



## Data Intelligence-Driven Development Strategies for the Integration of Agriculture, Culture, and Tourism in Yijun County

Yinning Ye<sup>1,\*</sup>

<sup>1</sup> Xi'an FanYi University, Xi'an, Shaanxi, 710105, China

**SUMMARY:** *Agriculture, Culture and Tourism integration means the integration of agricultural production, culture's heritage preservation roles, and tourism for recreation purpose to form a new industry. In this article, the author discusses the intelligent data mechanism of agricultural culture and tourism integration and establishes the evaluation index system for the integrated industry of agricultural culture and tourism. The study utilizes the case of Yijun County between 2015 to 2024 to illustrate how the entropy weight, coupling coordination index, and spatiotemporal development are studied. Lastly, geographical detector approach is employed to understand the influencing factors on the agriculture-culture-tourism integration. The results show a general upward development trend in Yijun County's agricultural tourism from 2015 to 2024, while the overall coordination and coupling relationship between the two was largely unbalanced within its towns and villages. Geographically, the coordination level follows a pattern that is "weak western area, strong eastern area; high southern area, low northern area." Absolute and relative disparities in development are declining but still obvious. In the Moran Index test, Global Moran's I is always statistically significant at the 5% level, indicating a high positive spatial correlation.*

**KEYWORDS:** *Integration of Agriculture, Culture, and Tourism; coupling coordination degree model; entropy method; geographic detector; spatiotemporal evolution trends*

### 1 Introduction

With the implementation of reform and opening-up policies for over four decades, China's overall national power has increased, and the agriculture, rural areas, and farmers sector has also undergone a new era of development. Overall, China's rural economy still faces three "insufficiencies": agriculture is not strong enough, rural areas are not beautiful enough, and farmers are not wealthy enough [1]. To address these issues, the rural revitalization policy has been formulated by the Chinese government. Following the proposal of the rural revitalization policy, the policy has emerged as a vital national initiative [2, 3]. Integrated urban-rural development is an essential requirement of Chinese-style modernization. By advancing comprehensive rural revitalization and new-type urbanization, China strives to address the issues of development inequality between urban and rural areas and the underdevelopment of agriculture and rural areas to achieve integrated urban-rural development [4].

For the industries to flourish and the objectives of the rural revitalization strategy to be fulfilled, it is imperative to carry out the reforms in the supply side of the agricultural sector and fully exploit the cultural components of rural society. The fusion of agriculture, culture, and tourism emerges as an essential means through which the strategy of rural revitalization

\*yeyinning@126.com

<https://doi.org/10.65102/is2026136>

can be successfully implemented [5-7]. Following the principle of integration of agriculture, culture, and tourism, it is crucial to embrace the spirit of preserving and sustaining the Chinese traditional farming culture. Herein, the fundamental aspects of rural culture need to be harmoniously incorporated into the tourism industry, ensuring that the three sectors blend together seamlessly within rural settings [8].

Located within the administrative district of Tongchuan City in Shaanxi Province, Yijun County is located between Weibei Plain and the Shaanbei Basin in a land of hills and valleys. It has its capital city located at the intersection between the temperate cool humid climate area of the central ridges and the temperate cold humid climate area of the western mountains, forming a landscape of valleys with central ridges. The physical features form the basis for the unique landscape of the area. As a result of the location in the warm temperate zone, the area enjoys abundant flora with a vegetative cover rate of 91.80% and a forest cover rate of 48.10%. The county town has been developed around the ridges, surrounded by valleys that abound in plants, thus creating high coverage of urban greening. These rich sources of ecology are important elements for making distinct ecological spaces. Thus, the ecology of Yijun County can effectively be utilized to create distinctive urban spaces from an ecological perspective. Moreover, Yijun has been playing an important role as an intermediary transport point between Yijun and northern Shaanxi, which was an important transit point of the Silk Route where Eastern and Western cultures met, blended, and even clashed. The county has 1 national level, 3 provincial level, 4 municipal level, and 18 county level cultural heritages sites. The historical and cultural resources are widespread, ranging from sculpture caves to historical buildings and traces left by man. This cultural heritage of history plays a very important role in building public spaces within the city and creating a firm basis for agriculture, culture, and tourism in Yijun County.

Industrial integration involves integration between different industries or among the upstream and downstream industries in the same industrial chain. Industrial integration is considered to be an innovative development wherein the boundaries between different industries disappear when they attain certain stages of development in order to meet growth [9]. With the constant emergence of technological innovations, industrial integration breaks down barriers between different sectors, promotes competition between industries, and boosts efficiency [10]. Gonzo, F. defines industrial integration to refer to the integration of different sectors that have nothing to do with one another in terms of their products, but which have adopted similar technologies for resource optimization among technology, markets, and industries [11]. Pourzakarya, M. carried out extensive studies on the benefits of industrial integration and found that this practice can break barriers between industries through technology innovation [12].

Similarly, industrial integration is seen as a very important factor that affects the creation of the economic structure in tourism industry economy and helps to upgrade the tourism industry [13]. According to Jin, C, the tourism industry economy integration should be considered an inevitable trend of development in the tourism industry economy and can be described as the collision between sub-elements of different industrial systems, competing, and rearranging during dynamic transmission within the open system of tourism to eventually form a new industrial system [14]. It should be noted that tourism industry integration usually refers to the mutual influence and entwining of tourism industry with another industry or between different parts of the tourism industry itself to create a unified whole that finally develops into a new industrial system. There are basically three categories: industrial penetration, industrial crossover, and industrial restructuring [15, 16]. Based on empirical analysis using CFPS data, Qi, L found that tourism industry integration substantially raises rural residents' incomes, reduces the urban-rural gap, and resolves the endogeneity problem through lag effects [17].

Kubickova, M and Martin, D argue that cultural industries and tourism share overlapping production factors and industrial chains [18]. The optimization and upgrading of tourism relies on the support and empowerment of cultural resources, while the dissemination and preservation of cultural elements depend on tourism's promotion and facilitation. Therefore, many researchers have done extensive studies about the interaction, interlinking, and complementary growth of cultural industries and tourism sectors. As far as the studies concerning cultural tourism resource development are concerned, K. Król and D. Zdonek investigated the situation concerning the state of cultural-tourism integration in Iran. Using the gap between tourism realities and expectations as an analytical framework, they found that local tourism development is influenced not only by government policies and the international environment but also by distinctive local cultural characteristics [19]. Carvalho, R et al. have studied the evolution of MED into creative tourism through the MED festival of Loulé, Algarve. This helped in promoting economic development, resulted in changing the tourism supply chain and also led to positioning it on the high-quality cultural tourism map that would provide not only seasonal but all-year round experiences [20]. The relationship between folklore and the tourism sector of Nigeria's Cross River State was investigated by Dixit, S. et al. Cultural-tourism integration policies were recommended for the area to achieve growth synergy in cultural industries and tourism [21]. Ezenagu, N. argued that distinctive cultural tourism products are created by leveraging cultural resources which boost destination competitiveness [22].

A fusion of agriculture, culture, and tourism that has taken place in the recent past, can be considered the manifestation of tourism convergence in this sector. This type of tourism integration is based on market demand from related industries, combining different resources, technology, and market elements and using them to improve innovation of agricultural and cultural tourism projects. The use of the above method enables the production of multi-dimensional tourist products that can satisfy various needs of modern consumers. [23-25]. Thus, agri-cultural-tourism integration aims at developing comprehensive tourism complexes, which will include multiple aspects of tourist experience, such as recreation, cultural entertainment, and learning activities [26]. According to Aithal, R et al., agri-tourism integration constitutes an innovative model for the rural economy's development. It will allow for achieving positive results in agriculture industry through its integration with tourism. Not only it will improve quality and efficiency of agricultural economic development, but it will also give rise to diversified agri-tourism products that will satisfy consumers' tourism consumption needs [27]. Hou, X et al. introduced a concept of revitalization in rural areas, integrating agriculture, culture, and tourism and allowing them to benefit each other and be ecologically sustainable [28]. A Lak and O Khairabadi performed research in pristine rural areas of Iran, performing a detailed analysis of the interaction between agriculture, tourism, and culture. The authors have proved that agriculture will contribute to the stimulation of tourism, thus facilitating economic development in rural areas, and culture as a means of promotion [29]. Karali, A et al., applied the concept of linear regression analysis in examining the level of coupling between agriculture and tourism. As a result, the researchers showed that agriculture and tourism are not individual sectors of the industry but may be integrated. Integrating these two sectors leads to the development of both [30].

Summing up the results of studies, we can conclude that research in agri-cultural-tourism integration is focused on management approaches, emphasizing mainly strategic approaches on a macro-level. Current research in the area of agri-cultural-tourism integration is mostly theoretical, considering mostly regional tourism sites without any micro-level studies in this sphere. Nowadays, when the digital intelligence era has come, the influence of the data and intelligent technologies on agri-cultural-tourism integration cannot be neglected. However,

research exploring the relationship between digital intelligence technologies and this integration remains scarce.

This study takes Yijun County, Shaanxi Province, as its research subject. It constructs a data-intelligence-driven mechanism for agri-cultural-tourism industry integration and establishes an evaluation index system for Yijun County's integrated development. In order to calculate the agri-cultural-tourism integration degree of Yijun County from 2015 to 2024, the entropy method and coupling coordination index model were adopted. Trend surface analysis, kernel density analysis, and Moran's I index were adopted to analyze the spatial-temporal evolutionary tendency of agri-cultural-tourism integration development of Yijun County. Finally, based on geographic probes, this paper analyzed the main factors that affect agri-cultural-tourism integration in three aspects: economics, society, and ecology. Policy suggestions have been drawn in view of the research results.

## 2 Data Intelligence-Driven Measurement Model for the Integrated Development of Agriculture, Culture, and Tourism Industries

### 2.1 Data Intelligence-Driven Mechanism for Integrating Agriculture, Culture, and Tourism Industries

The integration of agriculture, culture, and tourism is the result of multiple factors working in concert. Its mechanism of action can be analyzed from three perspectives: internal drivers, external drivers, and supporting forces, as illustrated in Figure 1.

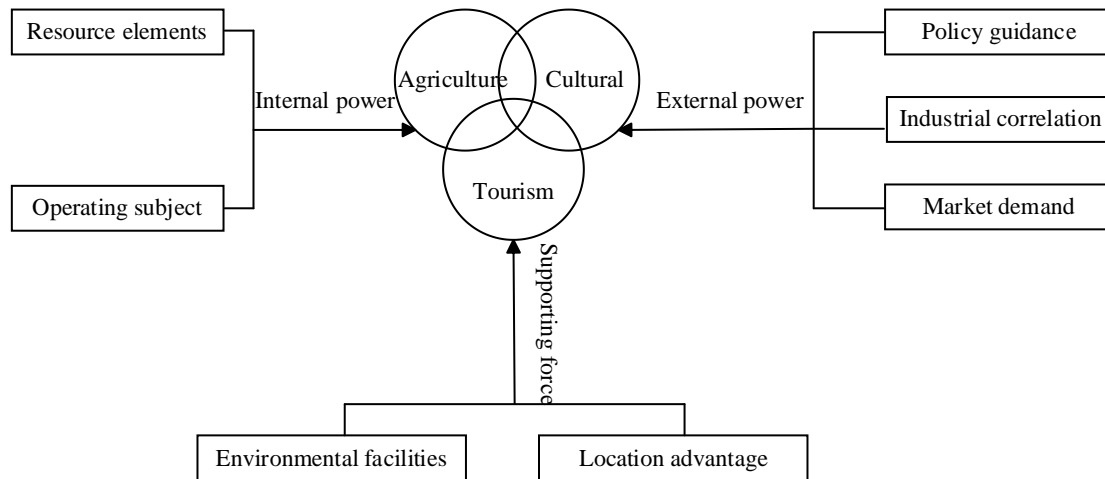


Figure 1: Dynamic mechanism for integrating agriculture, culture and tourism

#### 2.1.1 Internal Motivation

First, distinctive industrial resources serve as the core material element for the integration of agriculture, culture, and tourism, and also act as a vital vehicle for deepening the industrial chain. As these resources undergo cross-integration, new industrial chains emerge, driving industrial structure optimization and quality transformation.

Second, operational entities provide innovative support for agri-cultural-tourism integration. Driven by the rural revitalization strategy, agricultural transformation demands, and tourism expansion needs, governments have introduced policies to foster rural industrial integration. This has attracted agricultural enterprises, cultural tourism companies, and others to actively

transform and participate in agri-cultural-tourism projects, giving rise to new types of agricultural industry operators.

### 2.1.2 External Power

First, robust infrastructure serves as the cornerstone for integrating agriculture, culture, and tourism. Excellent external transportation access and hospitality facilities such as dining and lodging are crucial factors in attracting visitors to experience agritourism and cultural tourism projects. At the same time, industrial platform systems that have been constructed well can facilitate the joint development of agriculture, culture, and tourism. Such industrial platform systems consist of agricultural industrial parks, agricultural products processing parks, rural industrial development demonstration parks, and rural innovation and entrepreneurship parks.

Secondly, rural regions around urban places or transportation nodes enjoy certain strengths to promote integrated development of agri-culture and tourism. First of all, they have access to huge consumer markets, which offer assistance in such processes. Furthermore, by virtue of their geographic location, they are capable of generating an even stronger effect of urbanization on them, leading to closer ties between cities and rural regions.

### 2.1.3 Support Force

Firstly, the specific planning done by the government regarding industrial integration will be useful in integrating agriculture, tourism, and cultural industry. Policies relating to the integration of industry, land, and taxes are important for the development of agritourism.

Secondly, the culture industry makes an important contribution to the substance of agri-cultural-tourism integration. The folklore of the rural areas and farm activities are sources of materials for the culture industry. The tourist industry converts basic agriculture into agriculture-tourism, thus creating new markets for the same. Agriculture serves as an important source of material for tourism as well. There is a natural linkage between these industries, making it possible to complement each other's resource and share markets.

## 2.2 Development of a Coupling Coordination Degree Model for the Integrated Development of Agriculture, Culture, and Tourism

### 2.2.1 Entropy Method

#### (1) Dimensionalization Treatment

In this study, the range-standardization technique is adopted, whereby all the selected indices are positive indices. The standardization equation is presented as follows in (1):

$$X_{ij} = \frac{X_{ij} - \min(X_{ij})}{\max(x_{ij}) - \min(x_{ij})} \quad (i = 1, 2, \dots, n; j = 1, 2, \dots, m) \quad (1)$$

Here,  $X_{ij} (i = 1, 2, \dots, n; j = 1, 2, \dots, m)$  denotes the  $j$ th original indicator in the  $i$ th year.  $\max(x_{ij})$  denotes the maximum value among the indicators, while  $\min(x_{ij})$  denotes the minimum value.  $X_{ij}$  takes values within the range  $[0, 1]$ .

#### (2) Weight Calculation Using Entropy Method

The entropy method is an objective weighting scheme that measures the variation of the index. Entropy is an objective measure that captures the informational content of the data. An entropy value that is high implies low information content, while a low entropy value implies high information content [31]. In this study, after the data have been standardized, the entropy

method is applied to analyze the development of agriculture, cultural industries, and tourism in Yijun County, as illustrated in Equations (2) to (5):

$$P_{ij} = \frac{X_{ij}}{\sum_{i=1}^n X_{ij}} (j = 1, 2, \dots, m) \quad (2)$$

$$e_j = k \sum_{i=1}^n P_{ij} \ln P_{ij} \quad (3)$$

$$g_i = 1 - e_j \quad (4)$$

$$W_j = \frac{g_j}{\sum_{j=1}^m g_j} (j = 1, 2, \dots, m) \quad (5)$$

Among these,  $P_{ij}$  denotes the indicator value for the  $i$ -th year under the  $j$ -th indicator;  $e_j$  represents the entropy value of the  $j$ -th indicator;  $g_i$  signifies the difference coefficient of the  $i$ -th indicator; and  $W_i$  indicates the weight of the  $i$ -th indicator.

### 2.2.2 Design of the Indicator System and Determination of Weights

Based on the fundamental principles of input-output analysis, the comprehensive development index system for agriculture-culture-tourism three-dimensional industry chain is built. As seen from Table 1, this index system consists of three subsystems (agricultural industrial chain, cultural industrial chain, tourism industrial chain), two dimensions (factors of industry and output efficiency), and 18 individual evaluation indexes. The comprehensive development index system will be employed to assess the level of comprehensive development for the three-dimensional industry chain of agriculture-culture-tourism in Yijun County. The weights of all indices will be based on the degree of dispersion of the index; the greater the degree of dispersion of the index, the greater the index weight

Table 1: Evaluation index system and weight of integrated development of agriculture, culture and tourism

System	Sub-indicators	Specific evaluation indicators	Weight
Agricultural industry	Elements of agricultural industry	Agricultural employment	0.055
		Agricultural fixed assets investment	0.2125
		Tea garden area, orchard area	0.1203
	Agricultural industry performance	Per capita disposable income of rural residents	0.208
		Value added of agriculture, forestry, animal husbandry and fishery	0.221
		Total agricultural output value as a percentage of GDP	0.1832
Culture industry	Cultural industry elements	Number of cultural market institutions	0.1872
		Number of people employed in the cultural market	0.2107
		Culture and recreation costs	0.1645
	Cultural industry performance	Cultural market operating income	0.1347
		Number of performances in art performance venues	0.1576
		The proportion of cultural industry output value in GDP	0.1453
Tourism industry	Elements of tourism industry	Number of Grade A scenic spots	0.1515
		Number of star-rated hotels	0.1509
		Number of travel agencies	0.1527
	Tourism industry performance	Domestic and foreign tourist visits	0.2139
		Domestic and foreign tourism revenue	0.1758
		The proportion of tourism industry output value in GDP	0.1552

### 2.2.3 Coupling Coordination Model

This paper applies a coupling coordination degree model to study the extent of coordination between the three systems: agricultural system, cultural industries, and tourism. Through constructing a coupling degree model and a coupling coordination degree model, it calculates the degree of integration of the agriculture, cultural industries, and tourism systems.

#### (1) Computation of the Industrial Comprehensive Evaluation Index

The equation (6) for calculating the industrial comprehensive evaluation index is as follows:

$$u_i = \sum_{j=1}^m W_j P_{ij} \tag{6}$$

$u_i$  represents the comprehensive evaluation index for each industry. When  $i=1$ , it denotes agriculture; when  $i=2$ , it denotes the cultural industry; and when  $i=3$ , it denotes tourism. If  $u$  is high, then the development level of the subsystem will be considered to be good, and vice versa if  $u$  is low.

#### (2) Determination of the Coupling Level

The coupling level model determines the level of interaction and dependence between two or more subsystems, thereby revealing the degree of interdependence and mutual constraint among them. Therefore, this paper treats agriculture, cultural industries, and tourism as a coupling process among three systems. Let  $C$  represent the coupling degree among the three subsystems, where  $u$  is the comprehensive evaluation function for each subsystem's industry, as shown in Equation (7).

$$C = \frac{\sqrt[3]{u_1 + u_2 + u_3}}{u_1 + u_2 + u_3} \quad (7)$$

Calculations using this formula show that  $C \in [0,1]$ . The larger the value of C, the better the coupling state among agriculture  $u_1$ , cultural industries  $u_2$  and tourism industry  $u_3$  become more stable. Conversely, a smaller C value indicates instability in the coupling state among agriculture  $u_1$ , cultural industry  $u_2$  and tourism industry  $u_3$ .

The coupling coordination degree is employed to assess the extent of development coordination between different bodies. Hence, it could be employed to carry out an overall evaluation of the whole system, thus indicating the degree of coordination between the three subsystems: agriculture, cultural industry, and tourism, and the effectiveness of their coupled development. The formula for calculating the coupling coordination degree D is as follows (8).

$$D = \sqrt{C \times T} \quad (8)$$

$$T = \alpha u_1 + \beta u_2 + \gamma u_3 \quad (9)$$

In this case, D stands for the coupling coordination index. The larger the number, the greater the symbiotic coupling between the three systems, which implies that there is high integration. Conversely, a lower value suggests poor coupling coordination and a low level of integration among these sectors. When D equals 0, it indicates a state of severe imbalance among agriculture, cultural industries, and tourism. When D equals 1, it signifies an optimal state of coordination among these three sectors.

T represents the comprehensive coordination index for agriculture, cultural industries, and tourism, reflecting their overall development level.  $\alpha, \beta$ , and  $\gamma$  are the undetermined coefficients for the comprehensive evaluation indices of agriculture, cultural industries, and tourism, respectively. This paper treats agriculture, cultural industries, and tourism as equally important, so  $\alpha = \beta = \gamma = 1/3$ . Considering the coupling coordination degree falls within the interval [0, 1], the coupling coordination degrees of agriculture, cultural industry, and tourism can be classified into 10 categories according to their numbers, as illustrated in Table 2 below:

*Table 2: The range of values for the degree of coupling coordination*

Serial number	Range of values	Degree of coupling and coordination
1	0.00~0.09	Extreme dislocation
2	0.10~0.19	Major maladjustment
3	0.20~0.29	Moderate intoxication
4	0.30~0.39	Mild impairment
5	0.40~0.49	On the verge of breakdown
6	0.5~0.59	A patchwork of efforts
7	0.6~0.69	Primary coordination
8	0.70~0.79	Intermediate coordination
9	0.80~0.89	Good coordination
10	0.90~1.00	Quality coordination

## 2.3 Spatial Analysis Methods for the Level of Integrated Development in the Agriculture-Culture-Tourism Industry

### 2.3.1 Trend Surface Analysis

Trend surface analysis assumes that spatial coordinates already contain location information for target variables. By establishing regression equations between target variables and spatial coordinates, it reflects the influence of location factors on target variables [32]. Assume that in a two-dimensional Euclidean space, there exists a sample  $z_i(a_i, b_i), i = 1, 2, \dots, n$  with location coordinates  $(a_i, b_i)$  in the space. The trend surface model can be expressed as:

$$z_i(a_i, b_i) = \hat{z}_i(a_i, b_i) + \epsilon_i \quad (10)$$

where  $\epsilon_i$  represents the random disturbance term, and  $\hat{z}_i(a_i, b_i)$  denotes the estimated trend surface equation.

The trend surface equation primarily employs polynomial regression equations but may also be replaced by any function where the coordinates  $(a_i, b_i)$  serve as explanatory variables:

$$\hat{z}_i(a_i, b_i) = \beta_{00} + \beta_{10}a_i + \beta_{01}b_i + \beta_{20}a_i^2 + \beta_{11}a_ib_i + \dots + \beta_{pq}a_i^p b_i^q \quad (11)$$

Among these,  $\beta_{00}$  to  $\beta_{pq}$  are all polynomial coefficients to be estimated, where  $p$  and  $q$  denote the degrees of the polynomials.

### 2.3.2 Kernel Density Estimation

Kernel density estimation is a nonparametric statistical method. Unlike other estimation techniques, it does not rely on prior knowledge about the data distribution and imposes no assumptions on the distribution. Instead, it directly analyzes the characteristics of the data distribution based on the sample data itself. Consequently, kernel density estimation exhibits weaker dependence on the data and yields more robust results. Suppose  $x_1, x_2, \dots, x_n$  are  $n$  independent and identically distributed sample points from distribution  $F$ , with probability density function  $f(x)$ . The kernel density estimation function is given by Equation (12):

$$\left\{ \begin{aligned} f(x) &= \frac{1}{n} \sum_{i=1}^n K_h(x - x_i) = \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x - x_i}{h}\right) \\ K(x) &= \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{x^2}{2}\right) \end{aligned} \right. \quad (12)$$

In equation (12),  $N$  denotes the total number of observations;  $x$  represents an observation;  $\bar{x}$  is the mean of all observations;  $K(x)$  is the kernel density function; and  $h$  is the bandwidth. A larger bandwidth results in a smoother density function but lower estimation precision. Conversely, a smaller bandwidth yields a less smooth density function but higher estimation precision.

### 2.3.3 Moran's I Index

Global and local Moran's  $I$  indices form Moran's  $I$  index. The former measures spatial

correlation or outlier of the area as a whole in terms of whether the variable is similar, different, or unrelated throughout the entire region. On the other hand, the latter indicates the exact sites at which there exists spatial correlation or outlier. First, the global Moran's  $I$  index is used in this paper to investigate the spatial autocorrelation and pattern of the degree of coordination in the integration of three industries of agriculture, culture, and tourism. Then the local Moran's  $I$  index is adopted for localized spatial autocorrelation analysis, represented as:

$$I = \frac{\sum_{i=1}^n \sum_{j+i}^n w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{S^2 \sum_{i=1}^n \sum_{j+i}^n w_{ij}} \quad (13)$$

$$I_i = \frac{x_i - \bar{x}}{S^2} \times \sum_{j=1}^n w_{ij} (x_j - \bar{x}) \quad (14)$$

$$S^2 = \sum_{j=1}^n (x_j - \bar{x})^2 / n \quad (15)$$

In the above equation,  $n$  denotes the number of observations,  $x_i$  and  $x_j$  represent the observations for regions  $i$  and  $j$  respectively,  $\bar{x}$  is the sample mean,  $S^2$  is the sample variance, and  $w_{ij}$  is the spatial weight matrix indicating whether spatial regions  $i$  and  $j$  are adjacent, where 1 denotes adjacency and 0 denotes non-adjacency.

### 3 Spatial-Temporal Evolution Trends in the Integrated Development of Agriculture, Culture, and Tourism Industries in Yijun County

#### 3.1 Calculation and Analysis of Integrated Development of Agriculture, Culture, and Tourism Industries in Yijun County

##### 3.1.1 Data Sources

All data/information regarding the evolution of agriculture, culture, and tourism industries in Yijun County from 2015 to 2024 will be collected in this study. Additionally, a method for measuring the level of integration of the three industries will be proposed and analyzed. Sources of primary data are the statistical yearbook of Yijun County and national economic bulletins.

##### 3.1.2 Comprehensive Development Evaluation Analysis of the Agri-Cultural-Tourism Industry

By applying the weight of each index as shown in Table 1, the comprehensive evaluation index and coupling coordination degree of the agricultural sector, cultural industry sector, and tourism industry sector in Yijun County from 2015 to 2024 can be determined, as displayed in Table 3. As a result, it is observed that the trend for developing the agriculture, culture industry, and tourism industries in Yijun County was growing positively from 2015 to 2024. In particular, the index value of agriculture grew from 0.5870 to 0.6014. In spite of some fluctuations during the middle years, the index maintained at a level higher than 0.5212. This development was mainly

due to the heavy investment by Yijun County in agricultural development, rapid development of distinctive modern agriculture, steady grain production, and agricultural green transformation. There was a growth in the comprehensive evaluation indicator of the cultural industry from 0.2070 to 0.8288, which makes the increment 0.6218. The reason behind this change is that the cultural industry is considered the main industry in Yijun County. Moreover, there is an improvement in constructing digital cultural tourism infrastructure and creating cultural tourism data resources networks.

*Table 3: Comprehensive evaluation index of agricultural culture and tourism from 2015 to 2024*

Year	Comprehensive evaluation index		
	Agriculture	Culture industry	Tourism
2015	0.5870	0.2070	0.3567
2016	0.6252	0.2237	0.4261
2017	0.6908	0.2525	0.4652
2018	0.5490	0.3055	0.3979
2019	0.5417	0.4276	0.3678
2020	0.5212	0.6231	0.5063
2021	0.5434	0.7426	0.6155
2022	0.6363	0.8195	0.4723
2023	0.5238	0.7672	0.4682
2024	0.6014	0.8288	0.5384

### 3.1.3 Coupling Coordination Degree Calculation Results

A heat map presenting the level of integration among agricultural, culture, and tourism sectors in various villages and towns in Yijun County is provided in Figure 2 below. As seen in the diagram, there is considerable disparity in terms of the level of integration of the industries among most of the towns and villages in Yijun County, which are mainly of three types of development.

(1) Sustained Development Towns. They include Yiyang Subdistrict, Peng Town, Tai'an Town, and Yaosheng Town. These kinds of towns will always rank first among those present in Yijun County when it comes to integration between agriculture, culture, and tourism sectors. Therefore, these towns become the leaders in the integration between the culture and tourism industry in Yijun County.

(2) Growth-Inhibited Cities. This group consists of Kuquan Town and Yunmeng Township. Although these towns present an encouraging upward trajectory concerning agricultural-tourism convergence, they have been adversely affected by the impact of the pandemic, thus displaying poor resilience in recovery. Therefore, they have not been able to develop at the desired pace in comparison to other cities. Such towns need to consolidate on the foundation of their development and integrate cultural and tourism industries for better growth.

(3) Undeveloped Cities. These include Wuli Town and Qipan Town, whose growth has been sluggish due to minimal agricultural-tourism convergence. They are considered weaker zones concerning industrial convergence in Yijun County because of various reasons, including geographical location, access to transportation networks, and economic development level. They require support from other cities to identify advantageous cultural and tourism resources and accelerate their development pace to catch up.

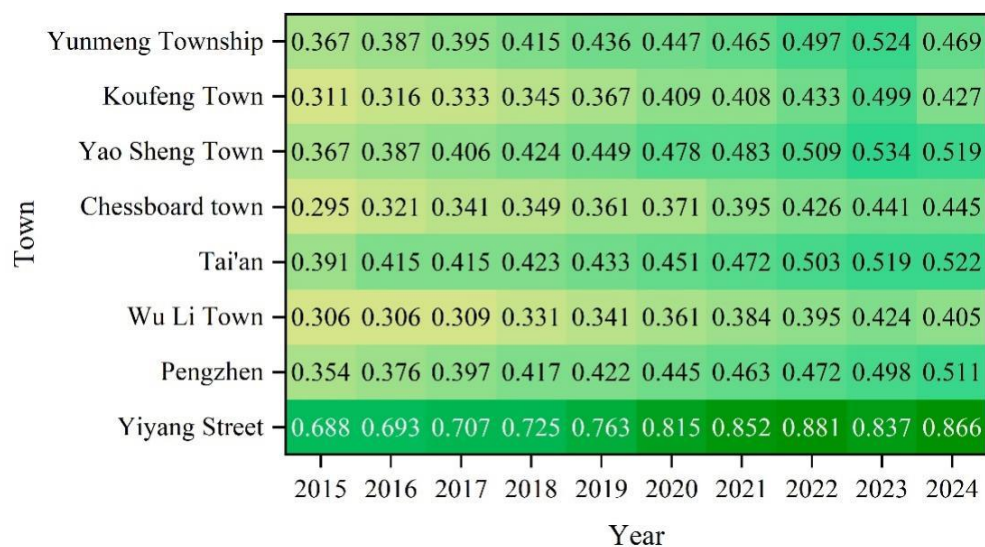


Figure 2: The integration level of agriculture, culture and tourism

## 3.2 Data Intelligence-Driven Spatiotemporal Evolution Patterns of Agri-Cultural-Tourism Industry Coupling

### 3.2.1 Spatial Trends in the Level of Integrated Development of Agriculture, Culture, and Tourism Industries

A trend surface visualization of the computed level of integration for the agriculture, culture, and tourism sectors in Yijun County from 2015 to 2019 and forecasted for 2024 is illustrated in Figure 3. In the Z-axis, the level of integration for the agriculture, culture, and tourism sectors is considered, while the X-axis and Y-axis correspond to the east-west and north-south directions, respectively.  $(x_i, y_i)$  stands for the spatial coordinates of the  $i$ th township, while  $Z_i(x_i, y_i)$  refers to the trend function for the level of integration for the agriculture, culture, and tourism sectors in the  $i$ th township. The blue line indicates the trend line for the east-west direction, and the green line represents the trend line for the north-south direction. The black clustered columns along the Z-axis represent the calculated integration levels for each township.

From the perspective of overall spatial distribution, the self-organizing and adaptive characteristics of the integrated “agriculture-culture-tourism” industry between 2015 and 2024 resulted in a spatial pattern characterized by “weakness in the west and strength in the east, high levels in the south and low levels in the north.” When looking at the west to east axis, it can be seen that the integration level rises in relation to eastward progression. In regard to the south to north axis, the trend line takes an inverted U-shape form, with the southern parts being more integrated than the northern ones.

Time series analysis has shown that the slope of the blue trend line (in terms of west to east movement) has become shallower, but on the other hand, the slope of the green inverted U-shaped trend line (in terms of south to north movement) has become steeper.

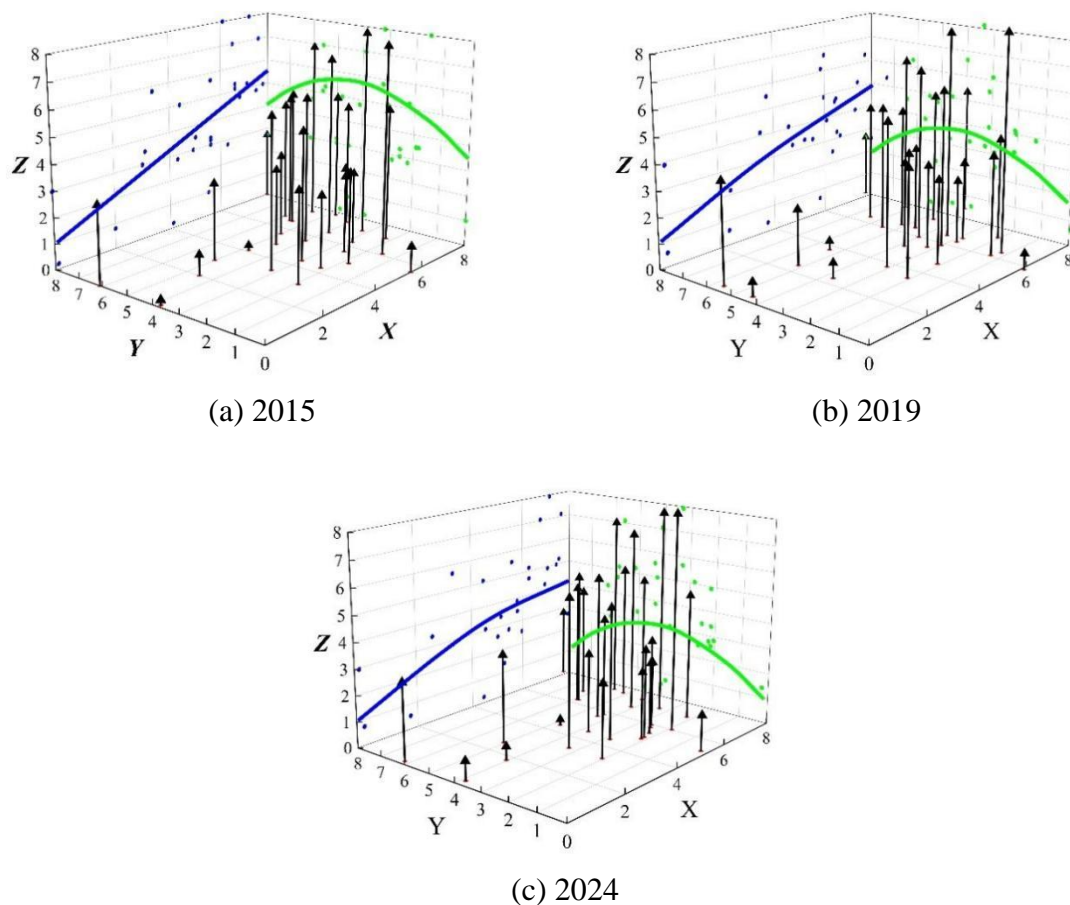


Figure 3: Spatial trend surface of agricultural culture and tourism industry integration level

### 3.2.2 Spatiotemporal Evolution Patterns of Agricultural-Cultural-Tourism Industry Coupling

In order to further explain the spatiotemporal evolution patterns of the interaction and coordination between agricultural, cultural, and tourism industries in towns within Yijun County, this study employs kernel density estimation to analyze the polarization characteristics and differences in their coordination evolution. Using Stata 17.0, the kernel density estimation results for their coupling coordination are presented in Figure 4.

Figure 3 presents several features in the dynamic development process of interaction and coordination between agricultural, cultural, and tourism industries:

(1) The general trend of coupling coordination between the two industries is clearly an upward one. According to the positional analysis of the kernel density distribution chart, in 2015, the distribution chart lies on the far left side of the diagram. Thereafter, the curve progressively moved towards the right-hand side with each passing year and finally reached the extreme right-hand side in 2024 when the level of coupling coordination between both sectors was highest. With regard to the degree of annual change, the biggest movement took place from 2015 to 2016, followed by the period from 2016 to 2017. Later on, the years from 2018 to 2024 witnessed clustered movement and uniform growth levels.

(2) The difference between urban and rural regions in Yijun County is showing signs of narrowing down. The distribution pattern of the annual curves reveals the presence of peak values that have shown fluctuations in the value of the coupling coordination index but also show an overall increasing trend. From the year 2015 to 2020, the peak values have shown a marked increasing trend, with the peak value being attained in 2020. From 2020 to 2024, the

peak values showed an overall decline in annual figures, with the peak values experiencing a sudden increase in the year 2020. When considering the distribution of the distribution curves per year, the distribution curve width has revealed a clear “widening then narrowing” trend throughout the past ten years.

(3) The disparity of coupling coordination between the two industries in townships within Yijun County decreases annually.

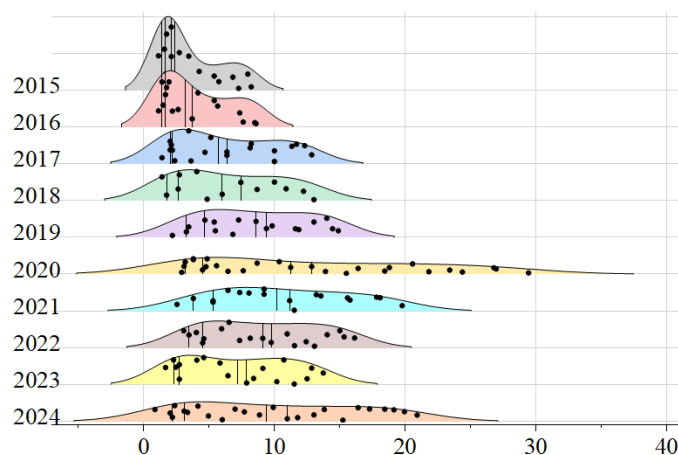


Figure 4: Dynamic evolution trend of nuclear density distribution

### 3.3 Spatial Aggregation of Integration Levels in Agri-Cultural-Tourism Industries

#### 3.3.1 Global Spatial Autocorrelation Analysis

Applying the global Moran's Index test for the spatial autocorrelation analysis of the integration development degree of "agriculture-culture-tourism" industry in all Chinese provinces from 2015 to 2024, the findings are presented in Table 4 below. The global Moran's Index values of the integration development degree of "agriculture-culture-tourism" industry in all Chinese provinces except 2023, under geographic distance spatial weight matrix, are significantly positive at the 5% level. It can be seen that there is strong spatial positive correlation between the integration development degree of "agriculture-culture-tourism" industry in different Chinese provinces.

Table 4: results of global spatial autocorrelation analysis

Year	Moran's index	P	Year	Moran's index	P
2015	0.065	0.007	2020	0.055	0.015
2016	0.059	0.009	2021	0.041	0.041
2017	0.056	0.013	2022	0.041	0.041
2018	0.058	0.011	2023	0.017	0.167
2019	0.058	0.011	2024	0.039	0.047

#### 3.3.2 Local Spatial Autocorrelation Analysis

With regard to the global spatial autocorrelation, it is difficult to define the relationship of autocorrelation inside each spatial unit. Thus, this paper adopts local spatial autocorrelation analysis further for investigating the connectivity of the combined development degree of the three industries in terms of “agriculture, culture, and tourism” in the towns of Yijun County.

Through the use of the Moran's scatter plots coupled with the analysis of LISA aggregation map, the spatial pattern of "agritourism-cultural tourism" integration can be classified into the following case: H-H Aggregation Pattern: It shows the "agritourism-cultural tourism" integration is at a high level in both the county itself and the adjacent towns, creating an area of high-level aggregation in this industry. The L-L pattern: There is a low level of integration within both the county and its adjacent towns, thus forming a low-level agri-cultural-tourism complex. H-L and L-H patterns: In such configurations, there is a high level of integration at the center while there is a low one at the periphery.

As seen from Figure 5 below, Moran's dots have been illustrated for the spatial pattern of the integration degree of the "agriculture-culture-tourism" industries in different townships of Yijun County in 2015, 2019, and 2024. The figure clearly indicates that clustering occurs mainly in the first quadrant (H-H) and the third quadrant (L-L). This clearly indicates that the integration degree of the "agriculture-culture-tourism" industries in each township has some spatial clustering characteristics; towns with a higher integration degree tend to cluster with towns of similar degrees.

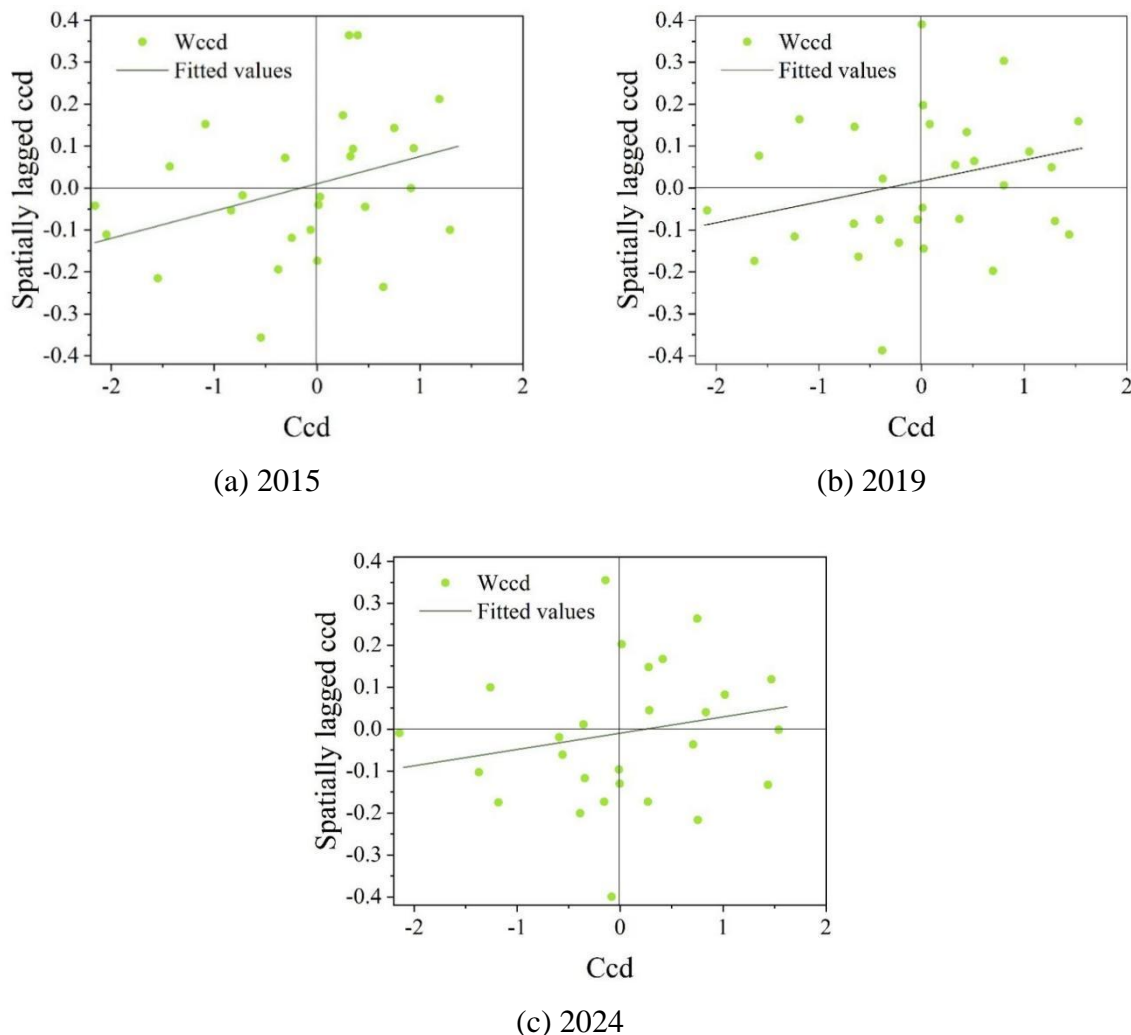


Figure 5: The level of integrated development of agriculture, culture and tourism industries

## 4 Driving Factors and Strategies for the Integrated Development of Agriculture, Culture, and Tourism Industries in Yijun County

### 4.1 Development of the Driving Factors Indicator System

As seen from the spatiotemporal evolution discussed above, the development process of the integrated agriculture-culture-tourism system is affected by many interdependent elements. According to previous research and existing information resources, there are mainly three types of factors that contribute to the integrated development: economic, social, and ecological. Ten indicators were selected for driving factor analysis across these dimensions, including economic level, government support, industrial structure, consumer demand, infrastructure, innovation level, transportation accessibility, environmental pollution, climate type, and moisture conditions, as shown in Table 5.

Table 5: Impact factor index system

Class	Affectoi	Metric
Economic factors	Economic level	Per capita GDP ( $X_1$ )
	Government support	Per capita financial expenditure ( $X_2$ )
	Industrial structure	The proportion of added value of the tertiary industry in GDP ( $X_3$ )
	Consumer demand	Per capita consumption expenditure ( $X_4$ )
Social factors	Infrastructure	Urban road area per capita ( $X_5$ )
	Innovation level	Tourism patent applications ( $X_6$ )
	Transportation level	Number of public transport vehicles per 10,000 people ( $X_7$ )
Ecofactor	Environmental pollution	PM2.5 concentration ( $X_8$ )
	Climate type	Average annual temperature ( $X_9$ )
	Dryness	Annual precipitation ( $X_{10}$ )

### 4.2 Drivers of Agricultural-Cultural-Tourism Integration Levels

#### 4.2.1 Factor Detection

In accordance with the findings from the geographic detector test, the impacting factors from all perspectives have significant effects on the spatial differentiation of integrated agricultural-cultural-tourism development in Yijun County, all of which have passed the significance tests as can be seen in Table 6 below. In the aspect of the ranking order of explanatory power, per capita consumption expenditure, and tourism patent applications ranked top three, with q-values exceeding 0.25. This suggests that these factors account for 25% of the variance in cultural tourism development, showing much greater explanatory strength than other factors and making them controlling factors. Factors like fiscal expenditure per capita, road area per capita, PM2.5 concentration, and temperature have lower q-values, thus considered general influencing factors. Other factors like GDP per capita, number of public buses per ten thousand, and annual rainfall have moderate explanatory strengths and thus can be regarded as dominant influencing

factors.

Concerning social variables, the impact of infrastructure has gradually increased, being statistically significant since 2015, which suggests that it is gradually developing into the determining variable impacting agricultural-cultural-tourism integration. The innovation indicator was found to be the strongest determinant in the case of Yijun County's agri-cultural-tourism integration, showing q-values of 0.367, 0.422, and 0.421, suggesting that innovation was the crucial variable.

In terms of ecological factors, the q-value of environmental pollution rose from 0.054 in 2015 to 0.091 in 2024. It reflects the increasing importance of environmental pollution in affecting agri-cultural-tourism integration. In regions, economic development should be focused on, but at the same time, the highest level of ecological protection should be maintained. Ecotourism will become the top priority in tourism consumption choices. The continuous rise in the q-value of climate change means the continuous enhancement of the explanatory power of temperature. The overall drought situation shows an upward trend, with its minimum q-value being recorded between 2019 and 2022 and increasing after 2015.

*Table 6: Exploration value of influencing factors of agricultural culture and tourism integration*

Affectoi	2015-2024	2015-2018	2019-2022	2023-2024
$X_1$	0.121***	0.099***	0.079**	0.149***
$X_2$	0.079***	0.073***	0.022	0.045
$X_3$	0.285***	0.284***	0.293***	0.179***
$X_4$	0.307***	0.308***	0.271***	0.279***
$X_5$	0.035*	0.034	0.033	0.067*
$X_6$	0.383***	0.367***	0.422***	0.421***
$X_7$	0.215***	0.223***	0.192***	0.197***
$X_8$	0.049***	0.054***	0.065***	0.091***
$X_9$	0.059***	0.063***	0.074***	0.085***
$X_{10}$	0.076***	0.078***	0.067***	0.082***

Note: \*\*\*, \*\*, and \* indicate that the variable is statistically significant at the 1%, 5%, and 10% levels, respectively.

#### 4.2.2 Interaction Detection

Figure 6 presents the interaction detection graph of integrated agri-cultural-tourism development impact factors of Yijun County. From Figure 6, it can be seen that from 2015 to 2024, the effect of any two factors on each other is always more pronounced than the effect of a single factor. The kinds of interaction are either nonlinear enhancement or dual-factor linear enhancement, meaning that the interaction between economy, society, ecology, and the overall development of agriculture, culture, and tourism of Yijun County is due to the interaction of these three aspects. Specifically, the strongest interaction explanatory power from 2015 to 2024 was observed between the tertiary industry's share of GDP and tourism patent applications, it has a value of 0.517. On the contrary, the weakest interaction explanatory power can be seen in the case of per capita urban road area with a q-value of 0.305. After post-interaction detection, the interaction explanatory power of tourism patents was more than 0.37 regardless of the factor, implying that the level of innovation explains spatial distribution well.

Across different time periods, the factors influencing cultural-tourism integration evolved over time. From 2015 to 2018 and 2019 to 2022, the strongest interactions were between the tertiary sector's share of GDP and tourism patent applications, with q-values of 0.564 and 0.528, respectively. In the period from 2015 to 2024, the best explanatory power regarding the interaction effect was achieved for per capita consumption expenditure and tourism patents, with the value of the q-value being 0.516, meaning that innovation is a key driver in agriculture-culture-tourism integration. As per the comparison of the top five factors for all three periods, the following factors were identified: per capita urban road surface area (1 time), number of public transport buses per 10,000 inhabitants (2 times), PM2.5 level (3 times), climate (2 times), and annual precipitation (3 times). Ecological factors predominantly appeared before 2015, indicating that Yijun County's agri-cultural-tourism integration model has evolved from an initial traditional development approach primarily sacrificing “ecological environment” to the current green development model centered on “innovative development.” Future cultural-tourism integration should prioritize industrial innovation as its core, guided by talent revitalization, continuously optimize regional spatial differentiation patterns, and accelerate the advancement of Yijun County's agri-cultural-tourism integration.

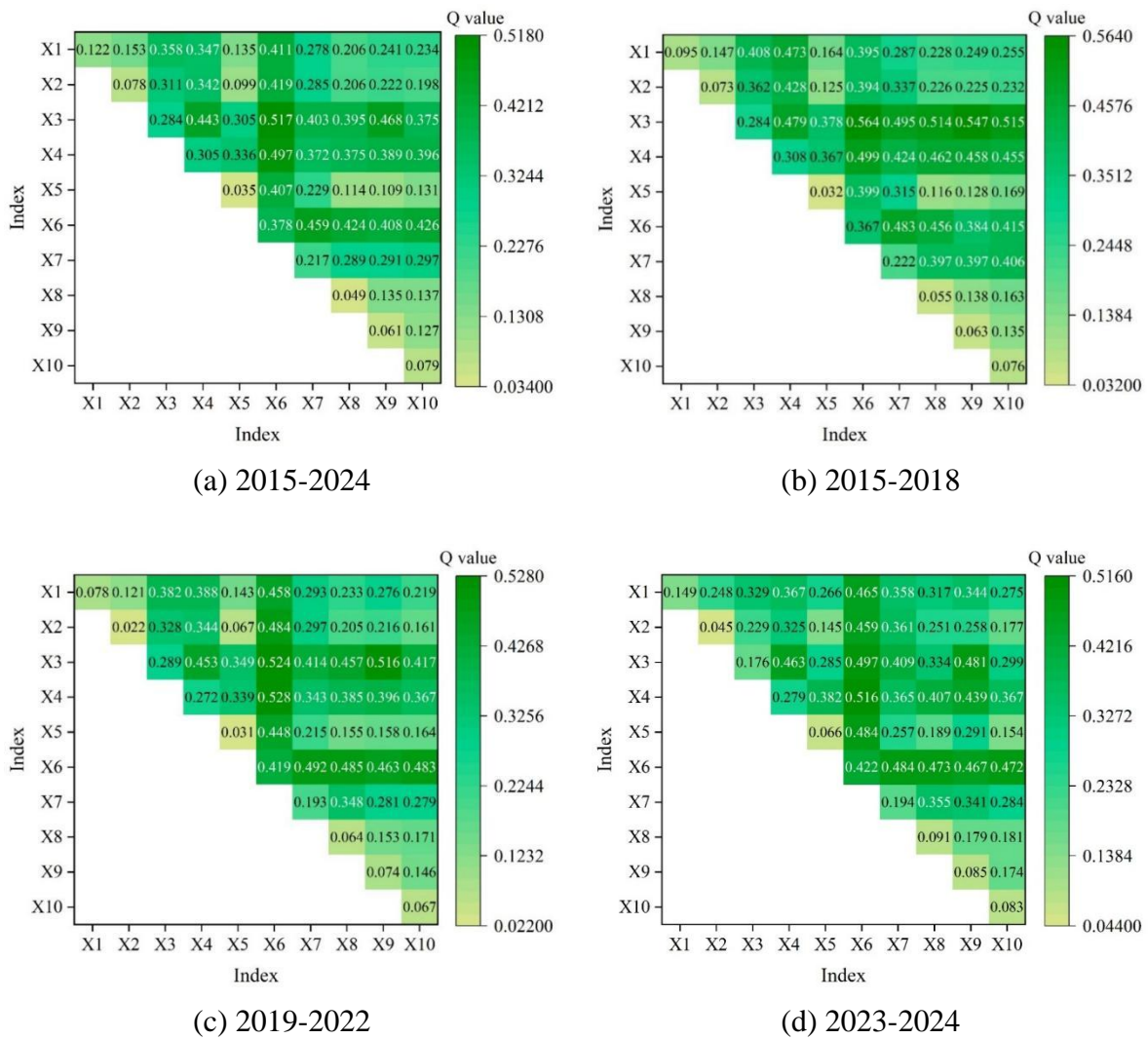


Figure 6: heat map of interaction of influencing factors

### 4.3 Development Strategies for Yijun County's Agricultural, Cultural, and Tourism Industries

#### (1) Developing an Adoption Economy to Enhance Scenic Area Competitiveness

However, despite having its own natural scenery and agricultural resources, Yijun Terraces cannot enjoy any competitive advantage in the tourist industry compared with other terraced landscapes. It becomes increasingly difficult to satisfy modern tourists' needs through conventional tourism models due to the low competitiveness of the landscape of Yijun.

In such a case, the "adoption economy" model in combination with tourism can be introduced in both Yijun Terraces and Pengzu Medicinal Valley. Through the proposed approach, tourists will be able to get closer experiences rather than relying directly on the scenery. Some parts of the farmland in the territories under consideration can be split into smaller lots. First of all, tourists will be able to visit the site or use mobile application services to find information about available land parcels. They are supposed to invest money in adopting the land and decide whether to plant anything by themselves or to use professional services offered in the territories. Furthermore, they will be able to control local weather, soil quality, and crop growth using applications. After harvesting crops, adopters of these lands have three options, namely participating in harvesting personally, receiving fruits of their labor at home, or selecting some processing method for harvesting products via apps. In such a way, the "adoption economy" model will provide a great chance to promote natural scenery of Yijun.

#### (2) Organizing Cultural Activities to Promote Agri-Cultural-Tourism Integration

In the holistic development of agriculture, culture, and tourism, culture plays a significant role as the connecting thread between agriculture and tourism. In the design of cultural projects, attention must be paid to the aspect of diversity, fun, education, and full involvement. It is advisable to hold agricultural festivals from time to time, for example, "Terrace Harvest Festival" or "Week of Traditional Farming Techniques." During the festivals, visitors have the chance to directly explore the culture of agriculture through various exhibitions of farming equipment, agricultural customs, farm dances, and opera. At the same time, it is possible to hold demonstration projects on modern technologies in agriculture, which will help contrast and combine different agricultural civilizations and increase cultural identity and participation of visitors. Visitors may also enjoy agricultural culture experience programs, for instance, "Playground for Family Farming" or "Agricultural Experience Camp," during which, under professional supervision, visitors will engage in various farm work such as planting, weeding, and harvesting. Moreover, visitors may try crafting workshops, where they will learn to make souvenirs using weaving, pottery, paper cutting, and other crafts related to agriculture.

#### (3) Building an Ecosystem to Extend Crop Industry Chains

In order to develop Yijun's primary value chain further, poultry can be raised in terraced field lands and the Pengzu Medicinal Valley of Yijun. In doing so, we have created small ecological cycles that are based around corn, which is the primary crop raised on terraced fields, and Polygonatum, the primary crop raised in the Pengzu Medicinal Valley, leading to the greener development of agriculture industry to meet current needs.

By raising free-range poultry in terraced fields and the Pengzu Medicinal Valley, the application of chemical fertilizers and pesticides will be greatly reduced, leading to natural restoration of soil. Furthermore, by raising poultry in these lands, weeds can be removed effectively by them. With the free-roaming of poultry in the vast land, their meat becomes tougher. They will lay healthy eggs too.

## 5 Conclusion

The entropy analysis method, coupling coordination model, trend surface analysis, and kernel density estimation analysis method, among others, were employed in the evaluation of the level of deep integration of agriculture, culture, and tourism in Yijun County from 2015 to 2024. Some of the conclusions drawn from the study are summarized below:

(1) For Yijun County, in the context of comprehensive development of agriculture, culture, and tourism exhibited a consistent increase between 2015 and 2024. For instance, the overall evaluation index of agriculture rose from 0.5870 to 0.6014, that of the cultural sector from 0.2070 to 0.8288, while that of tourism grew from 0.3567 to 0.5384.

(2) From the perspective of coupling coordination effects, the overall coupling coordination effect of agriculture, culture, and tourism in Yijun County was largely imbalanced in the period of 2015-2024. Of all the townships in Yijun County, Yiyang Subdistrict, Peng Town, Tai'an Town, and Yaosheng Town had reached high coordination levels, but the other townships were still in the basic unbalance coordination stages.

(3) Spatial development patterns reveal that from 2015 to 2024, the development of agriculture, culture, and tourism showed a spatial pattern of "weak western and strong eastern parts; southern parts with a high level and northern parts with a low level." As for the spatial agglomeration characteristics, the spatial agglomeration pattern of agricultural integration development mostly included high-high agglomeration and low-low agglomeration.

(4) On the issue of driving forces for integration development, the integration development of agriculture, culture, and tourism in Yijun County involved many economic, social, and ecological aspects. Among these, innovation level serves as the controlling factor affecting regional cultural and tourism integration development.

## Funding

2024 Research Project of "Writing a New Chapter of China's Modernization with High-Quality Development in Shaanxi Province" - Research on the High-Quality Development of Agriculture, Culture, and Tourism Industries in Yijun County (Project No.: 2024HZ1142).

## About the Author

Yinning Ye (1983-), female, from Cixi, Zhejiang Province, associate professor, master's degree, mainly engaged in research on rural tourism, health tourism, and the integration of agriculture, culture, and tourism.

## References

- [1] Han, J. (2020). Prioritizing agricultural, rural development and implementing the rural revitalization strategy. *China Agricultural Economic Review*, 12(1), 14-19.
- [2] Yang, Y. (2023). Research on the Path of "Sports, Tourism, Culture, Commerce and Agriculture" Industrial Integration Development in Guizhou. *The Educational Review, USA*, 7(12).
- [3] Yang, X., Li, W., Zhang, P., Chen, H., Lai, M., & Zhao, S. (2023). The dynamics and driving mechanisms of rural revitalization in western China. *Agriculture*, 13(7), 1448.

- [4] Jiang, G. (2022). How does agro-tourism integration influence the rebound effect of China's agricultural eco-efficiency? An economic development perspective. *Frontiers in environmental science*, 10, 921103.
- [5] Lane, B., Kastenholz, E., & Carneiro, M. J. (2022). Rural tourism and sustainability: A special issue, review and update for the opening years of the twenty-first century. *Sustainability*, 14(10), 6070.
- [6] Yanti, D., Heryadi, D. Y., Cakranegara, P. A., & Kadyrov, M. (2023). Developing rural communication through digital innovation for village tourism. *Jurnal Studi Komunikasi*, 7(3), 696-712.
- [7] Yanan, L., Ismail, M. A., & Aminuddin, A. (2024). How has rural tourism influenced the sustainable development of traditional villages? A systematic literature review. *Heliyon*, 10(4).
- [8] Shi, L., & Liao, X. (2025). From poverty to common prosperity: an evaluation of agricultural-cultural-tourism integration and its impact on economic growth. *Frontiers in Sustainable Food Systems*, 9, 1600264.
- [9] Kim, N., Lee, H., Kim, W., Lee, H., & Suh, J. H. (2015). Dynamic patterns of industry convergence: Evidence from a large amount of unstructured data. *Research Policy*, 44(9), 1734-1748.
- [10] Lee, K. R. (2015). Toward a new paradigm of technological innovation: convergence innovation. *Asian Journal of Technology Innovation*, 23(sup1), 1-8.
- [11] Gonzo, F. (2022). Stakeholder expectations influence the success of rural tourism development: a tale of three stakeholders. *Asian Social Science*, 18(8), 1.
- [12] Pourzakarya, M. (2022). Searching for possible potentials of cultural and creative industries in rural tourism development; a case of Rudkhan Castle rural areas. *Consumer Behavior in Tourism and Hospitality*, 17(2), 180-196.
- [13] Shen, W., Liu-Lastres, B., Pennington-Gray, L., Hu, X., & Liu, J. (2019). Industry convergence in rural tourism development: a China-featured term or a new initiative?. *Current Issues in Tourism*, 22(20), 2453-2457.
- [14] Jin, C., Lin, L., & Fubiao, Z. (2011). On the study progress of tourism industrial merging and its enlightenment. *Tourism Tribune*, 26(4), 13-19.
- [15] Zhou, C., & Sotiriadis, M. (2021). Exploring and evaluating the impact of ICTs on culture and tourism industries' convergence: Evidence from China. *Sustainability*, 13(21), 11769.
- [16] Yang, R. (2022). Development of tourism for culture and innovation based on convergence of data in the perspective of industrial integration. *Mobile Information Systems*, 2022(1), 4174050.
- [17] Qi, L. (2024). Can Rural Industry Integration Improve Rural Household Income? Empirical Analysis Based on CFPS Data. *Academic Journal of Business & Management*, 6(3), 1-10.

- [18] Kubickova, M., & Martin, D. (2020). Exploring the relationship between government and destination competitiveness: The TALC model perspective. *Tourism Management*, 78, 104040.
- [19] Król, K., & Zdonek, D. (2024). Digital artefacts of rural tourism: the case study of Poland. *Global Knowledge, Memory and Communication*, 73(3), 258-273.
- [20] Carvalho, R., Ferreira, A. M., & Figueira, L. M. (2016). Cultural and Creative tourism in Portugal. *PASOS. Revista de Turismo y Patrimonio Cultural*, 14(5), 1075-1082.
- [21] Dixit, S. K., Langstieh, K. C. S., & Abraham, A. (2023). Integrating indigenous knowledge and rural tourism in Kongthong, the “whistling village” of India. *Worldwide Hospitality and Tourism Themes*, 15(1), 41-51.
- [22] Ezenagu, N. (2020). Heritage resources as a driver for cultural tourism in Nigeria. *Cogent arts & humanities*, 7(1), 1734331.
- [23] Fan, B., & Li, J. (2022). Sustainable Development Path of Agriculture, Culture and Tourism Industry Under the Background of Rural Revitalization Strategy—Taking Jiangxi Province as an Example. In *Proceedings of the 3rd International Conference on Green Energy, Environment and Sustainable Development (GEESD2022)* (pp. 838-844). IOS Press.
- [24] Tang, M., & Xu, H. (2023). Cultural integration and rural tourism development: A scoping literature review. *Tourism and Hospitality*, 4(1), 75-90.
- [25] Zhou, Q., Zhu, K., Kang, L., & Dávid, L. D. (2023). Tea culture tourism perception: a study on the harmony of importance and performance. *Sustainability*, 15(3), 2838.
- [26] Shuai, M., Liu, C., Ahmed, F., & Wang, R. (2022). Analysis on the change of tourists' leisure agricultural tourism behavior and the influence of individual intrinsic characteristics. *Asia Pacific Management Review*, 27(2), 115-119.
- [27] Aithal, R., Anil, R. K., & Angmo, D. (2023). Rural tourism in India: case studies of resilience during crisis. *Worldwide Hospitality and Tourism Themes*, 15(1), 63-73.
- [28] Hou, X., Xu, H., Wang, R., & He, M. (2021). Research on the Formulation of Rural Planning from the Perspective of Integration of Agriculture, Culture and Tourism: A Case Study of Guifengshan Village, Macheng City, Hubei Province. In *Hydraulic and Civil Engineering Technology VI* (pp. 241-247). IOS Press.
- [29] Lak, A., & Khairabadi, O. (2022). Leveraging agritourism in rural areas in developing countries: The case of Iran. *Frontiers in Sustainable Cities*, 4, 863385.
- [30] Karali, A., Das, S., & Roy, H. (2024). Forty years of the rural tourism research: Reviewing the trend, pattern and future agenda. *Tourism Recreation Research*, 49(1), 173-200.
- [31] Hui Wang. (2025). Regional ecological risk assessment for Guangxi (China) based on entropy method and the pressure-capital-vulnerability-response model. *Ecological Indicators*, 175, 113542-113542.

- [32] Wang Lijing, Peeters Luk, MacKie Emma J., Yin Zhen & Caers Jef. (2023). Unraveling the uncertainty of geological interfaces through data-knowledge-driven trend surface analysis. *Computers and Geosciences*, 178,