

# Coupling and Coordination between Tourism Talents and Tourism Economy based on an Empirical Analysis of Jiangsu Province

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## **Abstract:**

With the increasingly effective control of the COVID-19 epidemic, the huge implicit demand for explosive tourism consumption growth in China is showing an urgent demand for tourism talents. In this paper, based on the concept of sustainable development and digital economy, the tourism economy is completely explained, the evaluation indicator system of tourism talents and tourism economy and the evaluation model of coupling coordination degree are established, and the coupling coordination between them is studied based on the data of Jiangsu from 2014 to 2018. The results show that (1) The comprehensive development level evaluation index of tourism talents and tourism economy in Jiangsu shows an upward trend, and the development speed of tourism economy is faster than that of tourism talents; (2) At present, the coupling coordination degree of tourism talents and tourism economy in Jiangsu is only at the lowest value of good coordination about 0.5, which has not broken through the antagonistic state and still needs to be improved. (3) The coupling and coordination level of tourism talents and tourism economy in Jiangsu Province shows the gradual improvement of “low coordination—moderate coordination—good coordination”, which changes from the former lagging type of low-level and medium-level coordination tourism economy to the lagging type of good-level coordination tourism talents at present with 2017 as the turning point.

**Keywords:** *Tourism talent system, Digital economy, Entropy method, Evaluation model of coupling coordination degree.*

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## I. INTRODUCTION

Although the global spread of the COVID-19 epidemic since 2020 has taken a heavy toll on the development of the tourism industry and hindered the development speed of the tourism industry in

the world, it cannot contain the potential implicit demand of the explosive growth of China's tourism consumption demand. In the Blue Book of China's Tourism Economy (No.13) (2021), it is pointed out that residents' willingness to "get back to travel" has not been significantly reduced by the epidemic situation, but has become stronger. Tourism demand will move along the demand curve in the direction of "low price and high quantity", and new demands of mass tourism and new formats of smart tourism will promote industrial iteration and service upgrading. However, the shortage of tourism talents does not match with the sharp increase in tourism demand that the shortage of tourism talents, frequent brain drain and insufficient overall strength of tourism talents due to the current low employment threshold, low salary level and low social reputation in China's tourism industry have been a major obstacle to the development of China's tourism industry.

In recent years, scholars have carried out related research on tourism talents and tourism economy. There are many researches on the influence of human capital structure on regional economic growth abroad (Schultz (1962), Romer (1990), Lucas (1988)), but relatively few researches on the relationship between tourism talents and tourism economy. Besides, relevant researches on tourism talents mainly focus on the cultivation of tourism talents, while those on tourism economy mainly focus on the sustainable development (Kishore Kumar Das, 2018), but there is no research on the coupling and coordination of tourism talents and economy[1,2,3,5]. Ana Rita Cruz (2014) pointed out that creative tourism can retain talents, who can improve regional creativity and promote regional development [4]. There are relatively many studies on the coupling relationship between tourism economy and environment and the cultivation of tourism talents in China, but few on the relationship between tourism talents and economy [6-8]. Fang Falin (2011) found through the study that the agglomeration of tourism talents in Southern Jiangsu promoted the development of tourism economy, and the development of tourism economy had an impact on the distribution of tourism talents [9]. Liu Jia (2017) found that the deviation between the spatial structure of tourism talents and the industrial sector structure had different influences on the growth of local tourism economy [10].

On the whole, due to the complex characteristics of multiple elements in tourism, a few existing researches on tourism talents and tourism economy are mainly one-way and lack of two-way coupling and coordination research. In this paper, the coupling and coordination of tourism talents and tourism economy is studied by establishing the coupling and coordination degree model of tourism talents and tourism economy based on the empirical analysis of Jiangsu Province, which has reference value for the development of regional tourism talents and tourism industry.

## 1.1 Tourism Talents

The definition of tourism talents in China changes with the development of the times. The former National Tourism Administration (now the Ministry of Culture and Tourism) pointed out in the Outline of the 13th Five-Year Plan for the Development of Tourism Talents that tourism talents are those who have high ability and quality in tourism human resources and certain tourism professional knowledge and skills, can do creative work, provide high-quality services and make certain contributions to the development of tourism, and can be divided into general talents and tourism professionals. In this study, the above concept of talents is further enriched as those who have high ability and quality in tourism human resources and certain tourism professional knowledge and specialized skills covering tourism fields such as administration, management and service, can do creative work, provide high-quality services and make certain contributions to the development of cultural tourism.

## 1.2 Tourist Economy

At present, tourism economy mainly refers to the economic ties formed by providing tourists with paid food, accommodation, transportation, travel, shopping, entertainment and other services by tourism enterprises. The tourism economy is mainly measured by the number of tourists received by the tourism destination, tourism income and other indicators [11]. Based on the research of scholars[12-14].In this paper, it is considered that in the current digital economy era, tourism economy is not only the increase of tourism income but also the adaptation to the development of digital economy, taking into account the contents of green environmental protection, sustainable development, social effects, cultural effects and so on. It is not comprehensive to measure the tourism economy if it only focuses on the “explicit” tourism income of result-oriented tourism output and ignores the implicit “income” such as digital economy, sustainable development effect, cultural effect and social effect.

Therefore, in this paper, the tourism economy is interpreted as one that takes into account the benign development of regional tourism resources, promotes the tourism economic income brought by the rational development of tourism resources, realizes low-carbon tourism, environmental protection and sustainable development and other tourism economic development models, and takes the digital economy as the driving force, develops and innovates new forms of smart tourism and creates a new normal for the digital tourism economy. On this basis, this paper holds that the tourism economy should consider the two key dimensions of sustainable development, which is mainly evaluated from the ecological, social and cultural levels and digital economy, which is mainly evaluated from the level of smart tourism.

### 1.3 Coupling Coordination

“Coupling” means mutual support and common prosperity; “coordination” means proper coordination, so “coupling coordination” means mutual support, common promotion and common development. According to the point of view of system theory, coordination is a benign functional relationship among various elements within the system, which not only shows a good state but also a process. Coordinated development is the overall comprehensive and common development of multi-systems or multi-factors under the constraints of effective and beneficial regulations, based on the overall interests. Coupling focuses on the interaction between systems to form mutual influence, while coordination focuses on the coordinated development between systems, which cannot be equated. In this paper, firstly, the coupling and coordination analysis of tourism talents and tourism economy was deeply carried out, and then the coupling and coordination evaluation indicator system of the two was established. Finally, the coupling state, coordination state and types of the two were analyzed and judged based on the empirical evaluation measure in Jiangsu Province.

## II. EVALUATION INDICATOR SYSTEM AND EVALUATION AND EVALUATION METHOD

### 2.1 Establishment of the Evaluation Indicator System

Two subsystems of tourism talent system (X) and tourism economic system (Y) were established according to the generally accepted principles of indicator system establishment such as scientificity, representativeness, comparability and data accessibility, and on the basis of comprehensive research results of domestic and foreign scholars and in combination with the current situation and trend of regional economic development. The indicator system of tourism talent system mainly consists of talents scale, talents structure and talents efficiency in the tourism industry. The tourism economic system is mainly composed of five parts: tourism income, industrial status, market demand, sustainable development model, and digital economy format, as shown in TABLE I.

**TABLE I. Evaluation index system of coupling and coordinated development of tourism talents and tourism economy**

SYSTEM LAYER	FACTOR LAYER	INDICATOR LAYER/CODE	UNIT
Tourism talent system (X)	Talents scale X1	Number of employees in Grade A scenic spots/X <sub>11</sub>	Person
		Number of employees in star-rated	Person

		hotels/ $X_{12}$	
		Number of employees in travel agencies/ $X_{13}$	Person
	Talents structure X2	Number of tour guide certificate holders/ $X_{21}$	Person
		Number of tourism students in institutions of higher learning/ $X_{22}$	Person
		Number of graduates from tourism-related departments/ $X_{23}$	Person/
	Talents efficiency X3	Labor productivity of all staff in star-rated hotels/ $X_{31}$	1,000 yuan/person
		Labor productivity of all staff in travel agencies/ $X_{32}$	1,000 yuan/person
		Labor productivity of all employees in Grade A scenic spots/ $X_{33}$	1,000 yuan/person
	Tourism economic system (Y)	Tourism income Y1	Domestic tourism revenue/ $Y_{11}$
Income from international tourism (foreign exchange)/ $Y_{12}$			100 million dollars
Total tourism revenue of Grade A scenic spots/ $Y_{13}$			100 million yuan
Added value of tourism/ $Y_{14}$			100 million yuan
Industrial scale Y2		Number of star-rated hotels/ $Y_{21}$	-
		Number of travel agencies/ $Y_{22}$	-
		Number of Grade A scenic spots/ $Y_{23}$	-
Market effect Y3		Visits to A-level scenic spots/ $Y_{31}$	100 million person-times
		Inbound overnight visitors received throughout the year/ $Y_{32}$	10,000 persons
		Domestic tourists received/ $Y_{33}$	100 million person-times
		Per capita tourism consumption of tourists/ $Y_{34}$	Yuan/person
Sustainable		Greening rate/ $Y_{41}$	%

	development model Y4	Tourist revisiting rate in scenic spots/ $Y_{42}$	%
		Added value of cultural industries in regional cultural departments/ $Y_{43}$	100 million yuan
	Digital economy format Y5	Website of tourist destination/ $Y_{51}$	-
		National ranking of comprehensive influence of tourism information dissemination on “Weibo, WeChat and Tik Tok”/ $Y_{52}$	-
		Total number of visits to official website of the Ministry of Culture and Tourism/ $Y_{53}$	Person

Note: (1) Labor productivity of all staff in star-rated hotels equals the operating income/number of employees of star-rated hotels; (2) Labor productivity of all staff in travel agencies equals the annual income of travel agencies/the annual number of employees of travel agencies; (3) The Labor productivity of all employees in Grade A scenic spots equals the annual income of Grade A scenic spots/the annual employment of Grade A scenic spots; (4) Per capita tourism consumption of tourists equals the annual total tourism income/total number of tourists; (5) Total revenue of travel agencies in 2017 and 2018 is calculated based on the proportional increase rate of the data in 2014, 2015 and 2016 due to the lack of data. (5) “Weibo, WeChat and Tik Tok”.

## 2.2 Entropy Evaluation Method

The weighting method is divided into subjective weighting method and objective weighting method, among which the AHP method in subjective weighting method is widely used, but the final result obtained according to the determined weight lacks practical reference value to a certain extent due to its obvious subjective tendency. In order to ensure the scientificity, correctness and objectivity of the evaluation results, the entropy weighting method in the objective weighting method is adopted in this paper. In entropy weighting method, the weights are determined according to the variability of indexes and the meaning of the values themselves, which is not affected by whether the evaluation data are linearly related or not, and at the same time avoids the interference of human factors. Furthermore, the weighting process is transparent and reproducible, so the weight has high credibility. The weighting steps are as follows.

### 2.2.1 Standardizing raw data of evaluation indicators

Because there are many evaluation indicators in the evaluation indicator system with different dimensions, they should be standardized to make different evaluation indicators comparable and ensure the accuracy of the evaluation results by the following method:

Supposing that  $n$  evaluation indicators in  $m$  evaluated schemes are evaluated to get a multi-index evaluation matrix  $X = (x_{ij})_{m \times n}$

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix}$$

Where,  $x_{ij}$  is the original value of the  $j$ -th evaluation indicator of the  $i$ -th scheme to be evaluated, then

For positive indicators, the standardized formula is:

$$X'_{ij} = \frac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}} \quad (1)$$

For contrary indicators, the standardized formula is:

$$X'_{ij} = \frac{\max x_{ij} - x_{ij}}{\max x_{ij} - \min x_{ij}} \quad (2)$$

### 2.2.2 Calculating the information entropy value of each indicator

According to the definition of information entropy in the theory of information, the information entropy  $E_i$  of the  $i$ -th evaluation indicator is calculated.

$$E_i = -1/\ln(m) \sum_{j=1}^n \frac{q_{ij}}{q_j} \ln\left(\frac{q_{ij}}{q_j}\right) \quad (i=1, 2, \dots, m ; j=1, 2, \dots, n) \quad (3)$$

Where,

$q_{ij}$  = the standardized value of raw data of the evaluation indicator  $x_{ij}$ ;

$q_j$  = the sum of the standardized values of the evaluation indicators in the  $j$ -th year, and  $\frac{q_{ij}}{q_j} \ln(\frac{q_{ij}}{q_j})$   
 $= 0$  if  $q_j = 0$ .

### 2.2.3 Obtaining the weight of the evaluation indicator

According to the theory of entropy method, after the information entropy  $E_i$  of the  $i$ -th evaluation indicator is obtained, the weight of the  $i$ -th evaluation indicator can be obtained:

$$Q_i = (1 - E_i) / (n - \sum_{i=1}^n E_i) \quad (i=1, 2, \dots, n) \quad (4)$$

Where,

$Q_i$  = the weight of the  $i$ -th evaluation indicator;

$E_i$  = the information entropy of the  $i$ -th evaluation indicator;

$n$  = the number of evaluation indicators, and  $\sum_{i=1}^n Q_i = 1$ ,  $Q_i \in [0, 1]$ .

### 2.3 Coupling Coordination Degree

For coupling coordination, “coordination degree” is generally used to quantitatively evaluate the degree of complementarity and harmony between two elements. Coordination degree is a measure of



the degree of harmony between the system or internal elements of the system in the development process, which reflects the trend of the system from disorder to order, and is a quantitative indicator of the degree of coordination. Coupling degree is used to measure the degree of interaction and influence between systems or elements. The degree of coupling coordination is the relationship of coordination and virtuous circle between systems or elements. Good coordination and coordinated development between systems or internal elements of a system are called benign coupling; otherwise, they are called malignant coupling. According to the calculation results of coordinated development degree, the level of coordinated development is divided into a continuous space in a certain numerical range, forming a hierarchical ladder of connected strip development, as shown in TABLE II.

**TABLE II. Criteria and classification of coordination degree**

UNACCEPTABLE RANGES	TYPE OF INBALANCE	ACCEPTABLE RANGES	TYPE OF COORDINATED DEVELOPMENT TYPE
0-0.09	Extremely maladjusted and declining development	0.50-0.59	Reluctantly coordinated development type
0.10-0.19	Seriously maladjusted and declining development	0.60-0.69	Primary coordinated development type
0.20-0.29	Moderately maladjusted and declining development	0.70-0.79	Moderate coordinated development type
0.30-0.39	Slightly maladjusted and declining development	0.80-0.89	Good coordinated development type
0.40-0.49	Near- maladjusted and declining development	0.90-1.00	High-quality coordinated development type

### III.CONSTRUCTING A COUPLING COORDINATION DEGREE EVALUATION MODEL

In this paper, an evaluation model of coupling coordination degree between tourism talents and tourism economic development was constructed by borrowing the capacity coupling coefficient and coupling coordination degree of physics and referring to the ideas of domestic and foreign scholars on the establishment of coupling coordination degree model between systems. The specific calculation formula is:

$$C = \frac{\sqrt{(u_1 \times u_2)}}{(u_1 + u_2)} \quad (5)$$

$$D = \sqrt{C \times T} \quad (6)$$

$$T = \alpha u_1 + \beta u_2 \quad (7)$$

Where,

C=the value of coupling degree;

D=the value of coupling coordination degree;

T=the comprehensive coordination index of tourism talents and tourism economy;

u<sub>1</sub>, u<sub>2</sub> = the respective comprehensive level values of tourism talents and tourism economy,

$\alpha$  ,  $\beta$ =the undetermined weights, which were set as 0.4 and 0.6 as tourism talents are only one factor to promote regional development, and tourism economy is the result of many factors.

$$C \in [0, 1], D \in [0, 1]$$

The closer the value of C is to 1, the better the coupling degree between the two systems, and the

closer the value of  $D$  is to 1, the more orderly and coordinated the two systems are.

According to the level of coupling degree in Table 1 and referring to Xu Yulian's research on coupling coordination degree [15], it is determined that the coupling coordination of tourism talents and tourism economy in this study was divided into two types and twelve levels, as shown in TABLE III.

**TABLE III. Coupling coordination level between tourism talents and tourism economy**

VALUE OF COUPLING DEGREE $C$	LEVEL OF COUPLING	VALUE OF COORDINATION DEGREE $D$	LEVEL OF COORDINATION
$C=0$	Lowest coupling	$D=0$	Uncoordinated
$0 < C \leq 0.3$	Low coupling	$0 < D \leq 0.3$	Low coordination
$0.3 < C \leq 0.5$	Antagonistic	$0.3 < D \leq 0.5$	Moderate coordination
$0.5 < C \leq 0.8$	Running-in	$0.5 < D \leq 0.8$	Good coordination
$0.8 < C < 1$	High coupling	$0.8 < D < 1$	High coordination
$C=1$	Highest coupling	$D=1$	Extreme coordination
When $u_1 > u_2$ , the development of tourism economy is lagging behind; When $u_1 = u_2$ , the development of tourism talents and tourism economy is synchronous; When $u_1 < u_2$ , the development of tourism talents lags behind.			

## IV EMPIRICAL ANALYSIS

### 4.1 Data Acquisition

In this study, we mainly selected the data from China Culture and Tourism Statistics Yearbook, China Statistics Yearbook, Jiangsu Culture and Tourism Statistics Yearbook, Jiangsu Statistics Yearbook and Jiangsu Statistics Development Bulletin from 2014 to 2019. When the data are inconsistent, the data of higher authority department shall prevail.

### 4.2 Determination of Indicator Weight

First, the evaluation indicator data were standardized, and the original index data were subjected to dimensionless processing according to formula (1) to get the standardized value of the evaluation indicator, as shown in TABLE IV.

**TABLE IV. Standardized values of each indicator**

INDICATORS	2014	2015	2016	2017	2018
X <sub>11</sub>	1.0000	0.0000	0.1120	0.2563	0.4540
X <sub>12</sub>	1.0000	0.7414	0.5187	0.2628	0.0000
X <sub>13</sub>	0.0000	0.0019	1.0000	0.6079	0.0775
X <sub>21</sub>	0.0000	0.1879	0.4623	0.6899	1.0000
X <sub>22</sub>	0.1914	1.0000	0.7967	0.0000	0.4844
X <sub>23</sub>	0.9449	0.6019	0.0000	0.3154	1.0000
X <sub>31</sub>	0.0000	0.3606	0.4136	0.9717	1.0000
X <sub>32</sub>	0.0000	0.2700	0.4220	0.7058	1.0000
X <sub>33</sub>	0.0000	1.0000	0.7016	0.9042	0.8264
Y <sub>11</sub>	0.0000	0.1920	0.4428	0.7300	1.0000
Y <sub>12</sub>	1.0000	0.6938	0.5227	0.2806	0.0000
Y <sub>13</sub>	0.6924	0.7715	0.8777	1.0000	0.0000
Y <sub>14</sub>	0.0000	0.1797	0.3719	0.7304	1.0000
Y <sub>21</sub>	1.0000	0.7453	0.4503	0.3043	0.0000
Y <sub>22</sub>	0.0000	0.1836	0.4708	0.7387	1.0000
Y <sub>23</sub>	0.0000	1.0000	0.6607	0.9821	0.5179
Y <sub>31</sub>	0.0000	0.4706	0.6569	0.7059	1.0000
Y <sub>32</sub>	0.0000	0.0762	0.3149	0.7036	1.0000
Y <sub>33</sub>	0.0000	0.1765	0.3934	1.0000	0.8934
Y <sub>34</sub>	0.0000	0.1856	0.4536	0.7423	1.0000
Y <sub>41</sub>	0.0000	0.5306	0.6965	0.7328	1.0000
Y <sub>42</sub>	0.0000	0.2863	0.3765	0.4562	1.0000
Y <sub>43</sub>	0.0000	0.3452	0.5207	0.6701	1.0000
Y <sub>51</sub>	0.0000	0.2705	0.5436	0.7086	1.0000
Y <sub>53</sub>	0.0000	0.3091	0.5665	0.7678	1.0000
Y <sub>53</sub>	0.0000	0.5043	0.6603	0.7563	1.0000

(2) Then, the information entropy and entropy weight (weight coefficient) of each evaluation indicator were calculated by formulas (2) and (3), and the calculation results are shown in TABLE V.

TABLE V. Entropy weight of each indicator

TOURISM TELENT INDICATO RS	INFORMATIO N ENTROPY	WEIGHT COEFFICIEN T	TOURISM ECONOMI C INDICATO RS	INFORMATIO N ENTROPY	WEIGHT COEFFICIEN T
X <sub>11</sub>	0.6977	0.1387	Y <sub>11</sub>	0.7732	0.0975
X <sub>12</sub>	0.8000	0.0918	Y <sub>12</sub>	0.8048	0.0839
X <sub>13</sub>	0.5138	0.2231	Y <sub>13</sub>	0.8554	0.0621
X <sub>21</sub>	0.7744	0.1035	Y <sub>14</sub>	0.7593	0.1035
X <sub>22</sub>	0.7757	0.1029	Y <sub>21</sub>	0.8030	0.0847
X <sub>23</sub>	0.8104	0.0870	Y <sub>22</sub>	0.7731	0.0975
X <sub>31</sub>	0.7998	0.0919	Y <sub>23</sub>	0.8393	0.0691
X <sub>32</sub>	0.7931	0.0950	Y <sub>31</sub>	0.8393	0.0691
X <sub>33</sub>	0.8563	0.0660	Y <sub>32</sub>	0.6989	0.1294
———	———	———	Y <sub>33</sub>	0.7553	0.1052
———	———	———	Y <sub>34</sub>	0.7720	0.0980
———	———	———	Y <sub>41</sub>	0.4549	0.0835
———	———	———	Y <sub>42</sub>	0.7085	0.0648
———	———	———	Y <sub>43</sub>	0.6776	0.0795
———	———	———	Y <sub>51</sub>	0.6291	0.0691
———	———	———	Y <sub>53</sub>	0.5393	0.0567
———	———	———	Y <sub>53</sub>	0.4493	0.0708

#### 4.3 Measurement Results of Coupling Degree and Coupling Coordination Degree

According to formulas (4)(5)(6), the coupling degree and coupling coordination degree between tourism talents and tourism economic system in Jiangsu were calculated, and the corresponding level and type of coupling coordination between them were determined. The results are shown in TABLE VI and Fig 1.

TABLE VI. Coupling coordination results

YEARS	$U_1$	$U_2$	COUPLING DEGREE	COUPLING COORDINATION DEGREE	LEVEL AND TYPE OF COUPLING COORDINATION DEGREE
2014	0.3324	0.0438	0.3207	0.2260	Antagonistic, low coordination, lagged tourism economy
2015	0.3680	0.2563	0.4919	0.3848	Antagonistic, moderate coordination, lagged tourism economy
2016	0.5405	0.3940	0.4938	0.4728	Antagonistic, moderate coordination, lagged tourism economy
2017	0.5102	0.6688	0.4955	0.5476	Antagonistic, good coordination, lagged tourism talents
2018	0.5620	0.7248	0.4960	0.5720	Antagonistic, good coordination, lagged tourism talents

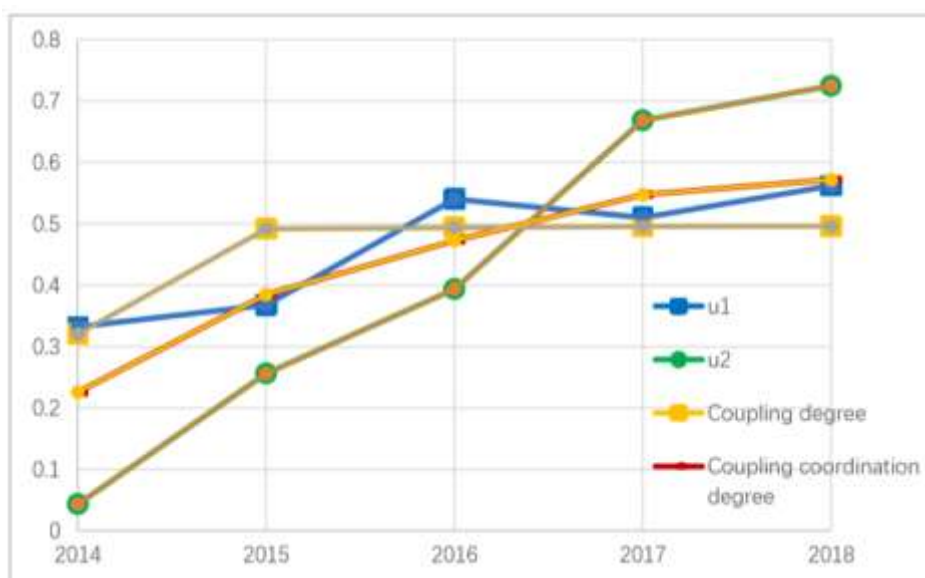


Fig 1: Coupling coordination results

#### 4.4 Analysis on the Measurement Results

##### 4.4.1 Analysis on the annual coupling development state

As calculated above,  $u_1 > u_2$  in 2014 exhibits a coupling degree of 0.3207, a low level of coordination of  $0.3 < C \leq 0.5$ , a high level of coupling coordination of 0.2260, and a low level of coordination of  $0 < D \leq 0.3$ , suggesting a tourism economic lag.  $u_1 > u_2$  in 2015 exhibits a coupling degree of 0.4919, which is higher compared to 2014, but still not breaking through 0.5 and in an antagonistic state of  $0.3 < C \leq 0.5$ , but with a coupling coordination degree of 0.3848, and in a moderately coordinated state of  $0.3 < D \leq 0.5$ , suggesting a moderately coordinated state of tourism economic lag.  $u_1 > u_2$  in 2016 exhibits a coupling degree of 0.4938, which is increasing again compared to previous years, but still at  $0.3 < C \leq 0.5$ , the coupling coordination degree rises obviously to 0.4728, at  $0.3 < D \leq 0.5$ , showing a moderate coordination state of tourism economic lag.  $u_1 < u_2$  in 2017 exhibits a coupling degree of 0.4955, which is higher than previous years, but still at  $0.3 < C \leq 0.5$ , and the coupling coordination degree is significantly increased to 0.5476, which is in the fine coordination state of  $0.5 < D \leq 0.8$ .  $u_1 < u_2$  appears for the first time in 2017, showing lagged tourism talents with moderate coordination, indicating that this year is a turning point when the development of tourism economy has made a leap at a certain stage, and tourism talents are gradually in a state of insufficient quantity and supply due to the rapid development of tourism economy. In 2018,  $u_2$  increased significantly,  $u_1 < u_2$ , with coupling degree of 0.4960 and coupling coordination degree of 0.5720, suggesting relatively lagging tourism talents with a good coordination.

##### 4.4.2 Analysis on development status of coupling coordination trend

First of all, according to the coupling coordination results in Fig. 1, both  $u_1$  and  $u_2$  showed a gradual increase from 2014 to 2019, but the increase of  $u_1$  was much lower than that of  $u_2$ , indicating the rapid development of tourism economy in Jiangsu in recent years on the one hand, and that the economic development needed the support of a large number of tourism talents on the other hand. However, since the speed of talent development is far from meeting the demand of tourism economic development, and increasing the cultivation and supply of tourism talents in the later period is a problem that Jiangsu needed to pay close attention to.

Secondly, the change of coupling degree shows that the coupling state between tourism talents and economy in Jiangsu Province is getting higher and higher in the past five years, but it still hasn't broken through the antagonistic state, and it will take some time to achieve a high-level coupling state in the future.

Finally, the change of coupling coordination degree shows that the coupling coordination between tourism talents and economy in Jiangsu has changed from low coordination to medium coordination and then to good coordination in the past five years. However, at present, the coordination value is only about 0.5, the lowest value of good coordination, and it will take a relatively long time to achieve a breakthrough of 0.8 at a highly coordinated state.

On the whole, the coordination between tourism talents and economy in Jiangsu is in a coordinated state year by year. The main problem at present is that tourism talents cannot meet the needs of the fast-growing tourism economy. Therefore, how to enrich the supply of tourism talents, give full play to the efficiency of tourism talents and meet the intellectual support of the rapid development of tourism economy has become a major focus of tourism development in Jiangsu in the future.

## V. CONCLUSIONS

The integrated development of tourism talents and tourism economy is the new kinetic energy of sustainable development of regional economy. In this paper, based on the concept of sustainable development and the idea of digital economy, an evaluation indicator system of tourism talents and tourism economy was constructed, and a coupling coordination degree model was constructed to quantitatively study the coupling coordination degree between tourism talents and tourism economy system in Jiangsu from 2014 to 2018, and the main conclusions are as follows:

(1) During the research period, the evaluation indicators of comprehensive development level of tourism talents and tourism economy in Jiangsu showed an upward trend, and the development speed of tourism economy was much faster than that of tourism talents. The evaluation indicators of comprehensive development level of tourism talents were 0.3324, 0.3680, 0.5405, 0.5102 and 0.5620 respectively, and those of comprehensive development level of tourism economy were 0.0438, 0.2563, 0.3940, 0.6688 and 0.7248 respectively. In comparison, although both of them are growing at a faster rate, the development rate of tourism talents is later than that of tourism economy, indicating that the intellectual support construction of tourism talents team should be accelerated in the later stage.

(2) During the research period, there was significant coupling between tourism talents and tourism economy in Jiangsu, but the degree of coupling coordination needed to be improved. Within five years, the coupling coordination degrees of the two systems were 0.2260, 0.3848, 0.4728, 0.5476 and 0.5720, respectively, indicating that their coupling coordination degrees gradually increased, but they were still in the antagonistic state, far from the high-quality coupling



coordination. Therefore, accelerating the promotion of the coupling coordination of the two systems in the later stage is beneficial to promoting the high-quality development of regional economy and society.

(3) During the research period, the level of coupling coordination between tourism talents and tourism economy in Jiangsu showed a gradual improvement of “low coordination-medium coordination-good coordination”, and the coupling type showed a lagged tourism economy with low and medium coordination before 2017, which turned into lagged tourism talents with good coordination in 2017, and has now evolved into lagged tourism talents with good coordination. It is thus clear that there is still a big gap between them from the highly coordinated state. The ability of collaborative development needs to be greatly enhanced to finally achieve the goal of coupling and coordinated development between them.

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