, Shanghai, Shenzhen and other places but have also successfully entered Singapore, Japan, South Korea and other foreign markets. With the help of digital resources, Xichong promotes various tourism activities, opens up an isolated island of consumer information, relies on online and offline sales models, opens up sales channels and realizes the increase of consumer demand.

With the help of the integration of agriculture and tourism, Xichong has promoted the increase of consumers' demand for organic agricultural products, increased consumers' trust in organic agricultural products through quality traceability and increased the output probability of high-quality agricultural products through technological progress. Thus, the price increase of organic agricultural products is realized. The specific mechanism is shown in Figure 3.

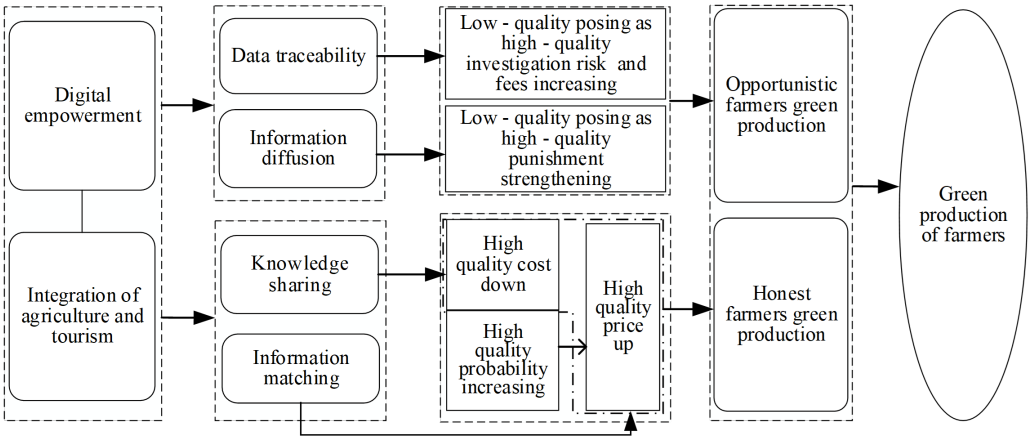

Figure 3. The mechanism chart of farmer's green production.

5. Conclusions and Recommendations

5.1. Conclusions

Based on the incomplete information dynamic game model, this study takes the development of organic agriculture in Xichong, as an example to explore the impact of agricultural tourism integration on farmers' green production from the perspective of digital empowerment. The study found that Xichong promotes green production of farmers through three ways.

Firstly, we should restrain the opportunistic farmers' impersonation behavior and increase the probability of their being investigated, the cost of impersonation and the effect of punishment. From the perspective of digital empowerment, the integration of agriculture and tourism has the characteristics of "data traceability", which leads to an increase in the probability of being punished for pretending to be an opportunistic farmer and an increase in the cost of pretending to be an opportunistic farmer. The characteristic of "information diffusion" is easily punishable by regulators and consumers. The above two characteristics make opportunistic farmers pretend to have less expected income than green production and restrain their impersonation behavior.

Secondly, improving the production probability of high-quality agricultural products and reducing the cost of green production will help farmers' green production. From the perspective of digital empowerment, the integration of agriculture and tourism has the characteristics of knowledge sharing, which improves the level of green production technology of farmers and then promotes the production probability and cost reduction of high-quality agricultural products.

Finally, the demand information is matched, the dilemma of the lemon market is resolved, and the demand for high-quality agricultural products is increased. From the perspective of digital empowerment, the integration of agriculture and tourism has the characteristics of information matching. Firstly, it starts from the supply side, retraces the consumer trust mechanism and breaks the dilemma of the lemon market. Secondly, it eases the search resistance and location resistance and increases the demand for high-quality agricultural products.

Among them, the former path promotes the green production of opportunistic farmers, and the latter two paths promote the green production of honest farmers. Previous research has demonstrated that the impact of agro-tourism integration on agricultural development presents nonlinear characteristics, but the black box of why agro-tourism integration presents nonlinear characteristics in relation to agricultural development has not been opened, and the bottleneck problem of agro-tourism integration to further promote agricultural development cannot be solved. This study explored the differences in the impact of agrotourism integration on green production of different types of farmers from the microperspective, which could effectively explain the reasons for its nonlinear

characteristics and effectively solve the bottleneck problem of agrotourism integration in promoting agricultural development.

5.2. Practical Implications

Firstly, we should pay equal attention to punishing opportunistic farmers' impersonation and protecting the interests of green production farmers to achieve green agricultural development. Using data tracing and information diffusion to build a multilateral punishment mechanism can effectively restrain opportunistic counterfeiting and achieve effective governance of opportunistic farmers. This study has affirmed this conclusion, but only punishment without incentives cannot effectively promote farmers' green production. Meanwhile, only protecting farmers' green production interests can achieve effective governance. Therefore, to realize the green production of farmers, while increasing the punishment for opportunistic farmers' impersonation, digital-enabled agriculture and tourism must be integrated to promote the value of high-quality agricultural products and protect the interests of green production farmers.

Secondly, the government should strengthen information construction, overcome the dilemma of agricultural production cycle and guide the rational allocation of resources. Xichong has resolved the dilemma of consumers' information asymmetry through information matching, realized the price increase of high-quality agricultural products and guided farmers' green production. However, farmers have difficulty understanding the market information fully in a timely manner. Hence, information asymmetry between supply and demand still exists. Digital technologies, such as big data, are necessary to match and guide the rational allocation of resources accurately to achieve high-quality agricultural development.

Thirdly, by leveraging the digital empowerment of agriculture and tourism integration, digital technology can effectively protect the profits of small farmers and enhance their willingness toward green production. To stabilize the market for high-quality agricultural products, we need to take the road of scale and branding, that is, to become stronger and bigger. The development of organic agriculture in Xichong has effectively expanded the production scale of agricultural products by invigorating land circulation and introducing diversified business entities. Moreover, it has innovated more industrial development models in the process of becoming stronger and bigger. In its further development, we can look for differentiation and service opportunities with the help of the integration of digital agriculture and tourism. Furthermore, we can reverse the competitive disadvantage of small farmers with small capital and small scale with the core competitiveness of original ecology and customization, meet the long-tail demand that consumers cannot meet, protect the profits of small farmers, enhance their green production willingness and promote the high-quality development of agriculture.

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References

1. Hu, P.B.; Zhong, Y.P. The Mechanism of Improving Agricultural Eco-efficiency by the Integration of Agriculture and Tourism Supported by the Government: Taking the National Leisure Agriculture and Rural Tourism Demonstration Counties as an Example. *Chin. Rural. Econ*. **2019**, *12*, 85–104.
2. Shen, C.C.; Wang, D.; Loverio, J.P. Influence of Consumer Landscape on Place Attachment in Agritourism: The Case of Huatung, Taiwan. *Agriculture* **2022**, *12*, 1557. [CrossRef]
3. Zhang, C.; Sun, Y.D.; Sun, S.Y.; Hu, R.F. Does the Urban-rural Income Gap Increase Agricultural Chemical Input? A Case Study of Pesticide Use. *Chin. Rural. Econ*. **2019**, *1*, 96–111.
4. Gao, J.J.; Shi Q.H. The Impacts of Rural Households' Productive Characteristics on Pesticide Application: Mechanism and Evidence. *Chin. Rural. Econ*. **2019**, *11*, 83–99.
5. Yang, F.X.; Zheng, X. Impact of ecological compensation methods on farmers' green production behaviours from the perspective of value perception. *China Popul. Resour. Environ*. **2021**, *4*, 164–171.
6. Li, M.Y.; Chen, K. An Empirical Analysis of Farmers' Willingness and Behaviours in Green Agriculture Production. *J. Huazhong Agric. Univ.* **2020**, *4*, 10–19, 173–174.
7. Hu, R.; Cai, Y.; Chen, K.Z.; Huang, J.K. Effects of inclusive public agricultural extension service: Results from a policy reform experiment in western China. *China Econ. Rev*. **2012**, *23*, 962–974. [CrossRef]
8. Li, H.; Li, S.P.; Nan, L. Can Technical Training Reduce Pesticide Overuse? *Chin. Rural. Econ*. **2017**, *10*, 8096.
9. Sun, X.Y.; Liu, Y. Can Land Trusteeship Improve Farmers' Green Production? *Chin. Rural Econ*. **2019**, *10*, 60–80.
10. Tong, D.J.; Huang, W.; Ying, R.Y. The Impacts of Grassroots Public Agriculture Technology Extension on Farmers' Technology Adoption: An Empirical Analysis of Rice Technology Demonstration. *China Rural Surv*. **2018**, *4*, 50–73.
11. Ng, T.L.; Eheart, J.W.; Cai, X.; Braden, J.B. An agent-based model of farmer decision-making and water quality impacts at the watershed scale under markets for carbon allowances and a second-generation biofuel crop. *Water Resour. Res*. **2011**, *47*. [CrossRef]
12. Genius, M.; Koundouri, P.; Nauges, C.; Tzouvelekas, V. Information transmission in irrigation technology adoption and diffusion: Social learning, extension services, and spatial effects. *Am. J. Agric. Econ*. **2014**, *96*, 328–344. [CrossRef]
13. Zheng, S.; Chen, Q.M.; Wang, Z.G. Scale of Land, Enrollment of Agricultural Cooperatives and Adoption of Unmannered Aerial Vehicle. *J. Agrotech. Econ*. **2018**, *6*, 92–105.
14. Hamilton, J.; Sidebottom, J. Mountain Pesticide Education and Safety Outreach program: A model for community collaboration to enhance on-farm safety and health. *North Carol. Med. J*. **2011**, *72*, 471. [CrossRef]
15. Ruan, J.; Jiang, H.; Li, X.; Shi, Y.; Chan, F.T.S.; Rao, W.A. Granular GA-SVM Predictor for Big Data in Agricultural Cyber-Physical Systems. *IEEE Trans. Ind. Inform*. **2019**, *15*, 6510–6521. [CrossRef]
16. Ruan, J.H.; Liu, T.J.; Feng X.C.; Qiao, Z.W.; Huo, X.X.; Zhu, Y.C.; Hu, X.P. Digital Agriculture Operation and Management: Key Issues, Methodology and Demonstration Project. *J. Manag. World* **2020**, *8*, 222233.
17. Liu, H.Q. Accelerating the Digital Transformation of Modern Agriculture by Driving the Agricultural Modernization with Precision Agriculture. *Chin. J. Agric. Resour. Reg. Plan*. **2019**, *1*, 1–6,73.
18. Buhalis, D.; Law, R. Progress in information technology and tourism management: 20 years on and 10 years after the Internet-The state of e-Tourism research. *Tour. Manag*. **2008**, *29*, 609–623. [CrossRef]
19. Farkhondehzadeh, A.; Karim, M.R.R.; Roshanfekr, M.; Azizi, J.; Hatami, F.L. E-Tourism: The role of ICT In tourism industry. *Eur. Online J. Nat. Soc. Sci*. **2013**, *2*, 566–573.
20. Jorgenson, D.W.; Ho, M.S.; Stiroh, K.J. A Retrospective Look at the U.S. Productivity Growth Resurgence. *J. Econ. Perspect*. **2008**, *22*, 3–24. [CrossRef]
21. Kim, E.; Nam, D.I.; Stimpert, J.L. The Applicability of Porter's Generic Strategies in the Digital Age: Assumptions, Conjectures, and Suggestions. *J. Manag*. **2004**, *30*, 569–589. [CrossRef]
22. Hjalager, A.M. Agricultural diversification into tourism: Evidence of a European Community development programme. *Tour. Manag*. **1996**, *17*, 103–111. [CrossRef]
23. Blöchl, F.; Theis, F.J.; Vega-Redondo, F.; Fisher, E.O. Vertex centralities in input-output networks reveal the structure of modern economies. *Phys. Rev. E Stat. Nonlin Soft Matter Phys.* **2011**, *83 Pt 2*, 046127. [CrossRef] [PubMed]
24. Kelly, G.F.; Cooper, A.B.; Pinkerton, E. Social network analysis, Markov Chains and input-output models: Combining tools to map and measure the circulation of currency in small economies. *J. Rural. Community Dev*. **2014**, *9*, 118–141.
25. Moosavi V.; Isacchini G. A Markovian model of evolving world input-output network. *PLoS ONE* **2017**, *12*, e0186746. [CrossRef]
26. Bao, B.F.; Jin, S.T.; Li, L.L.; Duan, K.F.; Gong X.M. Analysis of Green Total Factor Productivity of Grain and Its Dynamic Distribution: Evidence from Poyang Lake Basin. China. *Agriculture* **2022**, *12*, 271. [CrossRef]
27. Heckerman, D. Bayesian Networks for Data Miningand. *Data Min. Knowl. Discov.* **1997**, *1*, 79–119. [CrossRef]
28. Newton, A.C.; Stewart, G.B.; Diaz, A.; Golicher, D.; Pullin, A.S. Bayesian Belief Networks as a tool for evidence-based conservation management. *J. Nat. Conserv.* **2007**, *15*, 144–160. [CrossRef]
29. Zhao, B.Q.; Zhang, H.J. Research on the Operation Mechanism and Implementation Modes of Digital Agricultural Products Traceability System. *Issues Agric. Econ*. **2021**, *8*, 52–62.
30. Abreu, D.; Pearce, D.G.; Stacchetti, E. Toward a Theory of Discounted Repeated Games with Imperfect Monitoring. *Econometrica* **1990**, *58*, 1041–1063. [CrossRef]

31. Kreps, D.M.; Milgrom, P.; Roberts, J.; Robert, W. Rational cooperation in the finitely repeated prisoners' dilemma—ScienceDirect. *J. Econ. Theory* **1982**, *27*, 245–252. [CrossRef]
32. Siggelkow, N. Persuasion With Case Studies. *Acad. Manag. J.* **2007**, *50*, 20–24. [CrossRef]
33. Xiu, W.Y.; Ren, A.S. Development and Enlightenment of foreign agricultural product quality and safety traceability system. *Issues Agric. Econ.* **2008**, *1*, 206–210.
34. Deb, L.; Lee, Y.; Lee, S.H. Market integration and price transmission in the vertical supply chain of rice: An evidence from Bangladesh. *Agriculture* **2020**, *10*, 271. [CrossRef]