

# Study on the Evolution of the Coupling Relationship between Tourism and Agriculture in Guangdong Province under the Background of Rural Revitalization

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## ABSTRACT

Based on the relevant statistical data of tourism and agricultural development in Guangdong Province from 2010 to 2019, this paper constructs the index weight coefficient and coupling coordination degree model of agriculture and tourism, and analyzes the changes of the coupling coordination relationship between tourism and agriculture in Guangdong Province in the past decade. The results show that: (1) through the time series analysis of the comprehensive development level of tourism and agriculture, it can be concluded that the development level of tourism and agriculture in Guangdong Province shows the characteristics of general consistency in time series. In recent 10 years, Guangdong Province has experienced a cycle of advanced agricultural development, synchronous development, advanced agricultural development and advanced tourism development. (2) In the past 10 years, the degree of coupling and coordination between tourism and agricultural development in Guangdong Province has continuously improved, spanning five levels, from mild imbalance to good coordination.

**Keywords:** Rural vitalization tourism; Agriculture; Industrial integration; Coupling and Coordinated Development

## 1.INTRODUCTION

The strategy of Rural Revitalization was first put forward in the 19th CPC National Congress. This strategy is of great significance to solve the problems of unbalanced rural development and lagging rural economic development. Realizing Rural Revitalization and urban-rural integration through rural tourism is of great practical significance to increase farmers' income and rural industrial upgrading. Urban agriculture developed in suburban areas not only provides urban residents with excellent agricultural and sideline products and beautiful ecological environment, but also provides people with a place for leisure tourism and farming experience, so as to realize the highly intensive and multi-functional development of agriculture <sup>[1-3]</sup>. The content and form of leisure agricultural tourism have brought more leisure and entertainment space for urban residents from the initial simple farmhouse and orchard picking mode to today's ecological farmhouse and cultural and Creative Park <sup>[4-7]</sup>. Since 2010, the national leisure agriculture and rural tourism demonstration county (point) activities carried out by the Ministry of agriculture and

China Tourism Administration have played a positive role in exploring the development model of agricultural tourism and rural tourism, innovating the system and mechanism, and providing direction and guidance for the healthy development of agriculture and rural tourism in China <sup>[8]</sup>.

Through literature review, scholars mainly studied the relationship between rural tourism and leisure agriculture <sup>[9-13]</sup>, conducted in-depth research on the coupling between ecological agriculture and ecotourism, and further explored the empirical research on tourism and agriculture <sup>[13]</sup>. Based on the above research results, scholars have done more research on the coupling and coordination of rural tourism, leisure agriculture, ecotourism and ecological agriculture, and the research on the relationship between them focuses on their mutual promotion and common development. In terms of research methods, quantitative research is less; In terms of the current research content, most scholars focus on one of leisure agriculture and rural tourism, and there is relatively little collaborative research between them.

## 2.OVERVIEW AND DATA SOURCES OF THE STUDY AREA

### 2.1 overview of the study area

Guangdong is located in the southernmost part of Chinese mainland. It has been rich in China since ancient times. Pearl River Delta and Hanjiang Delta are fertile land. Guangdong is a home of overseas Chinese with inclusive culture. Its unique and diverse culture makes it a blending point of Chinese culture. Its history and culture have a long history, and it is also a window for China's reform and opening up. Guangdong Province has unique and diverse natural landscapes, including Danxia landform and high-quality beaches represented by Danxia Mountain and Jinjiling. The unique Hakka culture in eastern Guangdong has also become a tourist hotspot in recent years. In 2018, Guangdong Province will promote the transformation of tourism industry from classic tourism to global tourism, from large-scale tourism to beautiful tourism, and accelerate the construction of "Guangdong Hong Kong Macao Bay world-class tourism area" and "World Tourism and leisure destination". According to the current situation, rural tourism has become a major emerging tourism form in recent years. In the middle of 2017 alone, Guangdong Province received 210 million tourists, and the overall revenue reached 68 billion yuan. Both the number of tourists and the revenue reached an all-time high. It can be seen that the development prospect of rural tourism is very broad.

The development of rural tourism has fully driven the development of regional economy, effectively improved the rural industrial structure, and can further help farmers achieve higher economic benefits. It is an important way to drive the development of rural economy at present. Focusing on the development of high-quality agriculture in the special zone, vigorously adjust the agricultural industrial structure, guide the expansion of agricultural functions, strive to promote the development of tourism and leisure agriculture, actively build a number of tourism and leisure agricultural manors, and focus on promoting the development of leisure agriculture sector clusters. Leisure agriculture is gradually becoming a new growth point of agricultural economy in Guangdong Province.

### 2.2 data sources

According to the coupling coordination index system, this paper selects the relevant statistical data of tourism and agricultural development in Guangdong Province from 2010 to 2019. These data are from the content released by professional institutions such as the National Bureau of statistics.

## 3.COUPLING COORDINATION DEGREE MODEL AND EVALUATION INDEX SYSTEM OF TOURISM AND AGRICULTURE

### 3.1 Research methods

#### 3.1.1 Entropy method

In order to explain the indicators of tourism and agricultural system more accurately and objectively, this paper first uses the range method to standardize the original data, and then uses the entropy weight method to determine the weight of the index system.

- (1) Standardized processing of raw data. Due to the different dimensions of the selected original data, the significance of the positive and negative indicators is also different, so the data is standardized. The positive indicator indicates that the larger the value, the better. Therefore, if the taken indicator is a positive indicator, it is expressed by formula (1):

$$x'_{ij} = y_{min} + \frac{y_{max}-y_{min}}{maxx_{ij}-minx_{ij}} \cdot (x_{ij} - minx_{ij}) \quad (1)$$

The reverse index indicates that the smaller the value, the better. Therefore, if the index taken is a reverse index, it is expressed by formula (2):

$$x'_{ij} = 1 - \left[ y_{min} + \frac{y_{max}-y_{min}}{maxx_{ij}-minx_{ij}} \cdot (x_{ij} - minx_{ij}) \right] \quad (2)$$

- (2) Construction of each index weight. In order to reduce the error caused by people's subjective weighting of indicators, entropy method is selected to construct index weighting coefficient  $\alpha_i$ . The entropy method can objectively weight each index by using entropy according to the actual situation of each index. Where,  $P_{ij}$  represents the index value weight of the j-th index in the i-th year,  $E_j$  represents the entropy of the j-th index,  $W_j$  represents the weight of the j-th index, which can be expressed as follows:

$$P_{ij} = x'_{ij} / \sum_{i=1}^m x'_{ij} \quad (3)$$

$$E_j = -k \sum_{j=1}^m f_{ij} \cdot \ln f_{ij}, \quad k = 1 / \ln m \quad (4)$$

$$W_j = \frac{1-E_j}{n-\sum_{j=1}^n E_j} \quad (5)$$

Among them, the matrix constructed by each index weight  $W_j$  is the value of weight coefficient  $\alpha_i$ . In the tourism system, the weight coefficient of the number of travel agencies and tourism colleges is large, which shows that it has a relatively large impact on the comprehensive development index of the tourism system; In the agricultural system, the weight coefficients of rural residents' consumption level, total sown area of crops and grain yield are large, that is, they have a relatively large impact on the comprehensive development index of the agricultural system.

- (3) Calculation of comprehensive development index. After standardizing each index, the comprehensive development index of each system is obtained by summing the product of each index weight. The comprehensive development index  $F(x)$  of tourism system and the comprehensive development index  $g(y)$  of agricultural system can be expressed by the following formula:

$$f(x) = \sum_{j=1}^n a_i \cdot x'_{ij} \quad (6)$$

$$g(y) = \sum_{j=1}^n a_i \cdot y'_{ij} \quad (7)$$

### 3.1.2 Coupling coordination model

Based on the coupling concept and coupling model, this paper obtains the overall calculation formula through a series of calculations, which is specifically shown as follows:

$$C = 2\sqrt{f(x)g(y)} / [f(x) + g(y)] \quad (8)$$

$$T = \alpha f(x) + \beta g(y) \quad (9)$$

$$D = \sqrt{C \times T} \quad (10)$$

(8) Is the formula for calculating the coupling degree, in which  $C$  is the coupling degree of the system. On this basis, the development of these two industries is

expressed in the form of function. Since the coupling degree mainly measures the correlation degree between systems, and the coordination degree between systems cannot be measured, the coupling coordination degree function is also introduced here, that is, on the basis of calculating the coupling degree, the coordination development degree between systems can be further measured. (9), (10) is the formula for calculating the coupling coordination, and  $D$  represents the coordination degree;  $T$  represents the comprehensive coordination index of tourism industry and agriculture; Although the development of tourism industry promotes the development of agriculture, tourism is not the only driving force of agricultural development. Here, with reference to the previous research results, it is necessary to  $\alpha$ ,  $\beta$  Assign values of 0.6 and 0.4 respectively.

The coupling coordination degree  $D \in [0,1]$  obtained from the calculation formula of coupling coordination degree. The greater the value of  $D$ , the higher the coupling coordination degree between tourism industry and agricultural growth, and the more benign interaction and coordinated development between them; On the contrary, the more obvious the value of  $D$ , the worse the degree of coupling and coordination between the two. In order to observe more intuitively, the coupling coordination degree is divided into ten levels in this paper. See the table below for details.

**Table 1.** Classification Standard of Coupling Coordination Degree

Serial number	Coordination degree	Coordination level	Serial number	Coordination degree	Coordination level
1	0-0.10	Extreme disorder	6	0.501-0.60	Reluctantly coordinate
2	0.101-0.20	Severe imbalance	7	0.601-0.70	Primary coordination
3	0.201-0.30	Moderate disorder	8	0.701-0.80	Intermediate coordination
4	0.301-0.40	Mild disorder	9	0.801-0.90	Good coordination
5	0.401-0.50	Verge of disorder	10	0.901-1.00	High quality coordination

### 3.2 Construction of index system

The development of agriculture and tourism is affected by many factors. Combined with the principles of scientific and availability of data, in order to fully, objectively and comprehensively reflect the development level and integration degree of agriculture and tourism in Guangdong Province, using the existing research results

for reference, the indicators are selected and constructed from different angles and processed dimensionlessly. With the help of entropy method, It can determine the weight of each index, and on this basis, it can effectively build the coupling degree model of tourism and agriculture in Guangdong Province. The system elements of tourism and agriculture are complex. The index setting in this paper mainly includes the resource endowment, operation scale, operation efficiency and resource

utilization of the two industries<sup>[14-16]</sup>. According to the above principles and drawing on the existing theoretical basis, the comprehensive evaluation index system of the two industrial subsystems of tourism and agriculture in Guangdong Province is constructed, as shown in Table 2. Among the nine indicators included in the tourism system, domestic tourism revenue, domestic tourist arrivals, international tourism revenue and inferior overseas tourists reflect the resource endowment and tourism attraction effect of the tourism industry, and the operating revenue of tourism enterprises, the number of travel agencies, the number of star hotels and other indicators reflect the reception capacity and service quality of the local tourism industry, The number of tourism enterprises and tourism staff can effectively reflect the overall

development of tourism. Among the nine indicators included in the agricultural system, the total output value of the primary industry, the total output value of agriculture, forestry, animal husbandry and fishery, and the grain output indicators reflect the economic output of agriculture, the number of employees in the primary industry reflects the employment support of agriculture, and the total sowing area of crops, the effective irrigation area of cultivated land and the total power of agricultural machinery reflect the investment in agricultural modernization and the utilization rate of agricultural resources, And through the per capita net income and consumption level indicators of rural residents to reflect the rural economy.

**Table 2.** Evaluation index system and weight of coordinated development of agriculture and tourism in Guangdong Province

Target layer	Evaluation index layer	Weight
Tourism development system	Domestic tourism revenue (100 million yuan)	0.153234
	Tourism Foreign Exchange Income (100 million yuan)	0.077381
	Number of domestic tourists received (10000 person times)	0.103148
	Number of inbound tourists received (10000 person times)	0.103455
	Number of travel agencies (PCs.)	0.17046
	Number of star rated hotels	0.119765
	Travel agency employees (person)	0.145388
	Number of Tourism Institutions	0.182849
Agricultural development system	Growth value of primary industry (100 million yuan)	0.110155
	Total output value of agriculture, forestry, animal husbandry and fishery (100 million yuan)	0.07896
	Per capita disposable income of rural residents (yuan)	0.115781
	Rural per capita consumption expenditure (yuan)	0.116276
	Total sown area of crops (1000 HA)	0.089318
	Number of agricultural employees (10000)	0.125339
	Total power of agricultural machinery (100 million kwh)	0.112659
	Grain output (10000 tons)	0.098277

## 4. EMPIRICAL ANALYSIS

### 4.1 Time series analysis of comprehensive

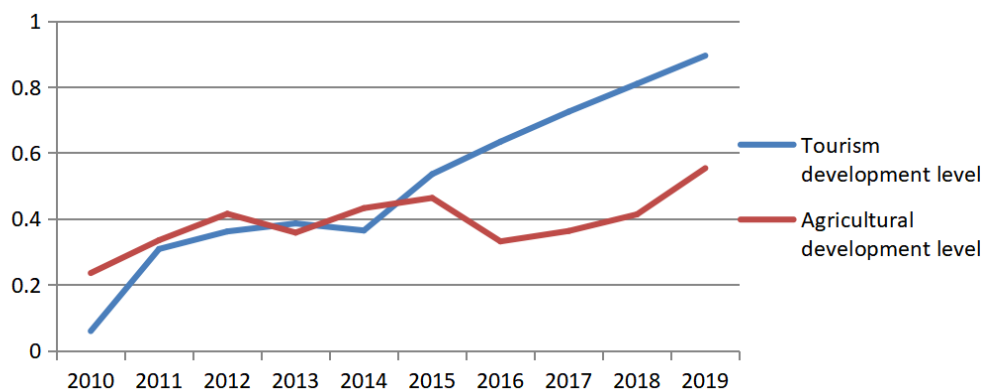
### *development level of tourism and agriculture*

The purpose of comprehensive development level evaluation is to study the development status and relative

development level of regional tourism system and agricultural development system. By analyzing the above model, we can effectively calculate the comprehensive evaluation index of tourism and agriculture in Guangdong Province, and use  $f(x)$  and  $G(y)$  to represent the development of these two industries respectively. It can be seen from Figure 1 that the development levels of tourism and agriculture in Guangdong Province are basically the same in time series, that is, after the development level of tourism is improved, the development level of agriculture will also develop in the same direction. In the three years from 2010 to 2012, tourism and agriculture are in the stage of rapid development, and the development of tourism is extremely rapid. This is because the convening of the 2010 Asian Games in Guangzhou has not only promoted the development of inbound tourism, increased tourism foreign exchange income, but also improved the tourism brand image and core competitiveness of Guangdong Province; In the three years from 2013 to 2015, there were small fluctuations in their development. This is because during these three years, natural disasters such as strong typhoon YUTE and Tiantu, heavy rainfall and major outbreaks of h7n9 avian influenza have had an adverse impact on agriculture. Although the Guangdong provincial government has made great efforts to fight the disaster, resume production in time and minimize the losses, so that the agricultural and rural economy has

remained basically stable throughout the year, the growth rate has dropped significantly; After 2015, the development level of tourism continued to improve, while the development of agriculture experienced a slow growth after two years of decline, and the development level has always lagged behind the tourism industry. This is due to the severe extreme weather and natural disasters caused by ElNino and LaNina in Guangdong in 2015-2016, which have a serious impact on most areas, As a result, the development of rural tourism has been restricted to a certain extent. Since 2017, Guangdong Province has carried out certain reforms in the regional agricultural structure, which has effectively promoted the development of agricultural economy and helped farmers improve their living standards.

Drawing on the relevant research results, this paper determines the type of coordinated development between tourism and agriculture according to the ratio of  $F(x)$  and  $G(y)$ : when the ratio is  $> 1$ , the development level of tourism is ahead of that of agriculture and in the leading stage of tourism development; When the ratio is less than 0.9, the regional agricultural development level is ahead of the tourism development level and in the leading stage of agricultural development; When  $0.9 \leq \text{ratio} \leq 1$ , the development of tourism and agriculture will remain at the same level, which shows that they are in the stage of synchronous development.



**Figure 1** Tourism Agriculture Comprehensive Evaluation Index of Guangdong Province from 2010 to 2019

It can be seen from table 3 that Guangdong Province has experienced a cycle of advanced agricultural development - synchronous development - advanced agricultural development - Advanced Tourism Development in recent 10 years. From 2010 to 2014, although Guangdong's tourism industry grew rapidly relying on a large number of tourism resources and the holding of large-scale international events, since the 12th Five Year Plan, Guangdong's agricultural modernization has made significant progress and become a large modern agricultural province. Guangdong accounts for about 2% of the national cultivated land area, about 6% of the total agricultural output value and about 10% of the agricultural added value. Therefore, the development

type of the two in the past four years is a cycle of advanced agricultural development, synchronous development and advanced agricultural development; After the "one belt, one road" cooperation strategy was released, the Guangdong provincial government was also very concerned about the development of tourism. From 2015 to 2018, Guangdong Province has successively issued a series of effective tourism policies and notices. With the help of these policies, all rural areas have legal support for the development of tourism, and have sufficient power in the process of development. Therefore, from 2015 to 2019, Guangdong Province entered the leading stage of tourism development. At this stage, the development of agriculture in Guangdong

Province is in the critical period of transformation and upgrading. While improving agricultural production, we should further combine tourism and agriculture to make

rural tourism a part of driving agricultural development, so as to make Guangdong Province enter the stage of simultaneous development of tourism and agriculture.

**Table 3.** Tourism - agricultural development types in Guangdong Province from 2010 to 2019

Year	the Type of Development
2010	Advanced development stage of Agriculture
2011	Synchronous development stage
2012	Advanced development stage of Agriculture
2013	Synchronous development stage
2014	Advanced development stage of Agriculture
2015	Advanced development stage of Tourism
2016	Advanced development stage of Tourism
2017	Advanced development stage of Tourism
2018	Advanced development stage of Tourism
2019	Advanced development stage of Tourism

#### 4.2 Time series analysis of tourism and agriculture coupling degree and coupling coordination degree

The purpose of coupling coordination evaluation is to measure the efficiency of interaction and mutual promotion between tourism development system and agricultural development system. The higher the degree

of coupling and coordination, the higher the level of coordinated development of the two systems. According to the calculation results of formulas (8), (9) and (10), the change characteristics of coupling degree and coupling coordination scheduling of tourism and agricultural Convention and exhibition system in Guangdong Province in recent 10 years are obtained, as shown in Table 4.

**Table 4.** Analysis on coupling coordination degree of tourism and agriculture in Guangdong Province from 2010 to 2019

particular year	Coupling degree ( C )	Coupled co scheduling ( D )	Coordination level
2010	0.8006	0.3429	Mild disorder
2011	0.9991	0.5666	Reluctantly coordinate
2012	0.9976	0.6222	Primary coordination
2013	0.9993	0.6094	Primary coordination
2014	0.9964	0.6298	Primary coordination
2015	0.9974	0.7056	Intermediate coordination
2016	0.9495	0.6768	Primary coordination
2017	0.9429	0.7160	Intermediate coordination
2018	0.9460	0.7604	Intermediate coordination
2019	0.9718	0.8388	Good coordination

From the value of coupling degree, the coupling degree C between tourism and agriculture in Guangdong Province has fluctuated and increased in the past decade, and the value is high, indicating that the interaction and influence between tourism and agriculture in Guangdong Province is obvious; From the value of coupling coordination degree, the coordination degree of tourism and agriculture is general, which shows that although the relationship between them is close, the two systems do not form a virtuous circle of mutual promotion. In the past decade, the coupling and coordination level of tourism and agriculture in Guangdong Province has crossed five levels. In the two years from 2010 to 2011, although both tourism and agriculture in Guangdong Province were developing continuously, the Coupled co scheduling D was between 0.3-0.5, and the coordination was poor, indicating that the two industries were seriously disconnected from each other and did not realize complementary advantages. In the three years from 2012 to 2014, the two have always been in the primary coordination state, which has improved compared with the previous two years, but they are still in a low state; In the four years from 2015 to 2018, the coupling level of the two has transitioned from primary coordination to intermediate coordination.

From 0.3429 in 2010 to 0.8388 in 2019, the coupling and coordinated development of the two systems has been significantly improved. This process shows that the interaction between tourism and agricultural system in Guangdong Province is increasing, the integration is more optimized, and gradually develops towards high-level coordination. Firstly, the tourism development level of Guangdong Province has been greatly improved in the past decade. On the one hand, the rapid development of tourism has attracted a large number of employed people and alleviated the local employment pressure; On the other hand, the development of tourism has also promoted the upgrading of rural industrial structure and brought greater development space to agriculture and rural areas. Secondly, the development of agriculture also widens people's travel space and meets the needs of people to return to the countryside and experience rural life. Leisure agriculture, rural tourism and other business forms also increase the supply of tourism products and make them more diversified, so as to further meet the needs of tourists.

## 5.CONCLUSION

Based on the panel data of Guangdong Province from 2010 to 2019, this study constructs the coupling coordination degree model of tourism and agriculture, and analyzes the coupling coordination between tourism and agriculture in Guangdong Province in recent ten years. The main conclusions are as follows:

(1) the development level of tourism and agriculture in Guangdong Province shows overall consistency in time series, As a whole, it has experienced the cycle of advanced development of agriculture, synchronous development, advanced development of agriculture and advanced development of tourism

(2) In the past 10 years, the degree of coupling and coordination between tourism and agricultural development in Guangdong Province has continuously improved, spanning five levels, from mild imbalance to good coordination.

## 6.DISCUSSION

Through the study on the evolution of the coupling and coordination level between tourism and agriculture in Guangdong Province, it is found that the development between the two systems has not yet reached a good integrated development. Combined with the data of coupling degree and coupled co scheduling, the two systems are closely related, but do not form a benign circle of mutual promotion. The main reasons are as follows: first, the combination of tourism and agriculture is too single, Without deep design excavation, it is easy to bring tourists bad experience and lack of attraction; Secondly, the integration of tourism and agricultural industry is low. In the process of promoting rural tourism, we should not only combine the relevant characteristics of agriculture, but also fully meet the needs of tourists; Finally, the business model is single and limited. At present, agricultural tourism has not formed a large-scale operation, mainly the development of individual buildings. The overall scale is small, large resorts and entertainment places have not been formed, and there is no professional system to restrict and standardize the business model and standards of agricultural tourism.

In view of the above situation and reasons, this paper puts forward some countermeasures and suggestions. First, while vigorously developing tourism and agriculture and promoting the integration of tourism and agriculture, we should pay attention to the top-level design, build a collaborative management system of various departments, and formulate relevant systems and regulations. The government should provide hardware and software support for the integration of agriculture and tourism, and strive to improve the development level of agricultural tourism; Second, innovate more tourism products and fully combine the local agricultural culture, so as to maximize the integration between agriculture and tourism and ensure the diversified development of agricultural tourism. In the process of development, it is necessary to reasonably allocate and layout rural land, and plan the local agriculture, tourism accommodation, catering, etc., to form a complete supporting system, so as to form a scale advantage; Finally, to strengthen the

integration of tourism and agriculture, we should also pay attention to the output of culture. Agricultural tourism presents lifestyles such as breeding and farming. Different regions have different agricultural cultures and rich forms of expression. We should deeply develop the agricultural culture belonging to Guangdong Province, so as to achieve the output of a culture and give tourism products vigorous vitality and unique connotation.

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