Empirical Research on the Coupling Degree of Anhui Regional Based on Index Coefficients, Models and Calculation Methods

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Abstract. In recent years, Anhui Province has made considerable progress in economy development, but there are still many problems. What is particularly prominent is that the contribution of tourism to economy growth is not obvious, and the coupling and coordinated development of tourism industry and regional economy is particularly important. Therefore, the article establishes index coefficients, models and calculation methods, to conduct an empirical analysis of the coupling and coordination degree between the economy and tourism in various regions of Anhui. The results show that there are obvious regional differences on the degree of coordination between the tourism industry and the regional economy in Anhui Province, and the tourism industry and regional economy development are restricted each other. On this basis, measures such as optimizing resources, promoting sustainable development, and changing vacation modes are proposed to optimize the development of tourism.

Keywords: Coupling degree; Tourism industry; Economy development.

1. Introduction
Since the reform and opening up, the tourism industry have played an increasingly prominent role in promoting regional economy development, especially in stimulating domestic demand, promoting economy opening to the outside world, and promoting industrial structure adjustment. In addition, the level of regional economy development will have a direct impact on the concentration of capital, labor, and information. Similarly, a significant increase in the level of regional economy development will also accelerate development procession of the tourism industry. The economy development level is relatively backward of Anhui, and the gaps are relatively obvious between cities. Therefore, the best way to enhance the economy development is accelerating the development of the tourism industry of Anhui. Therefore, this paper will construct a coupling coordination model for analyzing the relationship between tourism industry and regional economy development of Anhui, and explore the problems existing in Anhui tourism industry and regional economy development. At last, the paper have put forward countermeasures and advice for promoting the tourism industry’s development of Anhui.

2. Index Selection and Model Construction

2.1. Establish Indicator System
Based on the mechanism of the coupling and coordinated development between regional economy and tourism industry, a coordination index system is established. The comprehensive indicators of the tourism industry are generally analyzed from seven indicators, including domestic tourist arrivals,
domestic tourism income, inbound tourist arrivals, foreign exchange income from tourism, the number of employee in accommodation and catering services above the designated size, the number of star hotels, and the number of A-level scenic spots. The comprehensive system of regional economy development mainly selected thirteen indicators, such as fiscal revenue, fiscal expenditure, GDP, per capital GDP, tertiary industry output value, per capital net income of farmers, annual average wages of employees, total import and export of goods, mileage of graded highways, new fixed assets in cities and towns, total post and telecommunications business, area of gardens, and the total amount of foreign investment. In addition, the data comes from the "Anhui Statistical Yearbook (2019)" and relevant statistical data of various cities.

2.2. Building the Model of Coupling Coordination

According to the dynamic correlation between the tourism industry and the regional economy, the following formulas will be set to express the function of the tourism industry and the regional economy development level:

\[ F(X) = \sum_{i=1}^{n} A_i X_i \]
\[ G(Y) = \sum_{j=1}^{m} B_j Y_j \]

Among them, \( F(X), G(Y) \) are functions of tourism industry and regional economy development level. In the formula, \( A_i, B_j \) are the weight, and the weight assignment of each index are calculated by the entropy weighting method. \( X_i, Y_j \) are indicators of tourism and economy characteristics, and they are all dimensionless values. Implementation analysis using coordination degree model created by Chongbin Liao, namely:

\[ C = \left( \frac{F(X)\times G(Y)}{\frac{F(X)+G(Y)}{2}} \right)^k \]

In this model, \( C \) represent the degree of coordination, \( k \) represent the adjustment coefficient (\( k \geq 2 \)), let \( k=2 \).

\[ T = \alpha F(X) + \beta G(Y) \]

\( T \) represent the comprehensive evaluation index of the tourism industry and regional economy, and \( \alpha \) and \( \beta \) represent undetermined parameters. Because the interaction between the tourism industry and the regional economy is not balanced, the development process of the regional economy will be affected by a variety of factors, and the tourism industry is only a factor that affects its development. Although it has a driving effect, it is not the only one. so let \( \alpha = 0.6, \ \beta = 0.4 \). Let:

\[ D = \sqrt{C \times T} \]

\( D \) is the degree of coupling coordination.

In addition, in order to have a better description of the degree of coupling coordination between the tourism industry and the regional economy, the following table is used to determine the classification standards and types of coupling coordination.
Table 1. Classification of coupling coordination degree.

| Serial number | Coordination degree | Coordination level          | Serial number | Coordination degree | Coordination level          |
|---------------|---------------------|-----------------------------|---------------|---------------------|-----------------------------|
| 1             | 0.0-0.10            | Extremely adjustment        | 6             | 0.501-0.60          | Barely coordinated          |
| 2             | 0.101-0.20          | Serious imbalance           | 7             | 0.601-0.70          | Primary coordination        |
| 3             | 0.201-0.30          | Moderate imbalance          | 8             | 0.701-0.80          | Intermediate coordination   |
| 4             | 0.301-0.40          | Mild imbalance              | 9             | 0.801-0.90          | Good coordination           |
| 5             | 0.401-0.50          | On the verge of imbalance   | 10            | 0.901-1.00          | Good quality coordination   |

3. Empirical Analysis on the Degree of Coupling Coordination

3.1. Empirical Analysis Results

Based on the basic data of various cities of Anhui, specific numerical values of the coupling coordination degree of tourism industry and regional economy in various cities of Anhui are obtained by calculated, the results as shown in Table 2.

Table 2 Numerical values and types of coupling coordination degree.

| City       | F (x) | G (x) | C     | D     | Type             |
|------------|-------|-------|-------|-------|------------------|
| Hefei      | 0.7292 | 0.8625 | 0.9860 | 0.8932 | Good coordination |
| Anqing     | 0.3424 | 0.2845 | 0.9830 | 0.5499 | Barely coordinated |
| Wuhu       | 0.2045 | 0.3503 | 0.8876 | 0.5030 | Barely coordinated |
| Xuancheng  | 0.1254 | 0.2111 | 0.8744 | 0.3932 | Mild disorder    |
| Huangshan  | 0.8001 | 0.1799 | 0.3593 | 0.3921 | Mild disorder    |
| Maanshan   | 0.1155 | 0.3927 | 0.4936 | 0.3730 | Mild disorder    |
| Chuzhou    | 0.0924 | 0.2283 | 0.6729 | 0.3421 | Mild disorder    |
| Lu'an      | 0.0898 | 0.2016 | 0.7275 | 0.3378 | Mild disorder    |
| Bengbu     | 0.0882 | 0.1812 | 0.7759 | 0.3343 | Mild disorder    |
| Fuyang     | 0.0834 | 0.1924 | 0.7121 | 0.3255 | Mild disorder    |
| Tongling   | 0.0568 | 0.1965 | 0.4847 | 0.2611 | Moderate Disorder |
| Chizhou    | 0.3041 | 0.0677 | 0.3549 | 0.2400 | Moderate Disorder |
| Huainan    | 0.0515 | 0.2357 | 0.3463 | 0.2369 | Moderate Disorder |
| Suzhou     | 0.0420 | 0.1530 | 0.4563 | 0.2226 | Moderate Disorder |
| Bozhou     | 0.0165 | 0.1072 | 0.2134 | 0.1230 | Severe disorder   |
| Huaibei    | 0.0068 | 0.1377 | 0.0325 | 0.0527 | Extremely maladjusted |

3.2. Empirical Analysis Results

3.2.1. Significant differences in coupling coordination between regions. According to the empirical research results, it can be found that the degree of coupling coordination between the tourism industry and the regional economy are quite different of Anhui. Hefei is not only the political and economy center of the province, but also the transportation and tourism center, which it can be made the tourism industry and regional economy development reach a relatively good coupling coordination state; Anqing and Wuhu are located in the Wanjiang city belt, and the economy level is developing rapidly lays on a good economy foundation for the development of the tourism industry, making the tourism industry and the regional economy reach a barely coordinated state.
Although the southern Anhui region has rich tourism resources, its level of economy development hinders the development of the tourism industry, making the tourism industry and the regional economy in a state of mild and moderate imbalance; the northern Anhui region has a relatively low level of economy development, and it is difficult to undertake industrial transfer from developed regions, making its tourism industry and the regional economy in a state of serious and extreme imbalance.

From an overall point of view, the degree of coordination between the tourism industry and the regional economy is generally low of Anhui Province, and the regional differences are also more obvious. Generally speaking, the south is high and the north is low.

3.2.2. The level of regional economy development restricts the development of the tourism industry. Take Chizhou as example, according to analysis, it is actually a moderately unbalanced area in the regional economy development of Anhui. Chizhou is located in the southwest of Anhui, facing the Yangtze River in the north and Huangshan Mountain in the south. And it is rich in tourism resources, among which Jiuhua Mountain is a prominent attraction.

With the rapid advancement of the local tourism industry, its tourism income accounts for a quarter of the city's economy income, and it has also become the local leading industry. However, compared with the developed tourism industry, its level of economy development is far from insufficient, and the ability of regional sustainable development is poor. There is a huge development gap in the development of labor and the level of industrial development. This is the main reason of economy ranking is behind of Chizhou. Therefore, the backward economy restricts the development process of Chizhou tourism industry, making it difficult to break through.

3.2.3. The tourism industry affects the level of regional economy development. At the same time, it was discovered that only Huaibei City is a region of extreme imbalance. Huaibei is an industrial and mining city, and its economy development relies on coal mining and coal power. However, mineral resources will continue to decrease with the deepening of mining. When its resources are exhausted and no alternative industries can be found, the city's economy development speed will continue to decline. The coal resources have been mined continuously over the years and the resources are approaching exhaustion in Huaibei City. As a result, their popularity has become less and less. More importantly, in the tourism establishment of Huaibei City in recent years, there are few characteristic tourism projects, the phenomenon of homogeneity is more obvious, and the image is not clearly, making it difficult for tourists to interest them. Therefore, the development of the tourism industry has severely restricted the level of economy development, and a single economy structure can not create good conditions for the development of the tourism industry, which ultimately leads to both extreme imbalances.

4. Countermeasures for Optimizing the Development of Tourism Industry of Anhui

The tourism industry and regional economy development interact and influence each other. A good level of economy development can achieve the further development of the tourism industry, and the rapid advancement of the tourism industry can also improve the economy development level of the entire region; conversely, it will also cause constraints effect.

Therefore, the following four countermeasures are proposed for optimizing the coupling coordination degree of tourism industry and regional economy development in Anhui Province based on the results of the empirical analysis:

4.1. Optimize Resources, Create Features, and Enhance the Level of Tourism Development

Judging from the current tourism resources of Anhui, although the natural and cultural landscapes have been developed to a certain extent, the development efforts are insufficient and the characteristics are not obvious. At the same time, the management of scenic spots is not perfect, and the infrastructure is not matched, which will become obstacles to the further development of the tourism industry.

Therefore, it is necessary for tourism companies and local governments to cooperate and support each other, to organize practical investigations on the local regional economy development level, cultural
environment, tourist consumer preferences, tourist sources, etc., and develop a unique local tourism model to enhance the scenic spot. In order to make the legitimate interests of tourists in the scenic area be infringed, it should to strengthen management and improve the level of public security, At same time, improve scenic facilities, create conditions for convenient transportation, and save tourists on the road. In this way, it will create a more unique, safe and orderly tourism environment of Anhui, thereby enhancing the competitiveness of the tourism industry, to obtain more opportunities for tourists.

4.2. Promote the Sustainable Development of Tourism Resources
The core premise of the tourism industry is the tourism resources, by developing more types and higher-level tourism resources. Since the market economy is aimed at the pursuit of benefits, it is very easy to seek short-term benefits for some tourism companies and local governments, and develop tourism resources without plans or targets, which will cause many problems to some precious tourism resources. The most regrettable thing is that most tourism resources are unlikely to recover after being damaged. Therefore, the local government must protect the development of certain resources, formulate corresponding legal measures, and use technical or policy means to maintain the sustainable development of tourism resources. Only by better coordinating the relationship between man and nature and maintaining ecological balance can we create the possibility for the sustainable development of regional economy. As far as the tourism industry itself is concerned, a sustainable business model can not only promote the transformation of tourism consumption structure and increase the attractiveness of tourist attractions to tourists, but also promote the prosperity and stability of the entire tourism industry.

4.3. Strengthen the Macro-control of Government and Change the Vacation Mode
Although the holiday economy has greatly promoted the growth of tourism consumption for a period of time, the shortcomings of this highly concentrated tourism model have become increasingly apparent. Whenever a holiday approaches, some tourist attractions, tourism catering services, tourism agencies, etc. are overloaded with work, which makes it difficult to coordinate in terms of service quality. However, the price of tourism products remains high and seriously harms the interests of travel consumers. In contrast, the idle facilities outside the holiday and the under utilization of resources form a strong contrast with the holiday. Under this circumstance, the degree of satisfaction of tourism consumers will show a significant decline, which hinders the growth of overall tourism consumption. Therefore, it is absolutely necessary to reform the existing rest and vacation mode, and change the vacation mode from the original centralized state to the decentralized state. This not only fully compensates for the shortcomings of the limited tourism resources, but also increases the tourism utility of tourists. From a point of view, it has also played a role in promoting the growth of tourism economy.

4.4. Promote the Internationalization of Tourism Economy
The internationalization of the tourism economy can quickly stimulate economy growth. At present, foreign tourists are more inclined to go to Beijing, Nanjing, Xi’an, Hangzhou and other few historical civilized ancient capitals, and higher-level scenic areas such as Huangshan, Qingdao, Jiuzhaigou, Xiamen, and Zhangjiajie in China. The attractiveness of foreign tourists is far from enough, which leads to the extremely unbalanced development of scenic spots in our country. Anhui Province has sufficient tourism resources, but if it wants to attract more domestic and foreign tourists, it also needs to carry out effective and distinctive development of tourist attractions and promote the internationalization of the tourism industry.

5. Conclusion
In the analysis of the coupling and coordination of tourism industry and economic development in Anhui Province, it can be found that the degree of coordination in different regions is not the same, and the development of tourism industry restricts the development of economy. Therefore, it is
necessary to increase the development of tourism industry to promote the economic development of Anhui.

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References
[1] Bing Wu, Yaofeng Ma. Analysis of the Coupling Degree of Inbound Tourism Flow and Hotel Industry-Taking Xi'an as an Example[J]. Journal of Northwest University (Natural Science Edition), 2015, 42(1): 121-126
[2] Statistics Bureau of Anhui Province. 2018 Statistical Bulletin of Anhui Province's National Economy and Social Development[EB/OL]. (2019-02-28)
[3] Zhongqing Yin Tourism: A new force to promote coordinated regional development[N]. economy Daily, 2018-07-14 (6, 7)
[4] Ying Zhu, Yun Liu. Research on the Coordination Degree of Tourism and Tourism Real Estate Coupling in the Suburbs of Kunming-Taking Xinghe Hot Spring Town as an Example[J]. Value Engineering, 2017(23): 165-167.
[5] Chongbin Liao. Quantitative evaluation of the coordinated development of environment and economy and its classification system: Taking the Pearl River Delta urban agglomeration as an example[J]. Tropical Geography, 2017(2): 171-177.
[6] Yongming Wang, Yaofeng Ma. Analysis on the Coupling Degree of Urban Tourism Economy and Transportation Development-Taking Xi'an as an Example[J]. Journal of Shaanxi Normal University, 2018, 39(1): 86-90.
[7] Yuyan Luo. Measuring decarbonated development of tourist attractions associated with ecological environment and tourism economy[J]. Journal of Intelligent & Fuzzy Systems. 2017, Vol. 33 Issue 5, p2877-2886.