

# Research on Spatial Distribution and Coupling Characteristics of Sports Industry and Tourism Industry Based on Big Data Computational Analysis

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## ABSTRACT

This paper focuses on the coupling and coordinated development of provincial sports industry and tourism industry. In view of the integration trend of the two as the pillar of the tertiary industry and driven by relevant policies, in view of the insufficient quantitative and regional comparison of existing studies, data from 31 provinces from 2014 to 2021 were selected for analysis. The connotation mechanism of coupling coordination is explained from the economic, social, ecological and cultural levels, and the system including industrial scale and structural indicators is constructed, and the coupling coordination degree model is used to calculate. The results show that the coupling coordination degree of the country is rising in a step, with the eastern starting point being high, the central part making great progress and the western part growing fast. The types of industrial development vary between regions and over time. The global Moreland index shows that there are significant autocorrelation and clustering in the space, the local "high-high" cluster in the east and part of the middle, and the "low-low" cluster in the west. Further, suggestions were put forward to strengthen policy guidance, optimize industrial structure, promote the development of talents and technology, and strengthen the protection and utilization of ecological culture, so as to provide decision-making reference for industrial upgrading and sustainable development of regional economy.

**Keywords:** Sports industry, tourism industry coupling coordination degree, spatial autocorrelation

## 1. Instruction

As the scale of China's tourism and sports industries continues to expand, the degree of integration between the two is gradually increasing. Sports tourism, as an emerging industry in the deep integration of the sports industry and tourism industry, integrates the diversified elements of sports

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and tourism, and takes sports activities as the core to satisfy the public's demand for health and recreation, tourism and leisure and provide related products and services through the main forms of on-site spectating, participating in the experience, and visiting and touring [1-4]. With the change of consumption pattern and the growing demand for sports and leisure, the rapid development of China's economy and the transformation of income class structure have jointly promoted the development of sports tourism in a diversified direction [5-7]. The cross-fertilization of sports tourism industry gradually forms new industrial dynamics and realizes the complementarity and expansion of inter-industry functions in order to reach the goal of industrial integration [8-9].

Industrial integration is a development mode and industrial organization form for industries to enhance productivity and competitiveness in the context of economic globalization and rapid development of high technology [10]. The deep integration of tourism and sports industries plays a crucial role in the high-quality development of China's social economy. At the same time, the integration of tourism and sports helps to enrich the public's spiritual world to satisfy their growing spiritual and cultural pursuits [11-12]. The integration of sports culture in the tourism industry can further promote economic development by attracting sports enthusiasts to increase the flow of people [13-14]. The integration of tourism projects in the sports industry can drive the development of local related industries and form new economic growth points [15-16]. The integration of the two can effectively improve the utilization efficiency of resources, accelerate the transformation of old and new kinetic energy, promote the high-quality development of economy and society, and also promote the dissemination and inheritance of traditional culture [17-19]. Therefore, it is of great significance to systematically investigate the spatial distribution characteristics and coupling characteristics of the sports industry and tourism industry to optimize the spatial layout of sports tourism, enhance the spatial configuration of sports tourism resource elements and promote the linked development of inter-regional sports tourism projects [20-23].

As the sports tourism consumer market continues to expand, various regions have launched a rich variety of sports tourism projects, and the academic research on sports tourism projects has gradually increased. Literature [24] explored the spatial distribution pattern of the sports tourism industry and its influencing factors, pointing out that there are regional differences between different sports tourism industry projects, and natural resources are the primary factor explaining the spatial distribution of the industry, providing theoretical support for the mining of resources between the sports industry and tourism industry. Literature [25] combines spatial data analysis and grey correlation analysis model to study the spatial distribution pattern of sports tourism resources in the Yangtze River Delta region, which helps to optimize the allocation of resources between the sports industry and tourism industry in the region, and promotes the in-depth integration and development of the two. Literature [26] used ARCGIS to establish a spatial database of sports tourism attractions, and used it as a basis to analyze the spatial distribution characteristics of sports tourism industry in the destination system, which helps to understand the sports tourism resources in the region. Literature [27] studied the coupling development mechanism of sports industry and tourism industry in depth, analyzed the coupling degree and coordination degree of the two industries by constructing a data-based evaluation model, effectively assessed the coupling relationship between the two, and revealed the future development space and potential. Literature [28] established a sports tourism evaluation index system for the Chengdu-Chongqing region and analyzed the trend of coordinated evolution of sports tourism in the region accordingly, and provided effective insights for managers to promote the high-quality development of the sports tourism industry by identifying the obstacles to the coupled and coordinated development of the sports industry and tourism industry. Literature [29] used grey correlation analysis to analyze and assess the coupling development trend of the sports industry and tourism industry, and emphasized that the symbiotic relationship between the two is an important aspect of enhancing regional economic and environmental sustainability.

Therefore, this paper selects the integrated development of China's sports industry and tourism industry as the research object, selects the relevant data of 31 provinces from 2014 to 2021, constructs an evaluation system, and studies the integrated development of sports and tourism industry, in order to provide decision-making reference for the upgrading of sports and tourism industry structure in different regions of China.

## **2. The connotation mechanism of coupling and coordination between sports industry and tourism industry**

To study the connotation and mechanism of coupling coordination between sports industry and tourism industry, we need to define the concept of coupling coordination between industries first. Therefore, it can be considered that the degree of interactive coupling coordination between the sports industry and the tourism industry is to measure the strength of the relationship between the two industries that promote and influence each other. As an important part of the three industries, sports industry and tourism industry themselves have multiple similar characteristics. Therefore, the connotation mechanism of coupling coordination between sports and tourism industry can be expounded from the cultural, economic, social and ecological levels.

### *2.1. Economic coupling and coordination: promote national economic growth and promote industrial structure upgrading*

On the one hand, the improvement of people's living standards has promoted the expansion of the demand market of various industries, including the sports industry and the tourism industry, and the synergy between supply and demand has become an important driving force for economic growth. At the same time, the improvement of living standards promotes people's specialization and customization of products and services, and the integrated development of sports industry and tourism industry can better meet consumer demand, and then promote national economic growth. On the other hand, the integrated development of sports industry and tourism industry can promote the upgrading of industrial structure. The optimization of industrial structure is one of the important manifestations of high-quality industrial development, which is characterized by the transfer of primary industry and secondary industry to tertiary industry, which plays a boosting role in promoting economic transformation and upgrading and improving quality and efficiency.

### *2.2. Social coupling and coordination: enhance the ability to absorb employment and improve people's living standards*

The education industry and tourism industry have multiple advantages such as long industrial chain, large industrial correlation and wide radiation range, Accelerating the sports industry and tourism industry will help to enhance the ability to absorb jobs and improve people's living standards. From the perspective of the sports industry's ability to absorb employment, the sports industry achieved 4.439 million employees in 2018. Second, with the promotion and support of the national strategy of healthy China and national fitness, the concept of mass consumption has changed, and the consumption structure has gradually changed from material-type consumption to ornamental and participatory consumption. The sports and tourism products and services provided by the sports and tourism industry play a positive role in promoting the people's needs for a better life and the prosperity of people's spiritual and cultural life. To sum up, the sports industry and the tourism industry have greater commonality in enhancing the ability to absorb employment and improve people's living standards, and can promote the coupling and coordinated development of the sports industry and the tourism industry.

### 2.3. *Ecological coupling and coordination: promote green production and consumption and provide eco-friendly services*

Sports industry and tourism industry are green industry and sunrise industry with economic benefit, social benefit and ecological benefit. Accelerating the development of sports industry and tourism industry will play a positive role in promoting green production and consumption and providing eco-friendly services. On the one hand, both the sports industry and the tourism industry have the characteristics of public welfare, that is, they have the attribute of social benefits. The sports and tourism products provided by the government, society and various organizations can meet the consumption demand of the mass consumers for sports tourism, and play an important role in promoting green consumption, ecological consumption and healthy consumption. On the other hand, both the sports industry and the tourism industry have strong forward and backward industrial correlation effect, which promotes the interactive coupling and coordinated development, provides the public with appropriate sports and tourism high-quality ecological products, promotes the development of green ecological industry, and forms an ecologically friendly production mode and lifestyle.

### 2.4. *Cultural coupling and coordination: Create a healthy consumption culture and promote the integration of sports and tourism into new business formats*

The sports industry and tourism industry can create a healthy consumption culture by providing products and services, promote the coupling and coordinated development of the two industries, and form a new business form of the integration of sports and tourism. On the one hand, from the perspective of creating a healthy consumption culture, the sports industry provides sports services, sports goods and other health consumer products, and the tourism industry provides tourism shopping, catering and accommodation and other products and services. On the other hand, accelerating the integration of the sports tourism industry is conducive to the formation of new formats and new models, actively adapt to the needs of upgrading the consumption structure in the context of the transformation of the major social contradictions in the new era, and then form a new model of interactive development between the sports industry and the tourism industry linked by the integration of sports and tourism.

## 3. Index system construction

### 3.1. *Index system construction and related data sources*

Based on the basic principles of scientificity, feasibility, objectivity and availability of index data, and based on the coupling development mechanism of sports industry and tourism industry, the relevant data of 31 provinces in China (excluding Hong Kong, Macao and Taiwan) are analyzed and studied. In this paper, sports industry system  $\mu_1$  and tourism industry system  $\mu_2$  are selected as the first-level indicators, industrial scale and industrial structure are two second-level indicators, and the third-level indicators are mainly derived from China Statistical Yearbook, China Tourism Statistical Yearbook, authoritative data released by the General Administration of Sport and relevant official websites, and statistical yearbook and communique of various provinces (see Table 1).

**Table 1.** Evaluation index system of integrated development of sports industry and tourism industry

| Primary indicators                 | Secondary indicators | tertiary indicators                                                                    | type           |
|------------------------------------|----------------------|----------------------------------------------------------------------------------------|----------------|
| Sports industry System ( $\mu_1$ ) | Industrial scale     | Added value of sports industry                                                         | Positive index |
|                                    |                      | The value added of the sports industry as a percentage of gross domestic product (GDP) | Positive index |

|                                     |                      |                                                                                    |                |
|-------------------------------------|----------------------|------------------------------------------------------------------------------------|----------------|
|                                     | Industrial structure | Sports lottery sales                                                               | Positive index |
|                                     |                      | Number of national social sports instructors                                       | Positive index |
|                                     |                      | Per capita sports field area                                                       | Positive index |
|                                     |                      | Number of cultural, sports and entertainment legal entities                        | Positive index |
| Tourism Industry System ( $\mu_2$ ) | Industrial scale     | Gross tourism revenue                                                              | Positive index |
|                                     |                      | The value added of the tourism industry as a share of gross domestic product (GDP) | Positive index |
|                                     | Industrial structure | Number of travel agents                                                            | Positive index |
|                                     |                      | Number of A-level tourist attractions                                              | Positive index |
|                                     |                      | Urban green space                                                                  | Positive index |
|                                     |                      | Number of star-rated hotels                                                        | Positive index |

### 3.2. Standardized Processing

In order to eliminate the dimensional influence between the indicators, the measurement units used in the evaluation index system of the integrated development of sports industry and tourism industry are different<sup>Error! Reference source not found.</sup>. It is necessary to standardize the indicator data. Since the indicators constructed in this study are all positive indicators, it is only necessary to adopt corresponding data standardization processing methods, and the specific formula is as follows:

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

$\mu_{ij}$  is the value after dimensionless processing;  $X_{ij}$  is the unprocessed data in the index system, indicating the  $j$  index data in the year  $i$ ;  $\max(X_{ij})$  represents the maximum value in the  $j$  indicator in year  $i$ , and  $\min(X_{ij})$  represents the minimum value in the  $j$  indicator. Since the subsequent calculation process of natural logarithms is involved, in order to avoid the meaninglessness of the assigned number, the calculation results are uniformly added to 0.01 for non-negative processing<sup>Error! Reference source not found.</sup>.

### 3.3. Determining Indicator Weights

After standardizing the data of the index system, it is necessary to calculate and determine the weight of the index. In order to ensure that the problem of information overlap among multiple indicator variables is dealt with objectively<sup>Error! Reference source not found.</sup>, entropy method is selected in this paper to determine indicator weights.

1) Calculate the proportion of item  $j$  in year  $i$  of a region. The specific formula is as follows:

$$S_{ij} = \frac{\mu_{ij}}{\sum_{i=1}^m \mu_{ij}} \quad (2)$$

2) Calculate the entropy of the  $j$  index. The specific formula is as follows:

$$h_j = -k \sum_{i=1}^m S_{ij} \ln S_{ij}, k = 1/\ln m \quad (3)$$

3) Calculate the difference coefficient of item  $j$ . The specific formula is as follows:

$$a_j = 1 - h_j \quad (4)$$

4) Calculate indicator weights. The specific formula is as follows:

$$\omega_j = \frac{a_j}{\sum_{j=1}^n a_j} \quad (5)$$

#### 4. Analysis of coupling coordination degree of integrated development of sports industry and tourism industry

##### 4.1. Construction of coupling coordination degree model

1) Construct coupling degree model. After calculating the weights of each index,  $\mu_i$  is set as the development level of sports industry and tourism industry in year  $i$ , and a comprehensive evaluation model is established. The specific formula is as follows:

$$\mu_j = \sum_{j=1}^n \omega_j \mu_{ij} \quad (6)$$

2) The coupling coordination degree model is constructed. The specific formula is as follows:

$$D = \sqrt{C \times T} \quad (7)$$

$$C = \sqrt{\frac{\mu_1 \times \mu_2}{(\mu_1 + \mu_2)^2}} \quad (8)$$

$$T = \alpha \mu_1 + \beta \mu_2 \quad (9)$$

$D$  is the coupling coordination degree of the two subsystems. The greater the value of  $D$ , the higher the integration and development degree of the sports industry and the tourism industry, and vice versa.  $C$  is the coupling degree of the two systems, and the greater the  $C$  value, the higher the coupling degree of the two industries.  $T$  is the comprehensive evaluation index, which indicates the degree of influence of the overall development degree of each sub-region in the region on the regional coordinated development. Since the sports industry and the tourism industry both belong to the tertiary industry and have influence in various aspects of development, Therefore, the undetermined coefficient  $\alpha$  of the comprehensive development level of the sports industry and the undetermined coefficient  $\beta$  of the comprehensive development level of the tourism industry are both taken as 0.5.

According to the coupling coordination degree, the coupling coordination degree of sports industry and tourism industry is divided into 10 levels, as shown in Table 2.

**Table 2.** Evaluation index of coupling coordination level

|                              |                      |                   |                           |                      |                     |
|------------------------------|----------------------|-------------------|---------------------------|----------------------|---------------------|
| Coupling coordination degree | [0.9,1]              | [0.8,0.9)         | [0.7,0.8)                 | [0.6,0.7)            | [0.5,0.6)           |
| Coupling coordination level  | Quality coordination | Good coordination | Intermediate coordination | Primary coordination | Forced coordination |
| Coupling coordination degree | [0.4, 0.5)           | [0.3,0.4)         | [0.2,0.3)                 | [0.1,0.2)            | [0,0.1)             |
| Coupling coordination level  | Borderline disorder  | Mild disorder     | Moderate disorder         | Severe disorder      | Severe disorder     |

##### 4.2. Analysis of the coupling coordination degree between sports industry and tourism industry

The coupling coordination degree of sports industry and tourism industry in 31 provinces of China from 2014 to 2021 is calculated, and the results are shown in Table 3.

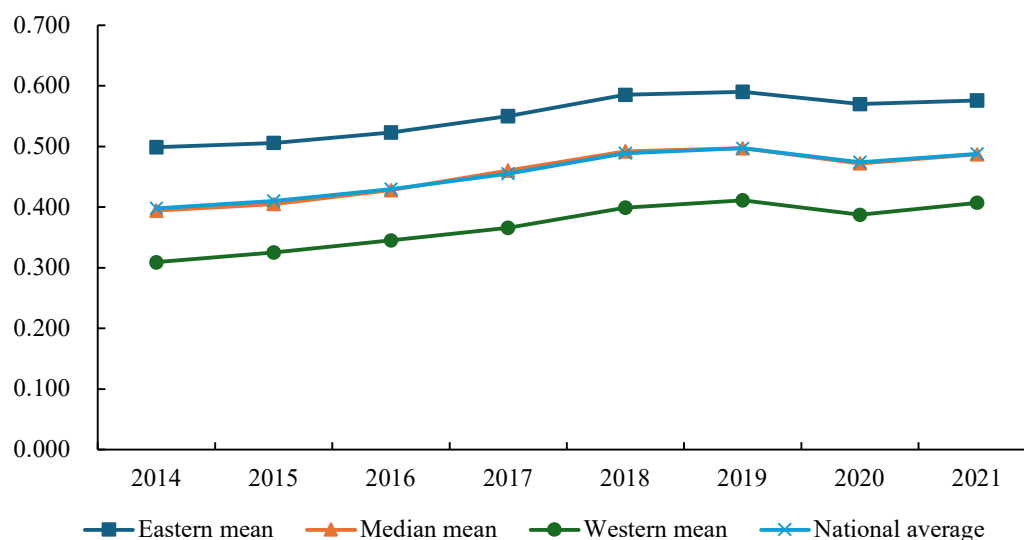
**Table 3.** Coupling coordination degree of sports industry and tourism industry from 2014 to 2021

| province            | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  | 2021  |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Peking              | 0.501 | 0.512 | 0.511 | 0.521 | 0.584 | 0.577 | 0.578 | 0.565 |
| Tianjin             | 0.358 | 0.359 | 0.374 | 0.395 | 0.400 | 0.403 | 0.343 | 0.363 |
| Hebei (Province)    | 0.438 | 0.454 | 0.471 | 0.526 | 0.555 | 0.555 | 0.531 | 0.540 |
| Liaoning (Province) | 0.484 | 0.475 | 0.487 | 0.514 | 0.531 | 0.533 | 0.511 | 0.509 |
| Shanghai            | 0.427 | 0.418 | 0.426 | 0.444 | 0.472 | 0.475 | 0.479 | 0.486 |
| Jiangsu (Province)  | 0.686 | 0.673 | 0.706 | 0.739 | 0.774 | 0.774 | 0.744 | 0.763 |
| Zhejiang (Province) | 0.553 | 0.565 | 0.594 | 0.628 | 0.671 | 0.676 | 0.675 | 0.682 |
| Fujian (Province)   | 0.500 | 0.523 | 0.536 | 0.571 | 0.606 | 0.629 | 0.613 | 0.613 |
| Shandong (Province) | 0.621 | 0.633 | 0.666 | 0.698 | 0.744 | 0.747 | 0.711 | 0.727 |
| Kwangtung           | 0.652 | 0.673 | 0.704 | 0.723 | 0.796 | 0.813 | 0.779 | 0.773 |
| Hainan (Province)   | 0.273 | 0.278 | 0.282 | 0.290 | 0.306 | 0.307 | 0.301 | 0.316 |
| Eastern mean        | 0.499 | 0.506 | 0.523 | 0.550 | 0.585 | 0.590 | 0.570 | 0.576 |
| Shanxi (Province)   | 0.350 | 0.370 | 0.392 | 0.420 | 0.448 | 0.455 | 0.415 | 0.427 |
| Ji Lin              | 0.355 | 0.371 | 0.381 | 0.395 | 0.415 | 0.432 | 0.347 | 0.348 |
| Amur River          | 0.366 | 0.378 | 0.388 | 0.394 | 0.420 | 0.418 | 0.406 | 0.404 |
| Anhui (Province)    | 0.439 | 0.428 | 0.454 | 0.508 | 0.537 | 0.556 | 0.530 | 0.546 |
| Jiangxi (Province)  | 0.367 | 0.375 | 0.396 | 0.434 | 0.483 | 0.509 | 0.487 | 0.529 |
| Henan (Province)    | 0.441 | 0.469 | 0.506 | 0.543 | 0.585 | 0.560 | 0.547 | 0.568 |
| Hubei (Province)    | 0.431 | 0.443 | 0.465 | 0.492 | 0.527 | 0.528 | 0.522 | 0.553 |
| Hunan (Province)    | 0.402 | 0.407 | 0.446 | 0.489 | 0.520 | 0.522 | 0.521 | 0.524 |
| Median mean         | 0.394 | 0.405 | 0.428 | 0.460 | 0.492 | 0.497 | 0.472 | 0.487 |
| Inner Mongolia      | 0.381 | 0.396 | 0.412 | 0.426 | 0.447 | 0.457 | 0.424 | 0.389 |
| Guangxi             | 0.346 | 0.373 | 0.375 | 0.418 | 0.454 | 0.437 | 0.452 | 0.511 |
| Chongqing           | 0.347 | 0.354 | 0.370 | 0.390 | 0.419 | 0.436 | 0.369 | 0.441 |
| Sichuan             | 0.411 | 0.430 | 0.461 | 0.491 | 0.552 | 0.583 | 0.564 | 0.565 |
| Guizhou (Province)  | 0.309 | 0.325 | 0.360 | 0.382 | 0.410 | 0.420 | 0.428 | 0.466 |
| Yunnan (Province)   | 0.337 | 0.357 | 0.387 | 0.417 | 0.467 | 0.502 | 0.438 | 0.463 |
| Xizang              | 0.213 | 0.244 | 0.247 | 0.257 | 0.280 | 0.279 | 0.262 | 0.269 |
| Shaanxi (Province)  | 0.339 | 0.368 | 0.409 | 0.436 | 0.480 | 0.487 | 0.459 | 0.483 |
| Gansu (Province)    | 0.295 | 0.305 | 0.343 | 0.350 | 0.400 | 0.399 | 0.390 | 0.406 |
| Qinghai (Province)  | 0.219 | 0.224 | 0.234 | 0.245 | 0.271 | 0.289 | 0.266 | 0.274 |
| Ningxia             | 0.213 | 0.208 | 0.222 | 0.231 | 0.230 | 0.251 | 0.238 | 0.233 |
| Xinjiang            | 0.296 | 0.311 | 0.326 | 0.346 | 0.373 | 0.391 | 0.353 | 0.384 |
| Western mean        | 0.309 | 0.325 | 0.345 | 0.366 | 0.399 | 0.411 | 0.387 | 0.407 |
| National average    | 0.398 | 0.410 | 0.430 | 0.455 | 0.489 | 0.497 | 0.474 | 0.488 |

From 2014 to 2021, the coupling coordination degree of the national sports industry and the tourism industry presents a stepped upward trend, with a total growth rate of about 22.6% and the highest growth rate of 7.5%, which is in the barely coordinated stage. From the perspective of provinces, the integration of sports industry and tourism industry in different regions presents different degrees. As shown in Figure 1, the overall performance of the eastern region is better, the central region has made significant progress, and the western region, although starting from a low point, has grown rapidly with the support of policy development. The total increase of the coupling coordination degree in the eastern region from 2014 to 2021 is about 15.4%, and the integration development degree of sports industry and tourism industry is obviously better than the national average level. Among them, Guangdong is the region with the highest integration development degree of sports industry and tourism industry in China, and its coupling coordination degree increases from 0.652 in 2014 to 0.773 in 2021. The e growth rate is 12.1% and the growth rate is 18.6%, which is in moderate coordination. The total increase of the coupling coordination degree in the central region from 2014 to 2021 is about 23.6%, and the average annual growth rate is 3.4%, with a large overall increase. The total growth rate of the coupling coordination degree in the western region from 2014 to 2021 is about 31.7%, with an average annual growth rate of 4.5%, which is higher than that in the eastern and central regions.



From the perspective of specific years and regions, in 2014, Jiangsu was the region with the highest degree of integration and development of sports industry and tourism industry, and the coordination degree was 0.686, which was in good coordination. The coupling coordination degree of Guangdong, Shandong, Zhejiang, Fujian and Beijing was 0.652, 0.621, 0.553, 0.500 and 0.501, respectively. The level of integration of sports industry and tourism industry in Tibet, Ningxia and Gansu is low, and the coupling coordination degree is 0.213, 0.213 and 0.295, respectively. In 2021, Guangdong is the region with the highest degree of integration and development of sports industry and tourism industry in China, and the coupling coordination degree is 0.773, which is in a good coordination level. Followed by Jiangsu, Shandong and Zhejiang, the coupling coordination degree is 0.763, 0.727, 0.682, respectively, are in a good coordination level. The provinces with low integrated development level include Tibet, Ningxia and Gansu, with the coupling coordination degree of 0.269, 0.233 and 0.406, respectively, which are all in the moderate imbalance level.



**Fig. 1.** The mean value of coupling coordination degree between sports industry and tourism industry in China and the three regions from 2014 to 2021

From the perspective of the comprehensive development level of the national sports industry and tourism industry, the development level of the national tourism industry in 2014 is better than the development level of the sports industry. According to the analysis of specific provinces, in the eastern region, except for Fujian, the tourism industry lags behind, other provinces are sports tourism synchronization or sports industry lags behind. In the central region, the sports industry lags behind. In the western region, except for Gansu and Qinghai, the sports tourism synchronization type, Ningxia tourism industry lagging type, and other sports industry lagging type. With the support of national policies for the sports industry and the continuous improvement of national living standards and consumption power, the development level of the national sports industry in 2021 is basically the same as that of the tourism industry. In terms of specific provinces, in the eastern region, except Shanghai and Shandong, sports tourism synchronization type, Inner Mongolia and Hainan sports industry lag type, and other provinces maintain tourism industry lag type; In the central region, except for Jilin and Jiangxi, the sports tourism synchronization type, Anhui and Hunan, the sports industry lagging type, the other provinces are lagging type of tourism industry; In the western region, except Ningxia and Qinghai, the tourism industry lags behind, and Chongqing is the sports tourism synchronization, the rest are the sports industry lags behind.



## 5. The spatial correlation between the coupling and coordinated development of sports industry and tourism industry

In order to further analyze and study the spatial correlation between the integrated development of China's sports industry and tourism industry and the spatial aggregation degree between provinces, this paper calculates the spatial correlation data from 2014 to 2021 based on the analysis of the Moran Index through Stata and adjacency matrix.

### 5.1. Global Moran's *I* test

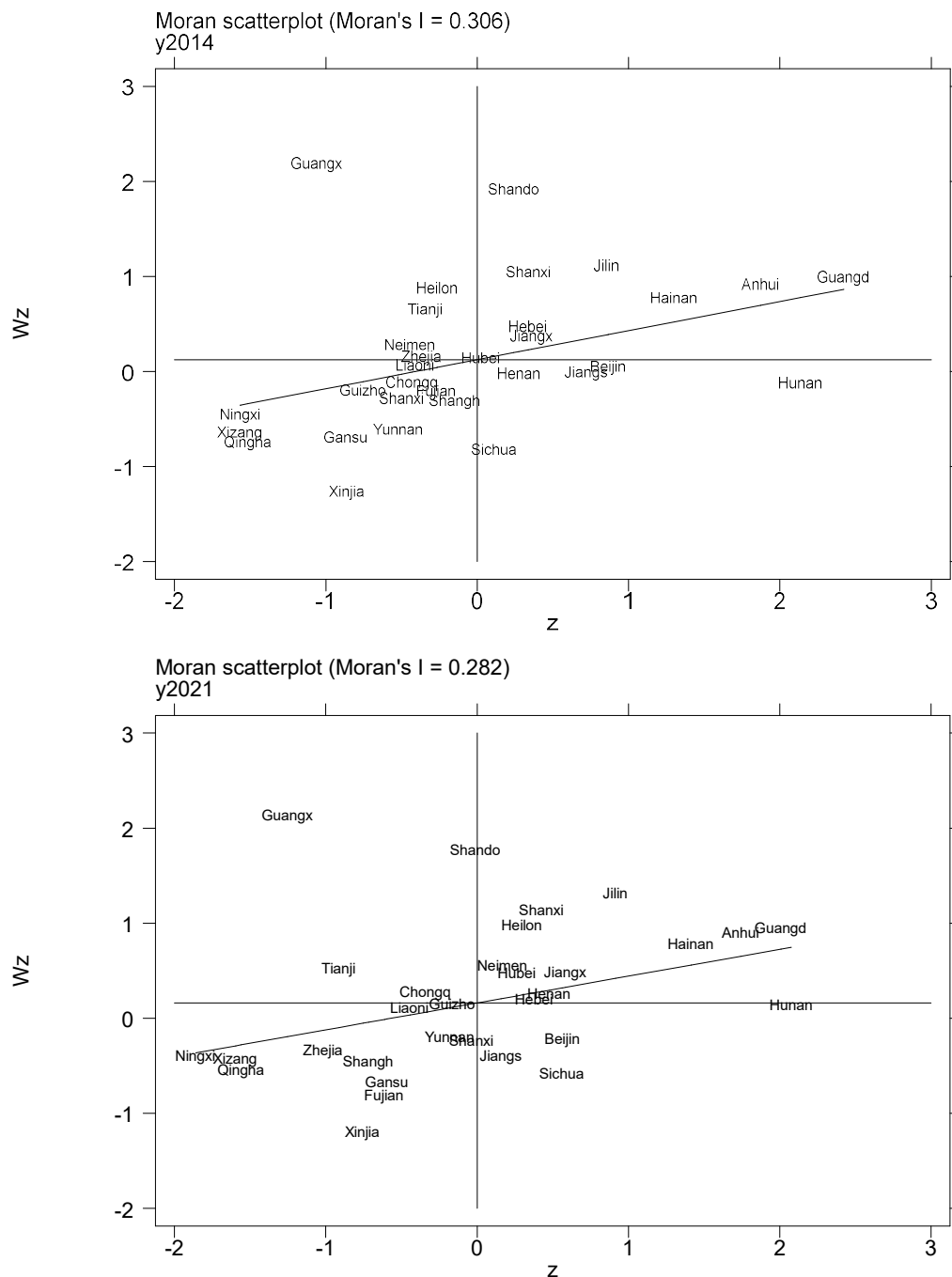
When the Moreland index is positive, it indicates that the index has a strong spatial correlation, and the spatial correlation increases with the increase of the value. When the Moreland index is negative, it indicates that the index has a negative spatial correlation, and the spatial heterogeneity increases with the increase of the value. Based on relevant data, the overall Moreland index of the integrated development of sports industry and tourism industry from 2014 to 2021 is calculated, and the results are shown in Table 4. It can be seen that the global Moreland index from 2014 to 2021 is positive, indicating that there is a significant autocorrelation between the integrated development level of the sports industry and the tourism industry in the global space, that is, there is an obvious spatial agglomeration. From the perspective of time span, although the Moreland index in 2019 is low, it is still growing year by year in subsequent years, and the integration and development of China's sports industry and tourism industry continues to improve.

**Table 4.** Global Moreland Index, 2014-2021

|           | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  | 2021  |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Moran's I | 0.306 | 0.255 | 0.219 | 0.266 | 0.205 | 0.179 | 0.221 | 0.282 |

### 5.2. Local Moran's *I* test

The local Moreland index test can measure the spatial autocorrelation between each spatial unit and its neighbors in the local spatial scale. Among them, the "high-high" gathering area means that the region itself presents a high value, and the neighboring region is also a high value. "High-low" indicates that the region itself has a high value, while the neighboring region has a low value; "Low-high" means that the region itself has a low value, but the critical area around it has a high value; "Low-low" indicates a low value for the area and its adjacent areas. Based on the adjacency matrix, the local Moreland index scatter plot was calculated with 2014 and 2021 as time nodes. As shown in Figure 2, the high-high (HH) aggregation areas were mostly in the eastern region and part of the central region, while the low-low (LL) aggregation areas were mostly in the western region.



**Fig. 2.** Partial Moran scatter chart of the integrated development of sports industry and tourism industry in 2014 (left) and 2021 (right)

## 6. Conclusions and Suggestions

### 6.1. Conclusion

By constructing the index evaluation system of sports industry and tourism industry, the coupling coordination degree and spatial correlation are calculated, and the following conclusions are drawn. (1) From 2014 to 2021, the coupling coordination degree between the national sports industry and the tourism industry showed a stepwise rise, with a total increase of 22.6%. From the regional level, the eastern region has a higher starting point and better development, with a total growth rate of about 15.4% from 2014 to 2021; The central region made remarkable progress, with a total growth

rate of 23.6% and an average annual growth rate of 3.4%; Although the western region started late, in recent years, with policy support and market expansion, the total growth rate has reached 31.7%, and the average annual growth rate has reached 4.5%. (2) From the perspective of the development of the sports industry and tourism industry, the development level of the national tourism industry in 2014 was generally better than that of the sports industry, and most of the eastern regions were synchronous sports tourism or lagging sports industry. By 2021, the development level of the national sports industry and tourism industry will be more coordinated. From the perspective of province, there are three trends of tourism industry lagging, sports industry lagging and sports tourism synchronizing. (3) The integrated development of sports industry and tourism industry has significant autocorrelation and agglomeration in the global space. Although the global Moreland index declined in 2019, it is still in a steady upward trend in the future. At the same time, the local Moran index also shows that the "high-high" gathering area of the integration of sports industry and tourism industry is mostly in the eastern and some central regions, and the "low-low" is mainly concentrated in the western region.

## 6.2. *Suggestion*

Based on the above research conclusions, this paper puts forward the following suggestions.

First, we need to strengthen policy guidance and promote coordinated regional development. Governments at all levels should formulate differentiated policies according to the current characteristics of the integrated development of sports industry and tourism industry in different regions. For the eastern region with better development, emphasis should be placed on encouraging industrial innovation and upgrading, creating personalized, distinctive and customized sports tourism products, strengthening coordination and cooperation among cities in the region, realizing resource sharing and tourist exchange, and building an integrated sports tourism ecosystem. Compared with the eastern region, the central region should pay attention to the precision of policy support, promote the infrastructure construction of the integrated development of sports industry and tourism industry, and promote the development of industrial clusters. The western region needs to increase the sustainable policy inclination, use natural resources and cultural resources to develop special sports tourism products, strengthen interaction with the central region, and improve the level of industrial development.

Second, optimize the industrial layout and rationally allocate resources. Each region needs to optimize its structure according to its own development characteristics. In areas with developed tourism industry, tourism enterprises can be guided to carry out in-depth cooperation with sports enterprises to promote the development of sports industry; The area with good foundation of sports industry should strengthen the deep integration of sports resources and tourism resources. At the same time, in the process of optimizing resource allocation, it is necessary to implement reasonable layout planning in close accordance with market demand, avoid resource waste, and thus improve the comprehensive industrial benefits.

Third, promote personnel training and innovation-driven development. Strengthen the system training of talents related to the integration development of sports industry and tourism industry, colleges and universities should set up relevant interdisciplinary professional courses to cultivate compound talents; Enterprises should build practice and training bases with universities and scientific research institutions. The use of emerging technologies such as artificial intelligence to improve the quality of industrial services, promote industrial innovation, and enhance industrial competitiveness.

Fourth, strengthen ecological protection and advocate mutualism. In the development process of sports tourism products and services, it is necessary to strengthen the awareness of ecological environmental protection, follow the principle of sustainable development, and ensure that development activities will not affect and damage the ecological environment. At the same time, we

should consider building sports tourism brands with cultural heritage, enhance the added value of industrial culture, and promote the deep integration and coordinated development of multiple industries.

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