Analysis of the Coupling and Coordination Degree of The Integrated Development of Cultural Industry and Tourism in Southern Sichuan

Xueli Yuan¹, *

¹ School of Architecture, Southwest Minzu University, Chengdu, China
* Corresponding author: Xueli Yuan (Email: 522025301@qq.com)

Abstract: Based on the mechanism of coupling and coordination between cultural industry and tourism development, an evaluation index system was established to comprehensively evaluate the level of cultural industry and tourism development in four prefecture-level cities (Yibin, Zigong, Luzhou and Neijiang) in the southern Sichuan region, and their coupling coordination degree was analyzed according to the coupling coordination degree model. The results show that the development levels of both cultural industry and tourism in southern Sichuan are gradually improving, but the coupling coordination degree level of the two systems is still low; the synchronization analysis shows that the synchronization between cultural industry and tourism development in the four prefecture-level cities in southern Sichuan varies greatly, and generally shows that the development of cultural industry is ahead of tourism development level for a long time, and the synchronization characteristics of the two are not obvious. The development of cultural industry in southern Sichuan region should further explore the tourism resources and the source market formed by the function, and then realize the coupled and coordinated development of the two systems.

Keywords: Cultural industry, Tourism development, Coupling and coordination, Southern Sichuan, Regional differences.

1. Introduction

In 2011, the Sixth Plenary Session of the 17th Central Committee adopted the Decision of the Central Committee of the Communist Party of China on Deepening the Reform of the Cultural System and Promoting the Great Development and Prosperity of Socialist Culture, which refined the spirit of the times and called for the vigorous development of cultural undertakings and cultural industries, to enhance the socialist cultural consciousness and cultural self-confidence and the improvement of the country's cultural soft power. The 14th Five-Year Plan for the Development of Cultural Industries highlights the need to promote the integrated development of cultural industries, create a carrier for the integrated development of culture and tourism, and promote about 30 high-quality tourism performance projects, build about 30 national demonstration zones for cultural industries and tourism industries, and build world-class tourist attractions and resorts, national tourism leisure cities and neighborhoods. Tourism and Leisure Cities and Neighborhoods [1]. In 2020, affected by the epidemic, the annual domestic tourist arrivals were 2.88 billion and domestic tourism revenue was 222.86 billion yuan, both indicators fell by more than 50%, but the annual domestic tourist arrivals and domestic tourism revenue in 2021 increased by 12.8% and 31.0% respectively for tourism's self-recovery. The integration of culture and tourism has become a hot topic of research at present.

Domestic scholars' research on the integration of cultural industry and tourism mainly focuses on tourism performance [2], cultural creative industry [3], tourism branding [4], precise poverty alleviation [5], theme park [6], heritage tourism [7], etc. Jianna Hou believes that the integration and display of regional cultural elements is the key to the success of tourism performance product development [8]. Li Wu-fei discusses the characteristics of creative tourism and analyzes how creative industry thinking and development models reshape and lead to the transformation of tourism industry [9]. Zhang Haiyan points out that cultural industry and tourism can be integrated in a progressive manner through four levels: technology integration, product integration, business and organizational integration, and market integration [10]. Wei Fusheng believes that ethnic cultural resources are regional productivity, and that the coupling and innovation of ethnic cultural creativity with regional tourism development and the use of the irreducible cultural characteristics of ethnic culture are potential advantages for western ethnic regions to catch up [11]. The current research on the coupling of culture and tourism mainly focuses on the industry level. Weng Gangmin analyzes the coupling coordination degree and spatial correlation of the integrated development of tourism and cultural industry in China by using the coupling coordination degree model and exploratory spatial data analysis method [12]. Zhang Yanfei established an evaluation index system to comprehensively evaluate the development level of cultural performing arts and tourism streams in Southwest China, and conducted a coupling coordination degree analysis [13]. Wu Bing constructed a coupled coordination model of inbound tourism flow - hotel industry by taking Xi'an as an example [14]. Zhang Chunhui quantitatively analyzed the coupling coordination degree of the two systems and their spatial and temporal differentiation characteristics in 12 provinces (districts and cities) in western China by constructing a coupling system index system of inbound tourism flow and provincial destinations [15]. Although the research on the coupling of culture and tourism has involved multiple aspects
and perspectives, the research on the cultural industry in tourism in ethnic areas is still immature. Based on the construction of the index system of the two systems of cultural industry and tourism in four prefecture-level cities (Luzhou, Zigong, Yibin, and Neijiang) in the south of Sichuan Province, and the measurement of their coupling coordination, in order to provide decision-making for the quality, efficiency and upgrading of tourism and cultural industry in ethnic areas. The purpose is to provide decision making for the improvement, efficiency and upgrading of tourism and cultural industry in ethnic areas.

2. Mechanism of Coupled Development of Tourism and Cultural Industries

Coupling refers to the phenomenon of two or more systems influencing each other to the point of synergy through interaction, and is a dynamic relationship that is coordinated and facilitated by the benign interaction between the subsystems. The cultural industry and tourism development are two mutually coupled, mutually driven and organic whole containing multiple subsystems.

Cultural industries and tourism development have a significant coupling relationship, which is mainly reflected in the mutual influence as well as synergy between the two developments. The cultural industry and tourism development interact through subsystems, which are coupled systems of mutual influence and constraint. The coupling relationship between cultural industries and tourism development is based on cultural resources and depends on the geographical space and market behavior of tourism development, which is reflected in the synergistic development of tourism regional space.

Tourism and culture are inseparable, culture is the soul of tourism and tourism is the carrier of culture. Whether it is a visit to the human landscape or the intimacy of the natural landscape, it is inseparable from the existence of culture and its cultural concepts. Tourism activities are essentially a cultural activity. Whether tourism consumption activities or tourism business activities, have a strong cultural nature. Culture is reflected in the way people social practice activities, reflected in the material and spiritual products created. Lack of cultural connotation of tourism is no soul of tourism, the lack of cultural taste of tourism products is difficult to form a tourism brand, is not have a long-lasting attractiveness and vitality. Tourism is the carrier to realize the function of cultural education and entertainment, and is the way to excavate culture, promote culture, enrich culture and protect culture.

Both the cultural industry and the tourism industry are industries with strong correlation, high permeability and blurred industrial boundaries, and the two industries intersect with each other, which also provides favorable conditions for the integration and development of the two industries. Culture provides rich connotations and cultural products for the tourism industry, while tourism provides a carrier, market space and resource input for the development of the cultural industry, achieving win-win interaction and common development.

3. Research Methodology and Indicator System Construction

3.1. Research Methodology

3.1.1. Entropy Method

In this paper, on the basis of standardizing the original data through the extreme difference method, the entropy value method is used to determine the weight of each indicator. The entropy value method mainly judges the importance of an indicator by judging its dispersion degree, and the greater the dispersion degree of the indicator, the greater the influence of the indicator on the comprehensive evaluation, which can avoid the bias caused by subjective factors to a certain extent. Considering that the data in this paper mainly come from the statistical yearbook, the entropy value method is used to determine the weights and conduct comprehensive evaluation, and the main steps of the method are as follows.

(i) Standardization of indicator data. In view of the difference in the scale of each indicator data, the indicators are standardized. All indicators are positive indicators. Assuming that the data of the jth indicator in year i of a region is xij , the maximum and minimum values of this indicator are set as xmax and xmin , respectively. To avoid meaninglessness in the subsequent logarithmic calculation, the initial standardized data are uniformly added by 0.001, and the final standardized value is xij ’ (Equation 1), where i=1, 2, ..., m denotes the year number; j=1, 2, ..., n denotes the indicator serial number, and the same below.

\[
x_{ij}' = \frac{x_{ij} - x_{\min}}{x_{\max} - x_{\min}} + 0.0001
\]  

(1)

The comprehensive evaluation value Ui of the development level of cultural industry or tourism development in various parts of the southern Sichuan region can be measured directly using the linear weighting method (Equation 5).
\[ U_i = \sum_{j=1}^{m} w_j x_{ij} \]  

(5)

3.1.2. Coupling Degree Model Construction

The coupling degree can reflect the strength of the interaction between the development of cultural industry and the development of tourism industry, but it is difficult to measure how well their coordinated development level. Therefore, the coupling coordination degree model of the two is further constructed as follows (Equation 6).

\[ D(u_1, u_2) = C(u_1, u_2)T(u_1, u_2) \]

\[ T(u_1, u_2) = au_1 + bu_2 \]

\[ C = \frac{\sqrt{u_1 \times u_2}}{u_1 + u_2} \]  

(6)

Where: D is the coupling coordination degree value; T is the comprehensive coordination index of tourism and cultural industries, reflecting the contribution of the development level of the two industries to the coordination degree; C is the coupling degree value, C ∈ [0, 1], when C = 0, the coupling degree is the smallest, when C = 1, the coupling degree is the largest [16], 0.5 is the dividing line, above 0.5 is to reach the primary coordination, below 0.5 are in the dysfunctional stage. \( a, b \) are coefficients to be determined, considering that the cultural industry and tourism development in the southern Sichuan region are of equal importance, so the prevailing practice is borrowed here: \( \alpha \) and \( \beta \) are taken as 0.5; \( u_1, u_2 \) are the respective total efficacy contributions of tourism and cultural industry.

Referring to Liao Chongbin's principles of coordination degree classification [17], the cultural industry-tourism development coupling coordination degree was classified into 10 categories (Table 1).

### Table 1. Classification of coordination levels

<table>
<thead>
<tr>
<th>Coupled coordination</th>
<th>Coordination level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-0.1</td>
<td>rare-imbalance</td>
</tr>
<tr>
<td>0.1-0.2</td>
<td>critical-imbalance</td>
</tr>
<tr>
<td>0.2-0.3</td>
<td>moderate-imbalance</td>
</tr>
<tr>
<td>0.3-0.4</td>
<td>mildly-imbalance</td>
</tr>
<tr>
<td>0.4-0.5</td>
<td>on the verge of imbalance</td>
</tr>
<tr>
<td>0.5-0.6</td>
<td>barely-qualified</td>
</tr>
<tr>
<td>0.6-0.7</td>
<td>junior-ranking</td>
</tr>
<tr>
<td>0.7-0.8</td>
<td>mid-level-coordination</td>
</tr>
<tr>
<td>0.8-0.9</td>
<td>good-coordination</td>
</tr>
<tr>
<td>0.9-1.0</td>
<td>excellent-qualitative</td>
</tr>
</tbody>
</table>

3.2. Data Collection and Indicator System Construction

3.2.1. Data Collection

Given that China began to pay attention to cultural construction from the policy level after 2014, the sample data from 2014-2019 were selected for this paper. In order to ensure the objectivity and accuracy of the collected data, the data on cultural industry and tourism development used in this paper are obtained from the 2014-2020 Sichuan Provincial Statistical Yearbook, the statistical yearbooks of the four prefectures, and the statistical bulletins on national economic and social development of the four prefectures to supplement them. For the small amount of missing data, the data of other years were used to fill in the data using the weighted average method or trend extrapolation method.

3.2.2. Indicator System Construction

According to the principles that need to be followed in the construction of the indicator system: scientific, comparability, operability, comprehensiveness, accessibility, etc., the two system indicator system of cultural industry and tourism development is constructed. The cultural industry is a business mode whose main activity is to produce and provide spiritual products, and whose goal is to satisfy people's cultural needs. Cultural industry needs to be carried by performing arts groups, museums, cultural museums, tourism resources, etc. Considering the accessibility and completeness of data, the number of arts performing groups, the number of employees of arts performing groups, the proportion of employees of arts performing groups, the total number of tourism resources, the number of museums and cultural museums are selected to measure the cultural industry. Combined with the recommendations of relevant experts and scholars, tourism development indicators include six items, including: the number of domestic tourists, domestic tourism revenue, the proportion of tourism revenue to GDP, tourism foreign exchange earnings, star-rated hotels, and road passenger turnover. (Table 2)

### Table 2. Evaluation indicators of cultural industry development and tourism development

<table>
<thead>
<tr>
<th>U1</th>
<th>Name of indicator</th>
<th>U2</th>
<th>Name of indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>cultural industry</td>
<td>Number of performing arts organizations (in number)</td>
<td>Tourism development</td>
<td>Number of domestic tourists (million)</td>
</tr>
<tr>
<td></td>
<td>Practitioners in performing arts groups (persons)</td>
<td></td>
<td>Domestic tourism revenue (billion yuan)</td>
</tr>
<tr>
<td></td>
<td>Share of employees in performing arts groups (%)</td>
<td></td>
<td>Tourism revenue as a share of GDP (%)</td>
</tr>
<tr>
<td></td>
<td>Total tourism resources (million)</td>
<td></td>
<td>Foreign exchange earnings from tourism (US$ million)</td>
</tr>
<tr>
<td></td>
<td>Number of museums and cultural halls (in number)</td>
<td></td>
<td>Star-rated hotels (pcs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Road passenger turnover (million km)</td>
</tr>
</tbody>
</table>
4. Analysis of the Degree of Coupling and Coordination Between Cultural Industries and Tourism Development

4.1. General Development of the Cultural Industries

According to the determined cultural industry and tourism development evaluation index system and evaluation method, the comprehensive development level total price index U1 of the cultural industry in south Sichuan from 2014 to 2020 can be obtained, and its overall development trend map is made accordingly (Figure 1). From the figure, it can be found that before 2020, the cultural industry of four prefecture-level cities in south Sichuan are at a lower level of development level index are not reached 0.4, and the difference is not big; except for Zigong city in 2019, the development index quickly exceeds 0.5, and in 2020, it quickly falls back to below 0.5. In terms of overall development trend, the development level of cultural industries in the four prefecture-level cities in southern Sichuan generally tends to be stable, except for a slight downward fluctuation from the end of 2019 due to the impact of the new crown pneumonia epidemic, the change in the development level of cultural industries in each city is not very different. Among them, the development speed of cultural industries in Neijiang and Luzhou is significantly lower, while the development speed of cultural industries in Yibin and Zigong is significantly higher than that in Neijiang and Luzhou. In terms of regional differences in the development level, the development level of cultural industry in Zigong City is significantly higher than that of other regions, and has converged to 0.5 since 2016, exceeding other regions.

4.2. General Development Trend of Tourism Development

Similarly, the comprehensive development level index U2 of tourism development in the southern Sichuan region from 2014 to 2020 can be calculated, and on this basis, its overall development trend map is made (Figure 2). It can be found that the overall level of tourism development in the southern Sichuan region is not very high in all four prefecture-level cities in Sichuan, and the overall strength of Luzhou City is the strongest, basically increasing year by year from 2014, reaching a peak in 2019, which is already close to 0.8; the tourism development level of Yibin City and Luzhou City is significantly higher than that of Neijiang City and Zigong City, of which Neijiang City has the lowest tourism development level, with tourism development index has been below 0.3 for a long time. In terms of the overall development trend, the tourism development level across southern Sichuan has experienced two peak fluctuation periods, one in 2015 and the other in 2019. Due to the emphasis on cultural construction proposed from the national level in 2014, in the first year of policy implementation, the policy was favorable to promote the development of cultural industries, which led to the growth of tourism development, and then tourism development tended to stabilize, indicating that the policy implementation needs to be improved; due to the impact of the new crown pneumonia epidemic at the end of 2019, tourism after 2019 was hit significantly and a precipitous decrease occurred, with each regions all dropping below 0.4.

4.3. Analysis of the Degree of Coordination Between Tourism Development and Cultural Industry Coupling

4.3.1. General Development Trend of Coupling Coordination

According to the comprehensive evaluation value of cultural industry and tourism development in south Sichuan, combined with the formula 6, the coupling coordination degree of the two systems can be calculated (Table 3), and according to this, the coupling coordination development trend chart of cultural industry and tourism development in south Sichuan is made (Figure 3). It can be found that the coupling coordination degree of the two systems of cultural industry and tourism development in the southern Sichuan region is between 0.4 and 0.7. From the development level, the level of coupling and coordination between cultural industry and tourism development in southern Sichuan region are relatively low, the best Yibin city broke through 0.7 by 2015 and reached the intermediate level of coordination; the coupling and coordination level of other regions is at a lower level, none of them break through the critical point of 0.7, especially Neijiang city is on the verge of disorder for a long time. In terms of the overall trend, the coupling coordination level of the two systems across the southern Sichuan region as a whole has not changed much and tends to be stable, except for two more critical time points in 2015 and 2019. In terms of local differences, Yibin City has the highest coupling
level, but the development declines after 2015 and remains in primary coordination for a longer period of time; Zigong City shows an upward trend in the overall coupling coordination level, rising from barely coordinated in 2014 and in primary coordination from 2015-2019; Neijiang City is on the verge of dissonance until 2016, except for 2020 when it is affected by the epidemic, the coupling coordination level rose slightly to barely coordinated status in 2017-2019, but the city's development has been sluggish for a long time and has not been able to achieve a big breakthrough.

![Figure 3. Coupled and coordinated development of cultural industries and tourism development in the southern Sichuan region, 2014-2020](image)

**Table 3. Tourism Development-Cultural Industry Coupling Coordination in South Sichuan, 2014-2020**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Yibin prefecture level city in Sichuan</td>
<td>0.637136</td>
<td>0.683794</td>
<td>0.652026</td>
<td>0.641263</td>
<td>0.637337</td>
<td>0.712228</td>
<td>0.628704</td>
</tr>
<tr>
<td>Neijiang prefecture level city in Sichuan</td>
<td>0.460590</td>
<td>0.511372</td>
<td>0.499178</td>
<td>0.519668</td>
<td>0.495300</td>
<td>0.483024</td>
<td>0.464032</td>
</tr>
<tr>
<td>Luzhou prefecture level city in Sichuan</td>
<td>0.495895</td>
<td>0.647083</td>
<td>0.596323</td>
<td>0.605929</td>
<td>0.599285</td>
<td>0.579760</td>
<td>0.538526</td>
</tr>
<tr>
<td>Zigong prefecture level city in Sichuan</td>
<td>0.486808</td>
<td>0.660590</td>
<td>0.631630</td>
<td>0.611137</td>
<td>0.621784</td>
<td>0.619212</td>
<td>0.539328</td>
</tr>
</tbody>
</table>

**4.3.2. Trends in Synchronicity between Cultural Industries and Tourism Development in Southern Sichuan**

Synchronicity between economic systems means that different regions have roughly similar growth trends and fluctuation cycles in observable economic indicators, and it is also an important indicator to test the synergy between two economic systems. Synchronicity between cultural industry and tourism development refers to the fact that cultural industry and tourism development have roughly similar growth trends and the growth process has the characteristic of "the same rise and fall", and analyzing the synchronization characteristics of the two can provide a deeper understanding of the development linkage between them. According to the different development levels of cultural industry system and tourism development system, the coupling coordination degree categories can be divided into three types: U1 > U2, tourism development lagging type; U1 = U2, cultural industry and tourism development synchronous type; U1 < U2, cultural industry development lagging type. Accordingly, according to the calculated comprehensive development level index of cultural industry and tourism development in each place in south Sichuan, we can get a comparison of the development trend of synchronous development of cultural industry and tourism development in each place (Figure 4), according to which the influencing factors of coupled and coordinated development of cultural industry and tourism development in south Sichuan can be analyzed.

It can be found that, on the whole, the synchronization of cultural industry and tourism development in the four prefecture-level cities in the southern Sichuan region varies greatly, generally showing that the development of cultural industry is ahead of the level of tourism development for a long time, and the synchronization characteristics of the two are not obvious, indicating that the development and formation of cultural industry is not closely related to the development of local tourism; a considerable proportion of cultural industry is not combined with tourism, and the cultural The promotion of the brand is also insufficient, and the development of cultural industries has limited contribution to tourism development; at the same time, many activities of cultural industries are more social activities of poverty alleviation and public welfare nature, and their tourism positioning and functions need to be further explored; they should be combined with the unique local regional culture to develop cultural performing arts activities with characteristics, and increase the promotion and publicity of the activities to give them added value for tourism. The development trend of cultural industry in Luzhou is significantly lower than the development trend of tourism, showing a lagging coupling coordination of cultural industry development. Luzhou's GDP is at the top of the four prefecture-level cities, and its tourism industry and related supporting facilities are well developed, but its cultural connotation needs to be further explored. Luzhou is rich in minority resources, and the uniqueness of its cultural resources needs to be further developed, and its promotion and publicity efforts should be increased. The GDP of Zigong and Neijiang is at a low level in southern Sichuan, and their tourism facilities and related supporting development are relatively backward, basically in the tourism development lagging type; the development of tourism and cultural industry in Yibin is more synchronized, and the development of its cultural industry has a certain effect on the promotion of tourism development, and tourism development can get some support from the cultural industry, and the activities
related to the cultural industry can become the brand attraction of tourism industry. Industry's brand attraction.

Figure 4. Synchronicity between cultural industry and tourism development in the southern Sichuan region, 2014-2020

5. Conclude

Combined with the coupling coordination degree model, this paper elaborates the mechanism of coupling and coordination between cultural industry and tourism development, establishes the corresponding comprehensive evaluation index system for the comprehensive evaluation of the level of cultural industry and tourism development in four prefecture-level cities in southern Sichuan, and constructs a mathematical model of coupling and coordination degree between cultural industry and tourism development to evaluate their coupling and coordination degree, and draws the following conclusions.

Firstly, the coupling between the cultural industry and tourism development is low. The coupling relationship between the cultural industry and tourism development in southern Sichuan is poorly coordinated, the resources, markets and other elements of the two systems have not fully established links, the dependence of tourism development on the cultural industry is low, and no unique cultural brand and regional cultural industry development brand has been formed in southern Sichuan.

Secondly, the development level of both cultural industry and tourism in southern Sichuan is gradually improving, but the overall level is still on the low side. The cultural industry in south Sichuan is at a low level, and the development index has not reached 0.4, and the difference is not large, except for Zigong, where the development index rapidly exceeded 0.5 in 2019 and rapidly fell back to below 0.5 in 2020; tourism development is influenced by many external factors and has obvious volatility, and is influenced by the cultural construction policy dividend and the epidemic to generate two fluctuating peaks. This indicates that on the whole, the level of cultural industry and tourism development in southern Sichuan is still at a low level, and the potential for future improvement is large.

Thirdly, the coupling coordination degree level of cultural industry and tourism development in southern Sichuan is low. Although the coupling coordination degree has all improved to some extent, except for Yibin City, which broke through 0.7 in 2015 and reached the intermediate coordination level, Luzhou City and Zigong City are basically in a barely coordinated state, especially Neijiang City, whose development has been lagging for a long time and is on the verge of dissonance.

Forthly, Synchronicity analysis shows that the synchronization of cultural production and tourism development in the four prefecture-level cities in the southern Sichuan region varies widely, and generally shows that the development of cultural industry is ahead of the level of tourism development for a long time, and the synchronization characteristics of the two are not obvious. The uneven posture of the development of the two systems will inevitably affect the level of their coupling and coordination, such as in the Yungui region, which is characterized by cultural tourism, the coupling and coordination of the two systems is not high, which has a certain relationship with the lagging development of its cultural performing arts. The development of cultural industry is not enough to drive the development of tourism, so the southern Sichuan region should pay special attention to excavating and creating local regional culture, developing relevant cultural industries by combining the characteristics of the Miao settlements in southern Sichuan, and also pay attention to the role of the source market formed by tourism in the development of cultural and performing arts products, basing on the needs of tourists for creative development, and finally improving the coupling and coordination level of the two systems. Due to the lack of basic data on cultural and performing arts in southern Sichuan, there are certain limitations; at the same time, due to the special characteristics of different regions, the selection of specific indicators also needs to better reflect the characteristics of the region.
Therefore, in future research, investigations can be carried out for the characteristics of tourism destinations, and a more complete indicator system can be established to study the coupling and coordination of regional cultural industry and tourism development systems in greater depth.

References


