

Measurement and Evaluation of Agricultural and Tourism Industry Integration Levels in the Yangtze River Delta Urban Agglomeration

Wenqing Wang*

College of Business Administration, Anhui University of Finance and Economics, Bengbu
233030, Anhui, China

*Corresponding Author

Abstract

The integration of agriculture and tourism industry promotes industrial transformation and upgrading, which is not only conducive to the sustainable development of the industry, but also of great significance to rural revitalisation. Taking the 26 cities in the Yangtze River Delta (YRD) urban agglomeration as an example, we constructed an evaluation index system for the development level of agriculture and tourism based on the "input-output" method, and used the entropy method and the coupling coordination degree model to calculate the industrial development level of agriculture and tourism in the 26 cities in the YRD urban agglomeration from 2015 to 2019, and the level of integration of agriculture and tourism industries. and the integration level of agriculture and tourism industry. It is found that the industrial development levels of agriculture and tourism in the 26 cities of the Yangtze River Delta city cluster from 2015 to 2019 show a slow upward trend, and the development level of integration of agriculture and tourism industries is steadily increasing. By 2019, 10 cities' agriculture and tourism industry integration levels are in the coordinated stage; among them, Hangzhou City and Shanghai City's agriculture and tourism industry integration levels are ranked in the top 2 places respectively, in the preliminary coordinated stage, while Taizhou City and Tongling City's agriculture and tourism industry integration levels are ranked in the last 2 places, in the mildly dysfunctional stage. Based on the above research results, countermeasures and suggestions to promote the integrated development of agriculture and tourism industry will be put forward from 3 aspects: inter-industry differences, inter-regional differences, and government policy support.

Keywords

Yangtze River Delta City Cluster; Agriculture and Tourism Industry Integration; Integration Level; Coupling Coordination Degree.

1. Introduction

The integration of agriculture and tourism industry is a dynamic development process in which the resources of agriculture and tourism intersect and penetrate each other in the process of development of the industry, and gradually form a new industry through the integration of resources, technology, function, market, capital, talents and organisations⁰. The No.1 document of the Central Government in 2022 regards "continuously promoting the integrated development of primary, secondary and tertiary industries in rural areas" as an important task in promoting rural development^[2]. In May 2023, the Ministry of Finance issued the Notice on Doing a Good Job in the Comprehensive Rural Reform Pilot Experiment in 2023, which explicitly pointed out that the rural areas should actively develop low-carbon agriculture, creative agriculture, intelligent agriculture, agricultural experience, and integration of agriculture and

tourism, and promote the in-depth integration and development of rural industries[3]. The integration of agricultural and tourism industries extends the industrial chain with combined advantages, enhances the added value of each industry and its products, and activates the new economy of rural revitalisation, and this integration has now become a rural revitalisation development mode of great practical significance, which not only helps to enrich the tourism industry, but also facilitates the activation of the development potential of the rural economy, and promotes the transformation and upgrading of the rural industry.

As one of the most economically developed regions in China, the Yangtze River Delta (YRD) possesses superior tourism and agricultural development resources and market conditions, laying a solid foundation for the integration of agriculture and tourism industries in the region. In-depth integration of agriculture and tourism industries in the Yangtze River Delta region plays an important role in promoting rural revitalisation, advancing the structural adjustment of the agricultural supply side, meeting people's consumption demand, and increasing farmers' income, which has become a new trend and a new growth point for the economic development of the Yangtze River Delta region. However, at this stage, the integration and development of the agricultural and tourism industries in the Yangtze River Delta region is plagued by problems such as the lack of product uniqueness, serious homogenisation, and insufficient in-depth excavation of resources[4][5]. However, there is still a gap between the deep integration of agriculture and tourism industries and the goal of high-quality development of agriculture and tourism. In view of this, constructing an evaluation index system for the development level of agriculture and tourism in the Yangtze River Delta (YRD) urban agglomeration, and measuring the development level of agro-tourism industry integration are of great practical significance and policy revelation to further promote the integration and high-quality development of the region's agriculture and tourism, and to facilitate the sustained development of rural tourism in the YRD region.

The tourism industry has an open nature, a characteristic that promotes the integration of the tourism industry. Tourism industry integration refers to the dynamic development process of mutual penetration and intersection between the tourism industry and other industries or between different industries within the tourism industry, which eventually integrates into one and gradually forms a new industry[6]. The purpose of the integration of tourism industry is to break through the tourism industry. The purpose of tourism industry integration is to break through the obstacle of homogenisation of tourism development products[7]. The purpose of tourism industry integration is to break through the barriers of product homogenisation in tourism development. Domestic and foreign research on tourism industry integration focuses on the connotation, power mechanism, path, level measurement and effect of the integration of tourism industry and other specific industries. The definition of the connotation of tourism industry integration has not yet reached a consensus, and scholars have mostly defined the concept of tourism industry integration by combining different research objects, for example, Nie Lei et al. believe that the integration of agriculture and tourism industry is a new and effective form of industry integration based on the agricultural system as the basis and support, and gradually copying and implanting the value creation and blood-creation function of the tourism industry in the agricultural system[8]. Jiang Zhe believes that the integration of culture and tourism industry refers to the phenomenon and process of mutual penetration and mutual promotion between the culture industry, tourism industry and related elements, gradually breaking through the original industrial boundaries or elemental fields, and intermingling with each other to form a new symbiosis[9]. The process of the integration of tourism industry is a phenomenon and process. In the study of the power mechanism of tourism industry integration, Zhao Shuhong et al. proposed that the power of integration of cultural industry and tourism industry in ethnic regions includes integration of resource elements, upgrading of tourism demand, support of innovation and change, and enterprise management decision-making[10].

In terms of the integration path of the tourism industry, Yang Yi et al. divided the integration path of the health tourism industry into the extended integration path and the permeable integration path[11]. Li Ren et al. proposed the practical path of deep integration of culture and tourism from the perspectives of product integration, industry integration, market integration, technology integration, service integration, and benefit integration[12]. Theory of tourism industry integration and industrial integration With the in-depth development of tourism industry integration theory research and industrial practice, some scholars have carried out research on the measurement and evaluation of the integration and development level and integration effect of the tourism industry and a specific industry, Wang Keling et al. used the coupling coordination degree model to measure the level of tea tourism integration in Yunnan Province[13]. Wang Qing et al. analysed the spatial distribution characteristics of the coupling coordination degree of body-tourism in the Yangtze River Delta region[14]. Anderson found that the integration of agriculture and tourism can promote regional economic development and help alleviate regional poverty[15]. Ma Shengqing analysed the economic effect of culture and tourism integration[16].

In summary, the existing research results on the integration of tourism industry are quite abundant, but these studies mostly focus on the qualitative elaboration of the integration effect of tourism industry, and only a small number of studies pay attention to the quantitative evaluation of the integration degree of cultural tourism and tea tourism, and there are fewer research results on the quantitative measurement and evaluation of the integration level of tourism and agriculture. In view of this, this paper selects 26[29] cities in the Yangtze River Delta urban agglomeration as the empirical research object, constructs the evaluation index system of industrial development level from the three dimensions of input factors, output level, output scale, and adopts the entropy value method and the coupling degree of coordination model to measure and evaluate the level of development of agriculture and tourism and the level of integration of agriculture and tourism industries in the Yangtze River Delta urban agglomeration, which helps to understand the current development situation of the integration of the agriculture and tourism industries and their regional differences in the Yangtze River Delta urban agglomeration in a more comprehensive way. The study helps to provide a more comprehensive understanding of the current situation of the development of agricultural and tourism industry integration in the Yangtze River Delta urban agglomeration and its regional differences, and to provide empirical research results to support the development of strategies to further promote the development of agricultural and tourism industry integration in the region and optimise the relevant management countermeasures by relevant management departments in the region.

2. Research Methodology

Existing studies on the evaluation of the level of integration of the tourism industry mainly include the coupled coordination degree model[17][18][19] and grey correlation analysis[20][21] and other evaluation methods include AHP-fuzzy comprehensive evaluation method[22] and TOPSIS method[23]. Other evaluation methods include AHP-fuzzy comprehensive evaluation method and TOPSIS method. In addition, some scholars have established the evaluation of the integration level of agriculture and tourism industry according to the three dimensions of "degree of industrial association", "new forms of integration" and "economic and social effects of integration development". index system to evaluate the quality of the integration[24]. The quality of integration is evaluated.

Among the above comprehensive evaluation methods on the integration degree of tourism industry, the coupling coordination degree model can not only quantitatively describe the interaction and coordination degree between the systems, but also intuitively carry out the

comparison of the differences in the integration level of different objects in the same period and the same object in different periods according to the coupling coordination degree level division, which is both scientific and operable, so this paper will use the coupling coordination degree model to carry out the measurement of the integration level of agriculture and tourism in 26 cities of the Yangtze River Delta city cluster. The entropy weight method is used to assign weights to the evaluation indicators of agriculture and tourism. The details are as follows.

2.1. Construction of the Evaluation Indicator System

The academic field has not yet formed a unified standard for the evaluation system of the development level of agriculture and tourism, this paper refers to Jiang Juanli[25]161 Jiang Juanli, Pang Jing[26] Wang Xiuwei[27] Jiang Feng[28] . This paper refers to the research results of Jiang Juanli, Pang Jing, Wang Xiuwei, Jiang Feng, et al. Starting from the two dimensions of the development level of agriculture and tourism, we construct the evaluation index system of the development level of the industry based on the three aspects of the input elements, the output level, and the scale of the industry, so as to make sure that the indicators are selected in a scientific, reasonable, and accessible manner, and that the relevant indicators basically reflect the overall level of the industry development. Three primary indicators and 14 secondary indicators are selected, including 7 for agriculture and 7 for tourism, as shown in Table 1.

Table 1. Indicator system for evaluating the development level of agriculture and tourism in the Yangtze River Delta Urban Agglomeration

System category	Level 1 indicators	Secondary indicators	unit (of measure)
agriculture	input element	Employed persons in the primary sector	ten thousand visits
		Gross power of agricultural machinery	kilowatt (unit of electric power)
		Crop sown area	thousand hectares
	Level of output	Per capita disposable income of rural residents	the Yuan or Mongol dynasty (1279-1368)
		Gross output value of agriculture, forestry, livestock and fisheries	\$10,000,000
		Primary sector GDP	billions
	industrial scale	Primary sector GDP as a share of GDP	%
travel trade	input element	Number of A-class scenic spots	classifier for individual things or people, general, catch-all classifier
		Number of travel agencies	classifier for individual things or people, general, catch-all classifier
		Number of star-rated hotels	classifier for individual things or people, general, catch-all classifier
		Number of employees in the tertiary sector	ten thousand visits
	Level of output	Total number of tourists	ten thousand visits
		Gross tourism receipts	billions
	industrial scale	Tourism revenue as a share of GDP	%

2.2. Data Sources

Considering that the data of tourism-related indicators in 2020-2022 fluctuates greatly under the influence of the epidemic and lacks representativeness, this paper selects 2015-2019 as the research period. The data of each indicator mainly come from the 2015-2019 provincial and municipal statistical yearbooks, statistical bulletins and official data released by the cultural and tourism departments.

2.3. Measurement of the Coupling Degree of Agricultural and Tourism Industry Integration

2.3.1. Calculation Steps of the Entropy Method of Empowerment

Because the units of the indicators are different and the scale is not the same, the data of the indicators are firstly processed without dimension. The indicators used in this paper are all positive indicators, and are processed as follows:

$$X_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} + 0.01 \quad (1)$$

Where x_{ij} denotes the original value of the j th indicator in the i th year, and X_{ij} denotes the standardised indicator value. In order to avoid the situation of negative value or 0 in dimensionless processing, 0.01 is added to the formula. $\min(x_j)$ and $\max(x_j)$ represent the minimum and maximum values of the j th indicator, respectively. In this paper, the entropy value method is used to determine the weight of each indicator. The calculation method is as follows:

(1) Find the weight of each evaluation object under each indicator in year i .

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

(2) Find the entropy value of each indicator

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

Where $e_j \geq 0$ and n is the number of objects to be evaluated.

(3) Calculate the weight of each indicator by entropy value

$$w_j = \frac{1 - e_j}{\sum_{j=1}^n 1 - e_j} \quad (4)$$

Among them. $\sum_{j=1}^n w_j = 1$.

2.3.2. Calculation and Ranking of the Coupling Coordination Degree between Agriculture and Tourism Industries

(1) Measurement of the level of comprehensive industrial development

The comprehensive development level of industry is an important factor affecting the level of industrial integration, and before calculating the degree of coordination of industrial coupling, it is necessary to measure the comprehensive development level of each industry, and the calculation formula is as follows:

$$U = \sum_{j=1}^n w_j * X_{ij} \tag{5}$$

In this study, U_1 represents the integrated development level of agriculture and U_2 represents the integrated development level of tourism. The development level varies among different industries, and by comparing the development level of different industries, the type of industrial integration can be classified into three categories: if $U_1 > U_2$, it indicates that the development level of tourism lags behind the development level of agriculture, which belongs to the tourism lag type; if $U_1 = U_2$, it indicates that the synchronous development of agriculture and tourism belongs to the synchronous type of agriculture-tourism; and thirdly, $U_1 < U_2$, it indicates that the development level of agriculture lags behind the development level of tourism, which The third is, which indicates that the level of agricultural development is lagging behind the level of tourism development, and belongs to the agricultural lag type.

(2) Measurement and grading of the level of integration of the agricultural and tourism industries

The level of integration of agriculture and tourism can be measured by the coupling degree model and the coupling coordination degree model. The coupling degree model can measure the degree of mutual influence between industries, but there may be a situation in which the development level of each industry is low and the coupling level between industries is high, which can be avoided by the coupling coordination degree model. Therefore, this paper applies the coupling coordination degree model to measure the level of integration between industries. Among them, for two industries, the coupling coordination degree model expression is:

$$C = 2 \times \left[\frac{U_1 * U_2}{(U_1 + U_2)^2} \right]^{\frac{1}{2}} \tag{6}$$

$$T = \alpha U_1 + \beta U_2 \tag{7}$$

$$D = \sqrt{C * T} \tag{8}$$

Where C is the coupling degree between the two industries; U_1 and U_2 are the comprehensive development level of agriculture and tourism respectively; the comprehensive coordination index T indicates the overall coordinated development level of the two industries. Each industry is equally important in economic development, so the coefficients α and β are set to 0.5. D is the degree of coupling coordination.

Table 2. Criteria for classifying the degree of coupling coordination

degree of coupling coordination	Level of coordination
$0 \leq D < 0.1$	extreme disorder
$0.1 \leq D < 0.2$	severe disorder
$0.2 \leq D < 0.3$	moderate disorder
$0.3 \leq D < 0.4$	mild disorder
$0.4 \leq D < 0.5$	on the verge of becoming dysfunctional
$0.5 \leq D < 0.6$	sue for coordination
$0.6 \leq D < 0.7$	Primary coordination
$0.7 \leq D < 0.8$	Intermediate level coordination
$0.8 \leq D < 0.9$	good coordination
$0.9 \leq D \leq 1$	Quality coordination

In order to facilitate the observation of the development level of the integration of various industries in each region, this paper draws on the research results of Jiang Juanli[25]162, based on the coupling coordination degree will be inter-industry coordination degree respectively classified into 10 levels, as shown in Table 2.

3. Analysis of Results

3.1. Comparative Analysis of the Level of Development of Agriculture and Tourism in the Yangtze River Delta City Cluster

According to the aforementioned entropy weight method and the formula for calculating the comprehensive development level of industries, the comprehensive development levels of agriculture and tourism in 26 cities in the Yangtze River Delta city cluster from 2015 to 2019 were measured and compared, and the specific results are shown in Tables 3 and 4.

3.1.1. Analysis of the Comprehensive Development Level of Agriculture and Tourism in the Yangtze River Delta City Cluster, 2015-2019

(1) Level of comprehensive agricultural development

It can be seen from Table 3 that the comprehensive development level of agriculture in the Yangtze River Delta urban agglomeration was generally low in 2015. After 5 years of development, the level of agricultural development in the region has improved, but the development speed is slow. In 2015, Yancheng City, Chuzhou City and Nantong City ranked the top three in the comprehensive development level of agriculture in 26 cities in the Yangtze River Delta urban agglomeration, and the comprehensive development indexes were 0.7382, 0.5401 and 0.4662 respectively. The last two are Shanghai and Wuxi, and the comprehensive development index is 0.1616 and 0.1380 respectively. In 2019, Yancheng City, Chuzhou City and Nantong City ranked the top three in terms of comprehensive agricultural development level, with comprehensive development indexes of 0.7569, 0.5297 and 0.4821 respectively. The last two are Tongling City and Wuxi City, and the comprehensive development index is 0.1351 and 0.1492 respectively. Among them, in 2015 and 2019, the comprehensive development index of Yancheng City was the highest, and the comprehensive development index of Wuxi City was the lowest, with a difference of 5 times between the two.

(2) Comprehensive level of tourism development

From Table 3, it can be seen that the tourism development level of 26 cities in 2019 is higher than that in other years, and the tourism development is generally stable. In 2015, Shanghai, Hangzhou and Nanjing ranked the top three in the comprehensive development level of tourism, with comprehensive development indexes of 0.7115, 0.3950 and 0.2892 respectively. The last two are Tongling City and Chuzhou City, and the comprehensive development index is 0.0261 and 0.0459 respectively. The top three cities in the comprehensive development level of tourism in 26 cities of the Yangtze River Delta urban agglomeration in 2019 are Shanghai, Hangzhou and Nanjing, with comprehensive development indexes of 0.8465, 0.5223 and 0.3511 respectively. The last two are Tongling City and Chuzhou City, and the comprehensive development index is 0.0562 and 0.0683 respectively. On the whole, the tourism industry of the Yangtze River Delta urban agglomeration maintains a good development trend, and the growth rate of tourism development level in some cities is limited, such as Tongling City and Chuzhou City.

Table 3. Comprehensive development level of the agriculture and tourism industry in the Yangtze River Delta City Cluster (2015-2019)

	Level of integrated agricultural development(U_1)					Comprehensive tourism development level(U_2)				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
capital of China at different historical periods	0.2451	0.2548	0.2519	0.2652	0.2701	0.2892	0.2986	0.313	0.3323	0.3511
Wuxi prefecture level city in Jiangsu	0.138	0.1428	0.1454	0.1448	0.1492	0.1807	0.1887	0.1998	0.2071	0.2117
Changzhou	0.1786	0.1847	0.1878	0.1905	0.1927	0.1275	0.1338	0.137	0.1448	0.1528
Suzhou prefecture level city in Jiangsu	0.2041	0.211	0.2142	0.2121	0.2083	0.2791	0.2907	0.302	0.3164	0.3125
Nantong prefecture level city in Jiangsu	0.4662	0.4683	0.4683	0.4729	0.4821	0.1384	0.1401	0.1475	0.1482	0.1526
Yancheng prefecture level city in Jiangsu	0.7382	0.7353	0.7296	0.7321	0.7569	0.0924	0.0909	0.0962	0.1033	0.1115
Yangzhou prefecture level city in Jiangsu	0.3182	0.3144	0.3124	0.3172	0.3227	0.1224	0.1217	0.1263	0.145	0.1534
Zhenjiang prefecture level city in Jiangsu	0.1718	0.1756	0.18	0.182	0.1838	0.1181	0.123	0.1292	0.135	0.138
Taizhou prefecture level city in Jiangsu	0.327	0.3353	0.3412	0.3515	0.3532	0.0726	0.079	0.0826	0.0845	0.084
Hangzhou subprovincial city and capital of Zhejiang province in southeast China	0.2954	0.2936	0.2944	0.2913	0.3025	0.395	0.4218	0.4498	0.5031	0.5223
Ningbo subprovincial city in Zhejiang	0.2626	0.2723	0.2701	0.2746	0.2902	0.2402	0.2566	0.2747	0.2805	0.2996
Shaoxing prefecture level city in Zhejiang	0.26	0.2691	0.2694	0.2678	0.2792	0.1648	0.1758	0.187	0.1987	0.205
Huzhou prefecture level city in Zhejiang	0.1936	0.1955	0.1953	0.2001	0.2079	0.1434	0.1686	0.1982	0.2304	0.2406
Jiaxing prefecture level city in Zhejiang	0.1945	0.1916	0.1921	0.1951	0.2028	0.1525	0.1684	0.1961	0.2127	0.2295
Jinhua prefecture level city in Zhejiang	0.2281	0.2302	0.2223	0.2197	0.2239	0.1493	0.172	0.1914	0.2216	0.2416
Zhoushan prefecture level city in Zhejiang (consisting solely of islands)	0.2137	0.2221	0.2386	0.2512	0.2545	0.1605	0.1679	0.198	0.2191	0.2225
Taizhou prefecture level city in Zhejiang	0.3031	0.3065	0.3025	0.301	0.3065	0.1583	0.1815	0.2079	0.2265	0.2364
Shanghai	0.1616	0.1606	0.1608	0.1653	0.1721	0.7115	0.7421	0.7786	0.8029	0.8465
Hefei prefecture level city in Guangdong	0.3997	0.3994	0.4009	0.39	0.3902	0.2085	0.218	0.2422	0.2577	0.2804
Ma'anshan prefecture level city in Anhui	0.4384	0.4493	0.4297	0.4437	0.4479	0.0552	0.0641	0.0675	0.0708	0.0776
Anqing prefecture level city in Anhui	0.435	0.4346	0.4184	0.4054	0.4184	0.1283	0.1389	0.1538	0.1601	0.1732
Tongling prefecture level city and county in Anhui	0.1617	0.1227	0.125	0.1275	0.1351	0.0261	0.0424	0.0485	0.051	0.0562
Chizhou prefecture level city in Anhui	0.2039	0.1997	0.1906	0.1887	0.1978	0.2047	0.2133	0.222	0.228	0.2359
Wuhu	0.231	0.2315	0.2274	0.2329	0.2439	0.0887	0.0947	0.1091	0.1179	0.129
Xuancheng prefecture level city in Anhui	0.3226	0.3212	0.3068	0.291	0.3013	0.0918	0.0995	0.1076	0.1114	0.1132
Chuzhou prefecture level city in Anhui	0.5401	0.5184	0.5132	0.5139	0.5297	0.0459	0.0505	0.058	0.0628	0.0683

3.1.2. Comparative Analysis of the Level of Development of Agriculture and Tourism in the Yangtze River Delta City Cluster, 2015-2019

From Table 4, it can be seen that the type of coupling coordination degree of agriculture and tourism industry in the Yangtze River Delta urban agglomeration from 2015 to 2019 is mainly tourism lag. Among the nine cities in Jiangsu Province, Nanjing, Wuxi and Suzhou are lagging behind in agriculture, and the other six cities are lagging behind in tourism, indicating that the coordinated development of agriculture and tourism in the nine cities of Jiangsu Province is not high. The development level of agriculture and tourism in eight cities of Zhejiang Province is similar. Among them, the coupling coordination degree type of agriculture and tourism industry in Ningbo City, Huzhou City, Jiaxing City and Jinhua City showed a trend of 'tourism lag' to 'agriculture lag' from 2015 to 2019. This change means that agriculture and tourism in these four cities promote and influence each other, which is conducive to the further integration and development of the two industries. The level of tourism development in Shanghai is always higher than that of agricultural development, and it is in a state of agricultural lag. Among the 8 cities in Anhui Province, except Chizhou City, the other 7 cities are lagging behind in tourism.

Table 4. Types of coupled coordination of agricultural and tourism industries in the Yangtze River Delta Urban Agglomeration (2015-2019)

	2015	2016	2017	2018	2019
capital of China at different historical periods	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag
Wuxi prefecture level city in Jiangsu	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag
Changzhou	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Suzhou prefecture level city in Jiangsu	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag
Nantong prefecture level city in Jiangsu	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Yancheng prefecture level city in Jiangsu	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Yangzhou prefecture level city in Jiangsu	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Zhenjiang prefecture level city in Jiangsu	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Taizhou prefecture level city in Jiangsu	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Hangzhou subprovincial city and capital of Zhejiang province in southeast China	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag
Ningbo subprovincial city in Zhejiang	tourism lag	tourism lag	Agricultural lag	Agricultural lag	Agricultural lag
Shaoxing prefecture level city in Zhejiang	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Huzhou prefecture level city in Zhejiang	tourism lag	tourism lag	Agricultural lag	Agricultural lag	Agricultural lag
Jiaxing prefecture level city in Zhejiang	tourism lag	tourism lag	Agricultural lag	Agricultural lag	Agricultural lag
Jinhua prefecture level city in Zhejiang	tourism lag	tourism lag	tourism lag	Agricultural lag	Agricultural lag
Zhoushan prefecture level city in Zhejiang (consisting solely of islands)	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Taizhou prefecture level city in Zhejiang	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Shanghai	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag
Hefei prefecture level city in Guangdong	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Ma'anshan prefecture level city in Anhui	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Anqing prefecture level city in Anhui	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Tongling prefecture level city and county in Anhui	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Chizhou prefecture level city in Anhui	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag	Agricultural lag
Wuhu	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Xuancheng prefecture level city in Anhui	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag
Chuzhou prefecture level city in Anhui	tourism lag	tourism lag	tourism lag	tourism lag	tourism lag

3.2. Evaluation of the Development Level of Agricultural and Tourism Industry Integration in the Yangtze River Delta Urban Agglomeration

The coupling coordination degree model was used to calculate the coupling coordination degree of agriculture and tourism industry in 26 cities in the Yangtze River Delta city cluster, and the results are shown in Table 5.

Table 5. Coupling and coordination of agricultural and tourism industries in Yangtze River Delta City Groups (2015-2019)

	2015	2016	2017	2018	2019
capital of China at different historical periods	0.5160	0.5252	0.5299	0.5448	0.5550
Wuxi prefecture level city in Jiangsu	0.3974	0.4051	0.4128	0.4161	0.4216
Changzhou	0.3885	0.3965	0.4005	0.4075	0.4143
Suzhou prefecture level city in Jiangsu	0.4886	0.4976	0.5043	0.5090	0.5051
Nantong prefecture level city in Jiangsu	0.5040	0.5061	0.5127	0.5145	0.5208
Yancheng prefecture level city in Jiangsu	0.5110	0.5085	0.5147	0.5245	0.5390
Yangzhou prefecture level city in Jiangsu	0.4442	0.4422	0.4457	0.4631	0.4717
Zhenjiang prefecture level city in Jiangsu	0.3774	0.3834	0.3905	0.3959	0.3991
Taizhou prefecture level city in Jiangsu	0.3925	0.4035	0.4097	0.4152	0.4150
Hangzhou subprovincial city and capital of Zhejiang province in southeast China	0.5845	0.5932	0.6032	0.6187	0.6305
Ningbo subprovincial city in Zhejiang	0.5011	0.5141	0.5219	0.5268	0.5430
Shaoxing prefecture level city in Zhejiang	0.4550	0.4664	0.4738	0.4803	0.4892
Huzhou prefecture level city in Zhejiang	0.4082	0.4260	0.4436	0.4634	0.4729
Jiaxing prefecture level city in Zhejiang	0.4150	0.4238	0.4405	0.4514	0.4645
Jinhua prefecture level city in Zhejiang	0.4296	0.4461	0.4542	0.4697	0.4823
Zhoushan prefecture level city in Zhejiang (consisting solely of islands)	0.4303	0.4394	0.4662	0.4844	0.4878
Taizhou prefecture level city in Zhejiang	0.4681	0.4856	0.5008	0.5110	0.5188
Shanghai	0.5823	0.5875	0.5948	0.6036	0.6178
Hefei prefecture level city in Guangdong	0.5373	0.5432	0.5582	0.5630	0.5752
Ma'anshan prefecture level city in Anhui	0.3945	0.4120	0.4127	0.4210	0.4318
Anqing prefecture level city in Anhui	0.4860	0.4957	0.5037	0.5047	0.5189
Tongling prefecture level city and county in Anhui	0.2549	0.2686	0.2790	0.2840	0.2952
Chizhou prefecture level city in Anhui	0.4520	0.4543	0.4535	0.4554	0.4647
Wuhu	0.3784	0.3848	0.3969	0.4071	0.4212
Xuancheng prefecture level city in Anhui	0.4149	0.4228	0.4263	0.4243	0.4298
Chuzhou prefecture level city in Anhui	0.3968	0.4022	0.4154	0.4238	0.4361

3.2.1. Analysis of the Changes in the Level of Development of Agricultural and Tourism Industry Integration in the Yangtze River Delta Urban Agglomeration, 2015-2019

From Table 5, it can be seen that from 2015 to 2019, the level of integrated development of agriculture and tourism in 26 cities of the Yangtze River Delta urban agglomeration has steadily improved, but the level of integrated development of agriculture and tourism in each city is quite different. The top three in the level of integration and development of agricultural and tourism industries are Hangzhou, Shanghai and Hefei. From 2015 to 2019, the level of integrated development of agriculture and tourism industry in Hangzhou rose from 0.5845 to 0.6305, which experienced a stage of reluctant coordination and primary coordination, and the level of tourism development in Hangzhou was always higher than that of agricultural development (see table 4). The tourism industry continues to drive agricultural development

and promote the integration of agriculture and tourism. On the one hand, Hangzhou is rich in rural tourism resources. The combination of tourism and agriculture innovates the 'pastoral experience + farming culture + local culture' tourism model and creates a number of modern new rural (agricultural) tourism areas. In addition, through the introduction of leisure tourism industry, Hangzhou promotes the gradual formation of rural vacation leisure function and guides urban residents to return to rural slow life. From 2015 to 2019, the integration level of Shanghai's agriculture and tourism industry increased from 0.5823 to 0.6178, entering the primary coordination stage. In the process of integration of agriculture and tourism, Shanghai belongs to the lagging type of agricultural development (see Table 4), but the developed tourism industry in Shanghai has continuously driven the development of agriculture in the region and promoted the integration of agriculture and tourism industries. From 2015 to 2019, the integration level of agriculture and tourism industry in Hefei increased from 0.5373 to 0.5752, which was in the stage of barely coordination, but the tourism industry was relatively lagging behind (see Table 4), which belongs to the type of agriculture driving tourism development.

3.2.2. Analysis of the Degree of Coupling and Coordination between Agriculture and Tourism in the Yangtze River Delta City Cluster, 2019

According to table 5 and table 2, the coupling coordination degree of agricultural tourism industry in 26 cities of the Yangtze River Delta urban agglomeration in 2019 is classified, as shown in table 6. The types of coupling coordination degree of agricultural tourism industry in 26 cities of the Yangtze River Delta urban agglomeration in 2019 can be divided into three levels: coordination, on the verge of imbalance and imbalance. First of all, in 2019, the coupling coordination degree of agricultural and tourism industries in 10 cities such as Hangzhou, Shanghai, Hefei and Nanjing reached the coordination level. The coupling coordination degree of agricultural tourism industry in 14 cities such as Shaoxing, Zhoushan and Jinhua is on the verge of imbalance. Zhenjiang City and Tongling City are in the stage of imbalance. The comprehensive development level of agriculture and tourism in these two cities is low, and the coupling coordination degree of agriculture and tourism industry is also low.

Table 6. Classification of agricultural and tourism industry coupling and coordination degree in the Yangtze River Delta City Cluster in 2019

hierarchy	degree of coupling coordination	provinces
Primary coordination	$0.6 \leq D < 0.7$	Hangzhou, Shanghai
sue for coordination	$0.5 \leq D < 0.6$	Hefei, Nanjing, Ningbo, Yancheng, Nantong, Anqing, Taizhou, Suzhou
on the verge of becoming dysfunctional	$0.4 \leq D < 0.5$	Shaoxing, Zhoushan, Jinhua, Huzhou, Yangzhou, Chizhou, Jiaying, Chuzhou, Maanshan, Xuancheng, Wuxi, Wuhu, Taizhou, Changzhou
mild disorder	$0.3 \leq D < 0.4$	Zhenjiang prefecture level city in Jiangsu
moderate disorder	$0.2 \leq D < 0.3$	Tongling prefecture level city and county in Anhui

4. Conclusion and Discussion

Using entropy value method and coupled coordination degree model, this paper analyses the development level of agriculture and tourism and the integration development level of the Yangtze River Delta city cluster in 2015-2019, and the main conclusions are as follows:

First, the development levels of agriculture and tourism in the 26 cities of the Yangtze River Delta city cluster have both continued to rise, but there are still differences between industries and cities, with Yancheng City having the highest level of comprehensive agricultural

development and Shanghai City having the highest level of comprehensive tourism development. According to the theory of input-output analysis, the level of industrial development mainly depends on industrial input factors, output factors and industrial scale. Yancheng City has invested a large number of primary industry employees, total power of agricultural machinery and total sowing area of crops, which brings high disposable income per rural resident, total output value of agriculture, forestry, animal husbandry and fishery, and gross domestic product of the primary industry, and the comprehensive development level of agriculture is high. Shanghai's travel agencies, star-rated hotels, A-class scenic spots and tertiary industry employees invested more, a large number of tourism industry elements of the input for the development of Shanghai's tourism industry has laid a solid foundation, but also brought a large number of domestic and foreign tourists and the total income of tourism. It can be seen that when promoting industrial development, the Yangtze River Delta city cluster should analyse the input status of different elements of agriculture and tourism in each city, and make efforts to narrow the gap between the comprehensive development levels of different industries by making use of their strengths and avoiding their weaknesses.

Secondly, most of the cities show a single lagging development status of agriculture or tourism, which is not conducive to the integrated development of the agriculture and tourism industries. A relative comparison of the comprehensive development levels of agriculture and tourism among the 26 cities in the Yangtze River Delta city cluster shows that most of the cities have a single-industry-priority development pattern of "agriculture lagging behind tourism" or "tourism lagging behind agriculture", reflecting the failure of effective synergistic development of agriculture and tourism, which to a certain extent restricts the integrated development of agriculture and tourism. This reflects that agriculture and tourism have not been developed in a synergistic manner, which to a certain extent restricts the integrated development of the agriculture and tourism industries. In the future, in promoting the integrated development of agriculture and tourism, the Yangtze River Delta city cluster should pay attention to the relative comparative situation of the integrated development of agriculture and tourism in each city, and make targeted efforts to promote the development level of lagging industries.

Thirdly, the overall development level of agro-tourism industry integration in the 26 cities of the Yangtze River Delta city cluster is low, and there are regional differences. During 2015-2019, the level of agro-tourism industry integration in the 26 cities was generally low. By 2019, only Hangzhou and Shanghai have reached the primary coordination stage, and Tongling is still in the moderate dislocation stage. The overall situation of agricultural tourism integration is affected by the comprehensive development level of agriculture and tourism, Hangzhou City has a more balanced level of comprehensive development of agriculture and tourism and a high level of comprehensive development of the industry, and the level of integrated development of the agricultural tourism industry is also high; Shanghai City has a well-developed tourism industry and agriculture is relatively lagging behind, and agriculture is driven by the tourism industry to promote the integration of the two industries; Tongling City is relatively low in the level of comprehensive development of agriculture and tourism, which to a certain extent hinders the integration of Tongling City. Tongling City is relatively backward in the comprehensive development of agriculture and tourism, which to a certain extent hinders the integrated development of agriculture and tourism industries in Tongling City. Therefore, to further promote the integrated development of agriculture and tourism industries in the Yangtze River Delta city cluster, it is necessary to have a comprehensive understanding of the basic situation of the development of the two industries in each city, so as to "prescribe the right medicine" to achieve the balanced development of the integration of agriculture and tourism industries in each city.

5. Recommendations for Countermeasures

First, analyse the differences in the development of regional agriculture and tourism industries, and increase the development of lagging industries. Tourism lagging cities need to focus on increasing the input of tourism industry factors to enhance the comprehensive development of the tourism industry. Similarly, agricultural lagging areas, need to appropriately increase the input of agricultural industry factors, such as the introduction of primary industry technical personnel to promote the development of agriculture to the modernisation, and further promote the integration of agriculture and tourism industries; for the balanced development of agriculture and tourism in the region, to sum up its agriculture and tourism industry integration and development of the experience of the practices for other municipalities to learn from.

Secondly, we should pay attention to the differences in the level of integration of the agriculture and tourism industries among different cities, and co-ordinate and promote the balanced development of different cities at the regional level of the Yangtze River Delta (YRD) city cluster. There are significant differences in the development levels of various industries among the 26 cities in the YRD urban agglomeration, and Hangzhou has a high level of agricultural and tourism development, which is a good reference for other regions in the YRD. In order to comprehensively promote the integrated development of the agriculture and tourism industry in various places, it is necessary to combine the degree of coordination of the coupling of the agriculture and tourism industry in different cities and the stage they are in, and to implement measures according to the local conditions, while at the same time, focusing on the promotion of inter-regional industrial co-operation in the Yangtze River Delta, complementing each other's strengths, and advancing the fusion of resources, technology and talents. For example, cities such as Nanjing, Suzhou, Ningbo, Hefei and other cities in the stage of barely coordinated development are the new potential for the integrated development of the agriculture and tourism industry. These cities have superior geographic location, rich resources and convenient transport, and have the potential for further in-depth integration of the agri-tourism industry. These cities can be constructed as demonstration zones, which will then lead and drive the development of other areas with lower levels of integration of the agri-tourism industry, and thus realise the integrated development of integration of the agri-tourism industry in the Yangtze River Delta city cluster.

Third, increase policy support, play a leading role in policy guidance. A pile of national macro-policy background of the Yangtze River Delta regional economic integration and development, 26 city government departments can consider formulating and issuing special policies to promote the development of industrial integration, such as, increasing the investment of funds for the integration of agriculture and tourism industry, and promoting the in-depth integration of agriculture and tourism industry; formulating policies for the introduction of talents to strengthen the talent pool, and cultivating innovative and complex talents, especially with the arrival of the digital economy, innovation is particularly important for the integration of industries. Industry integration is particularly important, therefore, in terms of talent requirements, innovation ability is one of the most important conditions, the government should pay attention to the cultivation of innovative talents; consider the establishment of agro-tourism industry integration demonstration zones, summarise the development experience and promote the exchange of experience, to provide references for other regions to learn from.

References

- [1] Liu Xia. Research on the integration development of agriculture and tourism in Henan based on path dependence[J]. *China Agricultural Resources and Zoning*, 2016, 37(3):233-236.
- [2] China.gov.cn. Opinions of the Central Committee of the Communist Party of China and the State Council on Doing a Good Job of Comprehensively Promoting the Key Work of Rural Revitalisation

- in 2022 [EB/OL]. (2022-02-22) [2023-12-12]. https://www.gov.cn/zhengce/2022-02/22/content_5675035.htm.
- [3] Ministry of Finance of the People's Republic of China . Notice on Doing the Work Related to the Comprehensive Rural Reform Pilot Experiment in 2023 [EB/OL]. (2023-4-21) [2023-12-12]. https://hn.mof.gov.cn/zhxx/202305/t20230508_3883137.htm.
- [4] China Rural Network. Problems and Countermeasures of Rural Revitalisation Practice in Yangtze River Delta [EB/OL]. (2021-03-03) [2023-12-13]. http://journal.crnews.net/ncgztxcx/2021/dsiq/snlt/934498_20210303094915.html.
- [5] People's Government of Wuzhong District, Suzhou. Suggestions on Improving the Development Planning of Agricultural Tourism Integration to Boost Rural Revitalisation [EB/OL]. (2022-04-26) [2023-12-13]. <http://www.szwz.gov.cn/szwz/qzxtalm/202211/9f18a82ad1114fd7a14dad9196938810.shtml>.
- [6] Zhang Lingyun. The foundation and premise of tourism industry integration[J]. Journal of Tourism, 2011, 26(4):6-7.
- [7] Li Y .A Study on the Spatial Distribution of Indian Tourism Resources and Tourism Product Innovation-Based on the Background of Industrial Convergence[J].Entrepreneurship, Business and Economics, 2016, 1: 579-588.
- [8] Nie Lei. Research on Agricultural Tourism Integration Development in Hainan Province [D]. Wuhan: Zhongnan University of Economics and Law, 2020.
- [9] Jiang Zhe. Research on the Spatial Pattern and Influencing Factors of the Integration Development of Cultural Industry and Tourism Industry in China [D]. Jinan: Shandong University of Finance and Economics, 2023.
- [10] Zhao Shuhong, Chen Tingting. Analysis of the Integration Dynamics and Mechanism of Cultural Industry and Tourism Industry in Ethnic Areas[J]. Journal of Tourism, 2020, 35(8): 81-93.
- [11] Yang Yi, Shi Beibei. Integration development of health tourism industry: motivation, mechanism and path[J]. Hunan Forum, 2020, 33(5):126-135.
- [12] Li Ren. Deep Integration and Synergistic Development: Theoretical Logic and Practical Path of Culture and Tourism Integration[J]. Theory Monthly, 2022, 481(1):88-96.
- [13] WANG Keling, PU Yuanlian, TANG Liyan. Research on the Coupling Relationship between Tea Industry and Tourism Industry--Taking Yunnan Province as an Example[J]. Tea Newsletter, 2020, 47(3):526-532.
- [14] Wang Qing, Lin Jianjun. Research on the integration characteristics of sports industry and tourism industry in the Yangtze River Delta region[J]. Zhejiang Sports Science, 2023, 45(2): 46-53.
- [15] ANDERSON W .Linkages between tourism and agriculture for inclusive development in Tanzania: A value chain perspective[J]. Tourism Insights, 2018, 1(2):168-184.
- [16] Ma Shengqing. Integration mechanism and economic effect of cultural industry and tourism industry[J]. Social Scientist, 2021, 289(5):101-106.
- [17] MONG Yongheng, FENG Yingtao, ZHAO Yu. Research on the coupled and coordinated development of agriculture and tourism industry in underdeveloped areas under the perspective of rural revitalisation--Taking Guangxi as an example[J]. Journal of Guilin University of Technology, 2021, 41(2):426-433.
- [18] Xu Fei, Li Bin. Measuring the Integration Situation of Culture and Tourism Industry in Liaoning Province Based on Coupling Model[J]. Journal of Liaoning University (Philosophy and Social Science Edition), 2021, 49(2): 70-78.
- [19] Zhao Man, Wang Ruzhong. Power mechanism and development evaluation of the integration development of cultural industry and tourism industry in China[J]. Ecological Economy, 2022, 38(2):121-129.
- [20] Yang Guangming, Luo Yao, Chen Yuya et al. Research on the coupling coordination mechanism and optimization of agriculture and tourism in Sichuan and Chongqing - Based on grey system theory[J]. Resource Development and Market, 2021, 37(8):991-997.

- [21] YUAN Ning, LI Hongguo, YIN Chengyu. Research on the coupled development of culture and tourism industry in Jilin Province[J]. Management Observation, 2019, (21): 112-116.
- [22] Yang Foeliang, Wang Chuan. Analysis of the integration degree of agriculture and tourism based on AHP-fuzzy comprehensive evaluation method--Taking Enshi Gongshui white grapefruit industry as an example[J]. China Agricultural Resources and Zoning, 2021, 42(1): 220-230.
- [23] Huang F. Research on the coordinated development of agriculture and tourism in Henan Province [J]. China Agricultural Resources and Zoning, 2019, 40(11):274-281.
- [24] Yang Gezhuang, Zhou Changchun, Yang Guangming. Analysis of the relationship between industrial integration of agriculture and tourism and rural poverty alleviation[J]. Statistics and Decision Making, 2020, 36(5): 81-86.
- [25] JIANG Juanli, WANG Xiaoyu, YANG Qingyuan. Research on the coupled and coordinated development and countermeasures of agricultural and tourism integration--Taking Shizhu Tujia Autonomous County in Chongqing as an example[J]. Journal of Southwest University (Natural Science Edition), 2022, 44(8):161,162.
- [26] Pang Jing. Measurement and analysis of the ternary industrial integration development of agriculture, culture and tourism in Ankang City[J]. Jiangxi Agricultural Journal, 2023, 35(1): 207-213.
- [27] Wang Xiuwei. Measurement of the level of cultural and tourism integration in the Grand Canal Cultural Belt and analysis of the development situation[J]. Journal of Shenzhen University (Humanities and Social Sciences Edition), 2020, 37(3): 60-69.
- [28] Jiang Feng. Research on the spatial pattern and influencing factors of the level of cultural and tourism integration in the central area of the Yangtze River Delta [D]. Hangzhou: Zhejiang University, 2021.
- [29] Wenzhou City was included in the Yangtze River Delta city cluster in June 2019, and this paper does not study the level of development and integration of the agricultural tourism industry in Wenzhou City from 2015-2019 for the time being.