



# Construction and Empirical Research on the Coupling Coordination Model of Tourism Industry-Regional Economy-Information Industry System

Qin Yang<sup>1</sup>, Junyi Wei<sup>2</sup>, Tingting Ni<sup>1</sup>, Pan Zhao<sup>1</sup>

<sup>1</sup>Business and Tourism School, Sichuan Agricultural University, Sichuan, China

<sup>2</sup>Business and Tourism School, Xihua University, Sichuan, China

Qin Yang, e-mail: 2020227014@stu.sicau.edu.cn

Junyi Wei, Corresponding author: 263734611@qq.com

Tingting Ni, e-mail: 2021227020@stu.sicau.edu.cn

Pan Zhao, e-mail: 570557211@qq.com

**Abstract.** The article analyzes the comprehensive level and coordination level of the tourism industry-regional economy-information industry system in Chongqing from 2010 to 2020. The study found that: the comprehensive index of the tourism industry, regional economy, and information industry system has steadily improved, and the tourism industry has lagged behind the information industry and regional economic system in the coordination stage.

**Keywords:** tourism industry; regional economy; information industry; coupling coordination degree

## 1 INTRODUCTION

The country's economic strength is enhanced and the tourism industry is booming, making the regional economy and tourism industry a hot topic in academic circles. At the same time, with the rapid rise of the information age, new concepts such as "smart tourism" and "tourism + Internet" have been continuously put forward, and the field of information and tourism research has opened up a multidisciplinary cross-integration. Therefore, exploring the coordination relationship between the tourism industry-regional economy-information industry system, clarifying the influencing factors of industrial development, and promoting high-quality urban construction and sustainable industrial development has become a research topic that has attracted much attention nowadays. As a city that the country focuses on and builds, Chongqing, to study the relationship and degree of interaction between its tourism, economy, and information, is conducive to providing high-quality construction samples of urban agglomerations.

The existing researches on the tourism industry, regional economy, and information industry mainly include concept analysis, influencing factors, coupling mechanism, relationship evaluation, and so on. In terms of the research scope, the main research scope is country<sup>[1-3]</sup>, economic zone<sup>[4-6]</sup>, province, and city<sup>[7-9]</sup>. In terms of research objects, it

mainly focuses on the analysis of the tourism industry and economic development<sup>[2, 8, 10]</sup>, the tourism industry and information industry<sup>[3, 11, 12]</sup>, the information industry, and the regional economy<sup>[13, 14]</sup>. Few scholars discuss the integration of the three. From the research conclusions of scholars, we can find that the development of the tourism industry is closely related to information and economy, both of which provide strong technical support and a solid foundation for tourism development; the information industry effectively promotes regional construction and economic development, which is conducive to tourism Industrial transformation and innovation and upgrading; the regional economy injects development activities into tourism and information development, and becomes an indispensable basic guarantee for the high-quality development of the industry. Therefore, it is more comprehensive to study the interaction relationship and the degree of function between industrial systems. Based on this, this paper constructs the tourism industry-regional economy-information industry system evaluation index system and uses the coupling coordination model to analyze the development characteristics and interaction between the systems, to provide information for the coordinated and sustainable development of Chongqing's tourism industry, regional economy and information industry. Theoretical basis provides scientific judgment basis for regional development in practice.

## 2 EVALUATION AND MODEL

### 2.1 Coupling coordination evaluation model

The researchers use the comprehensive evaluation function to analyze the development status and evolution trend of industrial systems in Chongqing, and obtain the comprehensive value of the tourism industry  $a(x)$ , regional economy  $b(y)$ , and information industry  $c(z)$ . The specific function model is:

$$\begin{cases} a(x) = \sum_{i=1}^l (f_i x'_i) \\ b(y) = \sum_{j=1}^m (g_j y'_j) \\ c(z) = \sum_{k=1}^n (h_k z'_k) \end{cases} \quad (1)$$

In formula (1),  $f_i, g_j, h_k$  represent the weights of various indicators of the tourism industry system, regional economic system, and information industry system.  $x'_i, g'_j, h'_k$  represent each system index. This paper uses range standardization to obtain standardized values. The specific function model is:

$$x'_i = \begin{cases} \frac{x_i - \min\{x_i\}}{\max\{x_i\} - \min\{x_i\}} \\ \frac{\max\{x_i\} - x_i}{\max\{x_i\} - \min\{x_i\}} \end{cases} \quad (2)$$

The researchers use the concept of coupling in physics to identify the role and development changes of the tourism industry-regional economy-information industry system in Chongqing. The specific function model is:

$$C_3 = \left\{ \frac{a_x \times b_y \times c_z}{(a_x + b_y + c_z)^3} \right\}^{\frac{1}{3}} \quad (3)$$

## 2.2 Coupling coordination model

According to the concept analysis, coupling coordination is to reveal the changing trend of industrial systems from disorder to orderly change and from uncoordinated to coordinated development. Therefore, the researchers will build a coupling coordination evaluation model based on calculating the strength of the coupling effect, comprehensively explore the degree of coordination between the tourism industry-regional economy-information industry system in Chongqing, and identify and judge the coordination level between the systems. The specific function model is as follows:

$$D = \sqrt{C \times T} \quad (4)$$

$$T = \alpha a(x) + \beta b(y) + \gamma c(z) \quad (5)$$

In formulas (4) and (5), D is the degree of coupling and coordination of Chongqing's tourism-economy-information industry system, C is the coupling degree of Chongqing's tourism-economy-information industry system, and T is the degree of coupling of Chongqing's tourism-economy-information industry system. The comprehensive evaluation value of the industrial system. When D=0, it is extremely out of balance, and when D=1, the coordination degree reaches the optimal level.  $\alpha$ ,  $\beta$ ,  $\gamma$  are undetermined coefficients. Considering the tourism industry and the information industry as the tertiary industry, the two are mutually conditional and promote each other. The integrated development boosts the rapid growth of the regional economy, and the two play an equally important role. Regional economic development is affected by many factors, and the result of its development is the effect of multi-industry interaction. Combined with expert advice, the final weight coefficients are  $\alpha=\gamma=0.3$ ,  $\beta=0.4$ .

## 3 EMPIRICAL ANALYSIS

### 3.1 Introduction to the research site

Chongqing is an area focused on and constructed by the state, with a total area of about 82,402 km<sup>2</sup> and a permanent population of 32,124,300. Chongqing is extremely rich in tourism resources and has significant tourism economic benefits. It has 262 A-level scenic spots and 714 travel agencies, with a total tourism income of 107.609 billion yuan, accounting for 3.9% of the city's GDP. situation.

### 3.2 Data sources and construction of evaluation index system

Given the accuracy of the research data, the original data adopts the official data such as the "China Statistical Yearbook" and "Chongqing Statistical Yearbook" from 2010 to 2020. Referring to the existing research results[3, 4, 6, 7], a coupling and coordination evaluation index system of Chongqing's tourism industry-regional economy-information industry system is constructed. The research data were all processed without dimension to ensure data comparability, and the entropy method was used to calculate the weight of each index, as shown in Table 1.

**Table 1.** Evaluation system and weight

System	Evaluation Index	Unit	Weight
Tourism Industry	Total tourism revenue as a share of GDP	%	0.048
	Number of inbound tourists	10000 person-times	0.134
	Number of domestic tourists	10000 person-times	0.141
	Foreign exchange earnings from tourism	Ten thousand dollars	0.182
	Domestic tourism revenue	Billion	0.251
	Number of star hotels	Individual	0.073
	Number of travel agencies	Individual	0.052
	Number of employees in the tertiary industry	People	0.041
	Per capita consumption level	Yuan	0.078
	GDP	Billion	0.17
Regional economy	GDP growth rate	%	0.125
	Fiscal revenue	Billion	0.149
	Fiscal expenditure	Billion	0.128
	The tertiary industry's share of GDP	%	0.148
	GDP per capita	Yuan	0.136
	Per capita disposable income	Yuan	0.144
	Total number of prints of books	Ten thousand volumes	0.111
	Total number of prints of newspapers	Million Copies	0.0967
	Total postal service	Billion	0.096
	Number of mobile phone base stations	Individual	0.089
Information industry	Mobile phone user	Million households	0.125
	Internet users	Million households	0.133
	Broadcast coverage	%	0.0829
	TV coverage	%	0.0974

Annual broadcast time of public radio programs	Hour	0.084
Annual broadcast time of public television programs	Hour	0.085

Chart Source: self-drawn

### 3.3 Evaluation results and analysis

Based on the evaluation function and coordination function, using the panel data of the tourism industry-regional economy-information industry system in Chongqing from 2010 to 2020, the  $a(x)$  value,  $b(y)$  value,  $c(z)$  value and T value are obtained, On this basis, the C value and D value were calculated, based on the research data, a comprehensive development trend chart is drawn, and the results are shown in Figures (1).

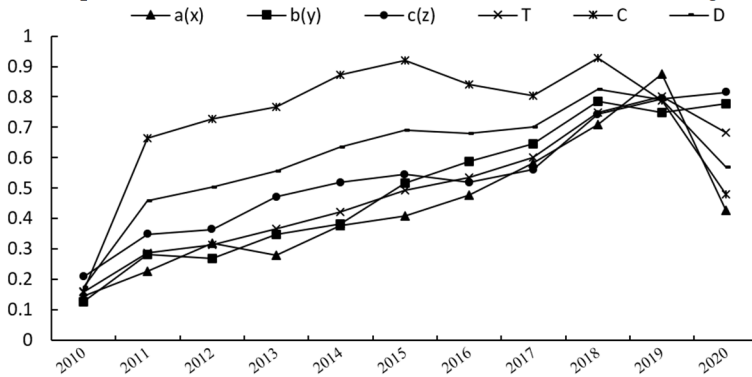


Fig. 1. Coupling and Coordination Trend of Tourism Industry-Regional Economy-Information Industry System

Chart Source: self-drawn

#### Comprehensive evaluation and analysis.

From 2010 to 2020, the comprehensive index of Chongqing's tourism industry-regional economy-information industry system showed a steady growth trend, showing a stable development trend. Judging from various comprehensive evaluation indexes, the inter-system development level shows the leading developer of the information industry, followed by the regional economy and the lagging development of the tourism industry. Since 2010, Chongqing's tourism development has been steadily increasing. To stimulate the international and domestic tourism market, Chongqing actively responds to the national tourism policy, builds an international tourism city, designs boutique tourism routes, improves tourism services, quickly opens up the international and domestic tourism market, and stimulates people's potential tourism. Desire, the tourism industry can develop rapidly, and the tourism economy is rapidly improving. The sudden "new crown pneumonia" epidemic in 2020 has caused a devastating impact on the tourism industry, the tourism industry is almost at a standstill, and the economic situation of

declining growth rate is even worse. As society enters normalized management, actual tourism consumers and potential tourism consumers are more dependent on the Internet, and the tourism industry and the information industry have ushered in new opportunities. The use of digitalization to empower the tourism industry, rapid transformation and upgrading, promote the tourism industry and the information industry. Realize the leap from "quantity" to "quality" and boost regional construction and economic growth.

### **Coupling coordination analysis.**

The coordination state of the tourism industry-regional economy-information industry system in Chongqing is relatively high-quality, and the overall coordination stage has developed from serious imbalance to good coordination, indicating that the coupling between the tourism industry-regional economy-information industry system in Chongqing is well-tuned. The changing trend can be regarded as three development stages: First, the low-level coupling phase (2010-2011). At this stage, Chongqing's information industry system takes the lead, followed by the regional economic system, and the tourism industry system lags. Coupling coordination has experienced serious imbalance and is on the verge of imbalance, and the gap is obvious, indicating that the development level of Chongqing's tourism industry was low during this period, and it was difficult to keep up with the pace of information and economic progress, the system development did not match, and the imbalanced state was obvious. Second, Coordination Rising Phase (2012-2018). At this stage, the degree of coordination is effectively improved, and high-quality development from imbalance to coordination is achieved. With the economic growth and the updating of information systems, the tourism industry has entered a rapid development track, gradually narrowing the gap with other systems, and the degree of mismatch between systems has eased. Third, is the Coordinated decline phase (2019-2020). At this stage, the degree of coordination has decreased, from good coordination to reluctant coordination. development period.

In general, the interaction degree of the tourism industry-regional economy-information industry system in Chongqing is stable and good, the regional economy and the information industry are growing steadily, the leading role of the tourism industry is gradually increasing, and the development potential is huge.

## **4 CONCLUSIONS**

This paper establishes the tourism industry-regional economy-information industry evaluation system, introduces the concept of physics coupling, and uses the calculation model and calculation function to identify and judge the industrial status and coordination degree of Chongqing in 2010-2020. The research finds: First, the evaluation index of Chongqing's tourism industry-regional economy-information industry system is relatively high, showing the leading developer of the information industry, showing a strong driving role, and driving the progress of the economy and tourism industry; the regional economy is growing steadily, and the trend of change is small. The tourism industry develops slowly, the effect of the linkage effect is not obvious, and it eases with the increase of the linkage effect within the industry. The development potential

is huge and needs to be further improved. Second, the coordination effect of the tourism industry-regional economy-information industry system in Chongqing is relatively high-quality, and the overall coordination stage is in the stage of coordination. The degree of cooperation between the systems is strengthened, and the coordination effect is gradually improved. Due to the devastating impact of the 2020 epidemic on the industry, the current coordination between industrial systems has not reached the ideal stage of high quality, and further efforts are needed in the future. Third, from the data results, we can see that Chongqing's economy plays a fundamental supporting role, providing support for tourism and the information industry; with the progress of the times, the leading role of the information industry has increased significantly, driving the transformation and upgrading of tourism; the tourism industry is affected by external disturbances Larger, the development potential is huge, the degree of interaction between tourism and information and economy, to achieve systematic and coordinated development.

## 5 References

1. Yi Baozhong, Li Mingyang. Research on the Coupling and Coordinating Relationship between China's Tourism Industry and Regional Economic Development [J]. *Social Science Front*, 2021(09):255-260.
2. Zhang Xincheng, Gong Zhigang, Gao Nan, et al. An empirical study on the coupling and coordination relationship between China's tourism industry and information industry [J]. *Resource Development and Market*, 2017,33(10):1259-1264.
3. Shan Chen, Chen Yidan. Research on the Differences in Coordinated Development of Beijing-Tianjin-Hebei Tourism Industry-Regional Economy-Social Undertakings [J]. *Economics and Management*, 2020,34(03):1-11.
4. Guo Wei, Zeng Xiangjing, Yang Shuo. Research on the spatial-temporal dynamic pattern and spatial spillover effect of the coupling coordination degree of the regional economy, human settlement environment, and tourism industry [J]. *Ecological Economy*, 2021,37(09):117-124.
5. Zhou Wei, Sun Dongliang, Sun Tong. Research on the coordinated development of tourism industry agglomeration and regional economy in the context of Beijing-Tianjin-Hebei synergy [J]. *Business Economics Research*, 2021(11):164-168.
6. Zhou Lei, Wang Chong. Research on the Coupling and Coordinated Development of Tourism Industry-Regional Economy-Information Industry System [J]. *Statistics and Decision*, 2017(18):103-107.
7. Hu Xiang, Fu Hongqiao. Demonstration of the coordinated development of tourism industry and provincial economy: Taking Hainan Province as an example [J]. *Statistics and Decision-Making*, 2022,38(12):79-82.
8. Yang Yan, Ding Zhengshan, Ge Julian, et al. Coupling and coordination relationship between rural tourism informatization and regional tourism economy in Jiangsu Province [J]. *Economic Geography*, 2018,38(11):220-225.
9. Liang Yongxian. Analysis of the Coupling Coordination Degree of Tourism Industry Development and Regional Economic Development: A Case Study of Shandong [J]. *Dongyue Lun Cong*, 2021,42(08):82-91.

10. Wu Dailong, Cao Fangdong. The temporal and spatial characteristics and influencing factors of the coupling of the tourism industry and informatization: Taking the Yangtze River Delta as an example [J]. *Jianghuai Forum*, 2021(01):29-36.
11. Lopes P, Almeida L, Pinto J, et al. Open Tourist Information System: A Platform for Touristic Information Management and Outreach[J]. *Information Technology & Tourism*, 2019, 21(4): 577-593.
12. Wang Ningning, Chen Rui, Zhao Yu. A Comprehensive Study of Urban Information Space and Economic Space Based on Network Analysis [J]. *Geography and Geographic Information Science*, 2018, 34(04):60-68.
13. Li Qianyan. Coupling Research on Tourism Information and Regional Tourism Cooperation under the Background of Big Data [J]. *Information Science*, 2016, 34(04):129-132.
14. Zhao Chuansong, Ren Jianlian, Chen Yanbin, et al. Spatio-temporal coupling and driving force of China's provincial tourism industry and regional development in the context of global tourism [J]. *China Population, Resources, and Environment*, 2018, 28(03):149 -159.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

