The Coordination of the Integrated Development between Sports Tourism Industry Standardisation and Tourism Urbanisation

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Abstract

With the growing demand for sports and tourism among urban residents and the support of national policies, an important topic for urgent research is to explore the integrated development mechanism between sports tourism industry agglomeration standardisation and tourism urbanisation. There is a lack of research on the virtuous integrated and coordinated development mechanism between the two. In response, this paper conducts a study on the coordination of the integrated development between sports tourism industry standardisation and tourism urbanisation. The paper elaborates on the development model of sports tourism industry, and presents a systemic causal loop of their integrated development. It delivers a spatio-temporal relationship analysis on whether there is sustainable integrated interaction between the two and accordingly constructs a spatio-temporal analysis model. Based on Pearson correlation coefficient, cluster analysis and coupling coordination degree, the paper conducts a quantitative analysis to further explore the interaction mechanism between the two, and gives a calculation method for the coordination of their integrated development. At last, the paper compared the comprehensive development levels of sports tourism industry standardization and tourism urbanization, gave the measurement and calculation results of the level of their integrated development, and verified the effectiveness of the proposed research method. This study has certain significance for improving the correlation between sports tourism industry standardization and tourism urbanization in the urban research system.

Keywords: sports tourism; spatio-temporal analysis; industry standardization; tourism urbanization; coordination of integrated development

1. Introduction

Sports tourism is a fitness pathway combining sports and tourism, reflecting the social nature of sports and tourism. It is an emerging tourism activity in social life and falls into the tourism industry category in social sports (Atalay, 2021; Booth, Kokkranikal, & Burukina, 2015; Candia, Pirlone, & Spadaro, 2020; Huang & Chi, 2015; Miyake et al., 2018; Novak, 2019; Promjittiphong, Junead, & Hanpattanakit, 2018; Rosardi et al., 2021; Wang, 2014). The reform of sports management system promotes the growth of the origin industry and the formation of carrier industry in sports tourism industry (Chen, 2017; Jun et al., 2018; Li et al., 2016; Wang, 2017; Xia et al., 2013). People can participate in sports activities through leisure tourism such as hiking, swimming, skiing, and watching games. Integration and relevance are important features of tourism urbanisation. As a new mode of production, tourism has shown great developmental dynamism in promoting comprehensive urban development (Allawi, 2022; Ariani, 2018; Diakonidze, 2021; Kurniati, Khadiyatna, & Angel, 2020; Lemy & Pramono, 2022; Liang & Bao, 2020; Liberato et al., 2019; Lu, Ren, & Xu, 2019; Matošević Radić, Jukić, & Roje, 2020; Nurfitriya & Iskandar, 2020; Pramezwary et al., 2022; Shi et al., 2020; Tan & Ismail, 2020; Xiaobing, 2020; Zhang & Zhang, 2020). Given the growing demand for sports and tourism among urban residents and the support of national policies, it is an important topic for urgent research at present to explore the integrated development mechanism between sports tourism industry agglomeration standardisation and tourism urbanisation.

There are complex interactions between tourism urbanisation environmental quality and tourism economy. In terms of the evaluation of system coordination, Guan and Guo (2022) aimed to construct a comprehensive evaluation index system of tourism urbanisation environment quality system and tourism economy system, and weighted the indexes using entropy weighting method. Using a comprehensive evaluation model and coupling coordination degree model, it analysed empirically the changes of tourism environment quality, tourism economy's comprehensive development level and coupling coordination degree in Nanjing from 2009 to 2020. Some scholars studied the development path of tourism industry and provided some suggestions for the research on integrated development Cheng (2021) analysed the correlation between online tourism information

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dissemination and tourism support of urban residents in ethnic minority areas by means of a questionnaire survey using spss26.0. It also analysed the mediating role of sense of locality between online tourism information dissemination and tourism support of urban residents in ethnic minority areas using the process plug-in of spss26.0. Facilitated by the 5G technology, smart tourism is increasingly meeting the needs of the public and improving tourism services. Based on this, Liang et al. (2022) proposed a new model path study for the development of smart leisure sports tourism industry based on 5G technology. Using the literature research to gain an in-depth understanding of the theoretical basis of 5G technology and smart tourism, it established a multidimensional resource allocation model of smart leisure sports tourism industry through 5G technology, while studying the influencing factors, information sources, and channel factors of the tourism industry. Huang and Chi (2015) constructed a model of information coupling system of sports tourism industry and cultural industry in the context of artificial intelligence era, and obtained the corresponding data results by using the invisible statistical logic computer independent judgment (IDIJA) method of artificial intelligence system under the condition of incomplete data. The ultimate goal of ecological sports tourism is to bring people back to nature, to enjoy and experience sports in nature, and to relax and get fit in the environment. Based on a survey of ecological sports tourism resources in Lanzhou City, Li and Wei (2021) used literature research, questionnaire, interview and field survey methods, and applied SWOT analysis to explore the ecological sports tourism market for the optimal allocation of ecological sports tourism resources.

At present, many domestic and foreign scholars conduct studies on tourism industry and tourism urbanisation, and analyse the correlation between various factors and tourism urbanisation based on qualitative or quantitative analysis, relevant research results can be taken as theoretical references of this paper and provide certain professional support. However, there is a lack of research results that focus on the agglomeration of sports tourism industry and tourism urbanisation, and explore the virtuous integration interaction and coordinated development mechanism between them. Therefore, this paper innovatively studies the coordination of the integrated development of sports tourism industry standardization and tourism urbanization, constructs a scientific and reasonable evaluation index system based on a qualitative analysis of the interaction mechanism between the two, and adopts multiple quantitative methods to analyze the interaction between the two. The research topic, content and method of the paper are innovative. At first, the paper explores the development model of sports tourism industry, then, to figure out whether there are continuous and integrated interactions between sports tourism industry standardization and tourism urbanization, this paper builds a spatio-temporal model to conduct space-time relationship analysis. After that, based on the Pearson correlation coefficient, cluster analysis and coupling coordination degree, this paper carries out related quantitative analysis to further explore the interaction mechanism between sports tourism industry standardization and tourism urbanization. Finally, the paper conducts an empirical analysis along with the results.

2. Analysis of Integrated Development Mechanism

There are five development models of sports tourism industry: the “tourism + sports” model, the project-based tourism resource development model, the combined sports tourism resource development model, and the incidental sports tourism resource development model (Kurniati, Khadiyatna, & Angel, 2020; Liang et al., 2022; Shi et al., 2020). The "tourism + sports" model and the "sports + tourism" model develop sports tourism products based on tourism resources and sports resources respectively, such as mountaineering, rafting and forest hiking based on natural scenic spots, or visiting and viewing activities based on sports events and festivals. The specialized tourism resources development mode is oriented to the only targeted tourism attraction projects, such as ski tourism, golf tourism. The combined sports tourism resource development model combines various types of tourism resources with sports resources to bring tourists a dual experience of sightseeing and sports, such as fishing competitions. The ancillary sports tourism resources development mode can guide tourists to participate in sports and entertainment programs during the tourism process, such as folk dance, wrestling, etc.

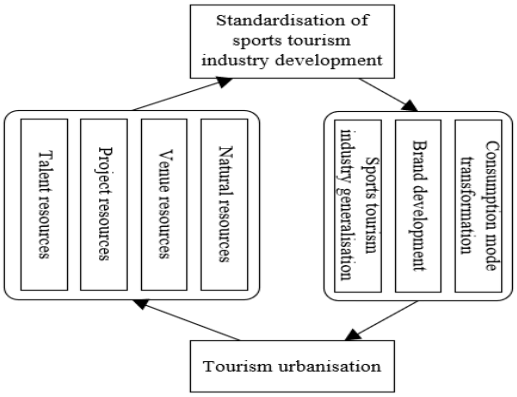

Figure 1. Interaction between standardisation of sports tourism industry development and tourism urbanisation

Figure 1 gives a diagram of the interaction between the standardisation of sports tourism industry development and tourism urbanisation. The figure indicates that the standardisation of sports tourism industry development and tourism urbanisation are both independent of each other and mutually constrained. Tourism urbanisation is the premise and foundation of the standardisation of sports tourism industry development, which influences the development of sports tourism industry from talent resources, project resources, venue resources, natural resources, etc., while the degree of standardisation of sports tourism industry development also plays the role of shaping and feedback to tourism urbanisation in terms of sports tourism industry generalisation, brand development and consumption mode transformation. There is a mutually reinforcing integrated development mechanism between the two.

Figure 2 presents the systemic causal loop diagram of the integrated development between the standardisation of sports tourism industry development and tourism urbanisation. The figure indicates that the economic effect generated by sports tourism development as a key link can be an important part of the main driving force of tourism urbanisation development. With the rise of urban tourism attractiveness, capacity and convenience, we have seen a growing urban tourism income, a wider range of sports tourism model development and stronger resource allocation. The promotion of tourism urbanisation also presents positive cause-effect feedback. Figures 1 and 2 were both plotted by the authors of this article.

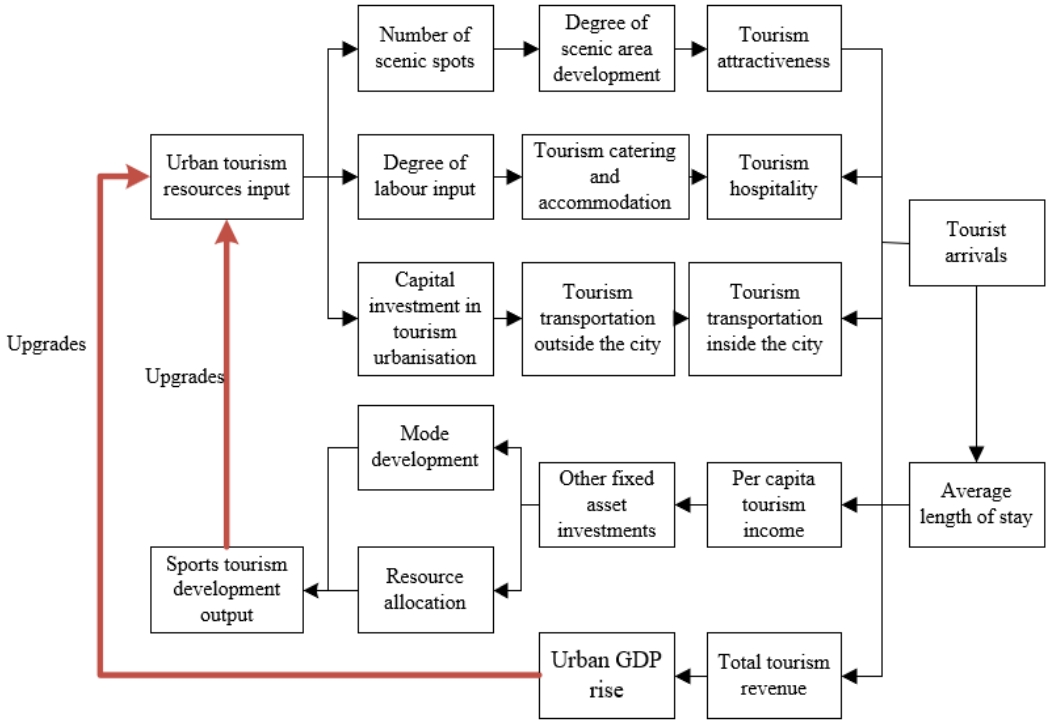

Figure 2. Causal loop diagram of the integrated development system

This paper focuses on whether there is a sustainable integration and interaction between standardisation of sports tourism industry development and tourism urbanisation and whether the coordinated development mechanism of the two is balanced in the long term. When studying the relationship between standardisation of sports tourism industry development and tourism urbanisation, it is generally required that the trend of the collected relevant data series over time is smooth and determinate, but does not align with the actual economic development. To address this issue and reasonably retain all the valuable information contained in the time series constructed from the collected data, this paper conducts relevant analysis based on cointegration theory.

3. Spatio-Temporal Relationship Analysis

Before conducting regression analysis, it is first necessary to do a smoothness test on the time series constructed from its collected data. Suppose the mean, variance and covariance of the time series B_p are represented by $SR(B_p)$, $Var(B_p)$, $Cov(B_p)$, respectively. If in a random process, a series B_p is smooth, then $SR(B_p)$, $Var(B_p)$, $Cov(B_p)$ are fixed, and this random process can be regarded as having smoothness, which is written as B_p: $U(0)$.

$$\begin{aligned} SR(B_p) &= SR(B_{p+l}) \\ Var(B_p) &= Var(B_{p+l}) \\ Cov(B_p, B_{p+l}) &= Cov(B_{p+f}, B_{p+f+l}) \end{aligned} \quad (1)$$

For the regression study of economic issues on the standardisation of sports tourism industry development, a time series smoothness test constructed by the collected data is quite important. The method used in this paper is the incremental DF test with the following model expressions:

$$\Delta b_p = \tau b_{p-1} + \sum_{l=1}^{m} \eta_l \Delta b_{p-l} + \sigma_p \quad (2)$$

$$\Delta b_p = \eta_0 + \tau b_{p-1} + \sum_{l=1}^{m} \eta_l \Delta b_{p-l} + \sigma_p \quad (3)$$

$$\Delta b_p = \eta_0 + sp + \tau b_{p-1} + \sum_{l=1}^{m} \eta_l \Delta b_{p-l} + \sigma_p \quad (4)$$

The null hypothesis of the model is given by the following equation.

$$F_0: \tau = 0 \quad (5)$$

The alternative hypothesis is given by the following equation.

$$F_0: \tau < 0 \quad (6)$$

When the value of τ is less than 0, the time series can be regarded as smooth; when τ *is* not significant, further stability tests based on the difference series are required for the time series. When the value of τ in the stability test of the difference series is less than 0, the time series can be regarded as smooth.

To avoid the problem of spurious regression for the time series constructed from non-stationary collected data, the cointegration test is introduced in this paper. If the series shown in equation 7 is a $U(e)$ series, x_1, x_2, *K*, x_t are real numbers that are not all zero, and *xA* is a $U(e\text{-}f)$ series.

$$A_{1p}, A_{2p}, \cdots, A_{tp} (t \geq 2) \quad (7)$$

The series can be defined as an (*e*,*f*)-cointegrating series with the corresponding cointegrating vector *x*, i.e.,

$$A = \left(A_{1p}, A_{2p}, \cdots, A_{tp}\right), x = \left(x_1, x_2, \cdots, x_p\right) \quad (8)$$

The autoregressive distribution lag model is given by the following equation:

$$b_p = \gamma_0 + \gamma_1 a_p + \gamma_2 b_{p-1} + \gamma_3 a_{p-1} + \sigma_p \quad (9)$$

Assuming that the error correction term is represented by $\alpha(\gamma_1 + \gamma_3 / 1\text{-}\gamma_2)$, the error correction model expression can be obtained based on the above equation after shifting the term and collapsing.

$$\nabla b_p = \gamma_0 + \gamma_1 \nabla a_p + (\gamma_2 - 1)\left(b - \frac{\gamma_1+\gamma_2}{1-\gamma_2} a\right)_{p-1} + \sigma_p (10)$$

From the above equation, it is clear that the short-period fluctuations ∇b_p of the dependent variable b_p for the standardisation of sports tourism industry development are jointly determined by the short-period wave ∇a_p of the independent variable of tourism urbanisation and the error correction term $\alpha(\gamma_1 + \gamma_3 / 1\text{-}\gamma_2)$. Let if there is a long-run equilibrium relationship between the coordinated development mechanisms of the variables b_p and a_p, i.e., with $b^{*=} xa^*$, then the error correction term can be rewritten as:

$$b^* = \frac{\gamma_1+\gamma_3}{1-\gamma_2} a^* \quad (11)$$

Assuming that the error correction term for equilibrium is represented by *BE, the* corresponding model can be transformed into

$$\nabla b_p = \gamma_0 + \gamma_1 \nabla a_p + \mu BE_{p-1} + \sigma_p \quad (12)$$

Normally $|\gamma_2| < 1$, so $\mu = \gamma_2 - 1 < 0$. Thus, when BE_{p-1} is positive, μBE_{p-1} is negative, causing ∇b_p to decrease, and vice versa. This reflects the control of *BE* over b_p.

Assuming that the annual average value of the tourism urbanisation index of city *i* is represented by P_i, the annual average growth rate of the tourism urbanisation index of city *i* is represented by PH_i, the annual average value of the standardisation index of sports tourism industry development of city *i* is represented by D_i, the annual average growth rate of the standardisation index of the sports tourism industry development of city *i* is represented by DH_i, the ratio of P_i, PH_i, D_i, DH_i to their respective average values is represented by p_i, ph_i, d_i, dh_i, the competing value of the tourism urbanisation index of city *i* is represented by p_i, the competing value of the tourism urbanisation index growth of city *i* is represented by ph_i, the competing value of the sports tourism industry development standardisation index of city *i* is represented by d_i, the competing value of the sports tourism industry development standardisation index growth of city *i* is represented by dh_i, the static competing value of city *i* is represented by DU_i, which refers to p_i or d_i , and the dynamic competing value of city *i* is represented by E_i, which refers to ph_i or ph_i . The spatio-temporal analysis model is given by the following equation:

$$p_i = \frac{P_i}{\sum_{i=1}^{m} P_i} \times m, ph_i = \frac{PH_i}{\sum_{i=1}^{m} PH_i} \times m, d_i = \frac{D_i}{\sum_{i=1}^{m} D_i} \times m, dh_i = \frac{DH_i}{\sum_{i=1}^{m} DH_i} \times m, \quad (13)$$

4. Analysis of the Coordination of Integrated Development

To better explore the interaction mechanism between the standardisation of sports tourism industry development and tourism urbanisation, this paper conducts a relevant quantitative analysis based on Pearson correlation coefficient, cluster analysis and coupling coordination. The Pearson correlation coefficient is calculated by the formula:

$$s = \frac{\sum_{i=1}^{m}(a_i - \overline{a})(b_i - \overline{b})}{\sqrt{\sum_{i=1}^{m}(a_i - \overline{a})^2 \sum_{i=1}^{y}(b_i - \overline{b})^2}} \quad (14)$$

In the cluster analysis, the classes H_t and H_w are merged into H_s, and the corresponding number of independent variables is represented by m_t, m_t, m_t ($m_s = m_t + m_w$). Characterizing the distance between the two categories can be done by the following equation:

$E_H^2(l,s) = \frac{1}{m_l m_s}\sum_{i\in H_l}\sum_{j=H_s}\xi_{ij}^2 = \frac{1}{m_l m_s}\left[\sum_{i\in H_l}\sum_{j=H_t}\xi_{ij}^2 + \sum_{i\in H_l}\sum_{j=H_w}\xi_{ij}^2\right]$ (15)

It can also be expressed as:

$E_H^2(l,s) = \frac{m_t}{m_s}E_H^2(l,t) + \frac{m_w}{m_s}E_H^2(l,w)$ (16)

In this paper, the entropy value method is chosen to assign weights to the independent variable evaluation indexes. The calculation steps are elaborated as follows.

Let $L = 1/\ln n$, the number of data samples collected is represented by n. First, the entropy value is calculated based on the following equation:

$$o_j = -L\sum_{i=1}^{n}\left(A_{ij}\ln A_{ij}\right)\left(0 \le o_{ij} \le 1\right)$$

$(i = 1,2,3,\ldots,n; j = 1,2,3,\ldots,m)$ (17)

The information utility value is then calculated based on equation 19:

$h_j = 1 - o_j$ (18)

The indicator weights can be obtained by equation 20

$\omega_j = \frac{h_j}{\sum_{i=1}^{m} h_j}$ (19)

For the comprehensive evaluation index of the tourism urbanisation of the city, it is calculated by the formula:

$R_i = \sum_{j=1}^{14}\omega_j \cdot A_{ij}$ (20)

where the comprehensive evaluation index of the tourism urbanisation index of the city in year i is represented by R_i, the weight of the secondary index of the tourism urbanisation index of the city is represented by ω_j, and the standardisation value corresponding to the j-th index indicator in year i is represented by A_{ij}. Similarly, the comprehensive evaluation index of the standardisation of sports tourism industry development can be calculated.

This paper constructs a model of the coordination degree between the standardisation of sports tourism industry development and tourism urbanisation. The calculation steps and formulas of the model are elaborated below. The expression of the coupling degree function is given in equation 21.

$OH_i = \left[\frac{R_i \times DU_i}{(R_i + DU_i)^2}\right]^{\frac{1}{2}}$ (21)

Assuming that the weights to be determined are represented by β and γ, the formula for the reconciliation index ψ_i of the standardisation of sports tourism industry development and tourism urbanisation is given by the following equation.

$\psi_i = \beta R_i + \gamma DU_i$ (22)

Finally, the coupling coordination OX_i between the two can be calculated by equation 23:

$OX_i = (OH_i\psi_i)^{\varepsilon}$ (23)

The closer the value of OX_i is to 1, the better the coupling and coordination between the standardisation of sports tourism industry development and tourism urbanisation, and conversely, the worse the coordination between the standardisation of sports tourism industry development and tourism urbanisation.

5. Experimental Results and Analysis

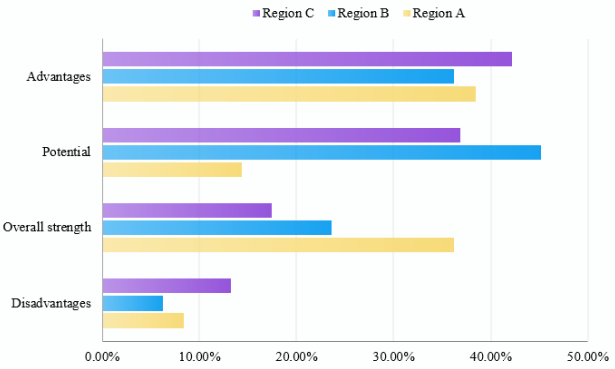

Figure 3. Cluster analysis results of the degree of tourism development in different regions

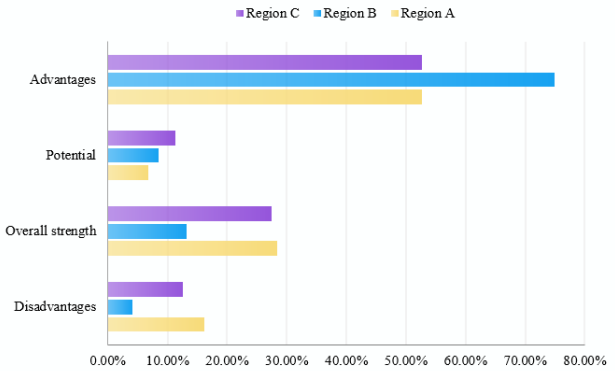

Figure 4. Cluster analysis results of the degree of standardisation of sports tourism industry development in different regions

In this paper, the target cities were classified into several regions according to the regional development level of tourism urbanisation. On average, there are 2-3 cities in each region. The study area selected in this paper includes 3 cities, which were marked as A, B, and C region cities. Figure 3 presents the cluster analysis results of the development level of tourism urbanisation in different regions. As can be seen from the figure, for the cities in region A of the study area, the percentage of those at the overall strength level and the disadvantage level is higher, and the percentage of the overall strength level is higher than that of the cities in region B and region C. It indicates that the region with greater economic development advantages has the competitive edge in tourism urbanisation. Years of development can lay a good foundation for the standardisation of sports tourism industry development. The other regional cities at the potential level have a higher percentage. Their own development and the support of national policies have promoted their tourism urbanisation at a steady and rapid pace.

Figure 4 gives the cluster analysis results of the degree of standardisation of the development of sports tourism industry in different regions. From the figure, it's easy to see

that the overall degree of standardisation of sports tourism industry development in the study area is low, and the percentage of those at the disadvantage level is higher. Thus, it is necessary to actively promote the development of the sports tourism industry model in the study area, accelerate the transformation of the old and new dynamics of tourism urbanisation, and optimize the allocation of resources in four aspects: talent resources, project resources, venue resources, and natural resources. From the statistical data, the sports tourism industry development degree in Region A region has the most percentage of cities at the overall strength level and advantage level compared to Regions B and C. It can be inferred that with the promotion of the sports tourism industry transfer strategy and greater convenience of tourism transportation, Region A, which is rich in talent resources, project resources, venue resources, and natural resources, is expected to "make great progress" in the development of sports tourism industry. Figures 3 and 4 were both plotted by the authors of this article.

Table 1

Calculated results of coupling coordination for different sub-regions

Sub-region Number	R_{STI}	R_{UT}	OH	ψ	OX
1	0.512	0.625	0.487	0.958	0.617
2	0.354	0.247	0.592	0.472	0.498
3	0.308	0.027	0.318	0.251	0.346
4	0.215	0.069	0.473	0.295	0.269
5	0.208	0.062	0.014	0.192	0.047
6	0.384	0.174	0.495	0.257	0.362
7	0.182	0.059	0.408	0.162	0.248
8	0.259	0.147	0.436	0.185	0.235
9	0.405	0.318	0.431	0.522	0.593
10	0.629	0.471	0.436	0.849	0.615
11	0.542	0.468	0.403	0.651	0.527
12	0.341	0.295	0.451	0.328	0.316
13	0.384	0.154	0.415	0.352	0.394
14	0.217	0.116	0.428	0.174	0.259
15	0.614	0.247	0.463	0.511	0.426

According to the level of tourism urbanisation, the A, B, and C region cities were divided into 15 sub-regions, 6 in region A, 4 in region B, and 5 in region C. Based on the constructed mathematical model, we calculated the comprehensive evaluation indices of the standardisation of sports tourism industry development and tourism urbanisation in the 15 sub-regions of the study area. The two were denoted by R_{STI} and R_{UT} respectively. The concepts of relevant parameters have been given in the previous text. Table 1 also gives the results of coupling function OH, reconciliation index ψ and coupling coordination degree OX between standardisation of sports tourism industry development and tourism urbanisation. It can be seen from the table that the integrated development of standardisation of sports tourism industry development and tourism urbanisation in the regions with greater economic development advantages will produce good results of mutual promotion along with higher overall strength. Some of the regions with lower economic development advantages have higher tourism urbanisation clustering results, but the lag of standardisation of sports tourism industry development leads to the decline of overall coupling coordination. Therefore, we need to explore a good mechanism for the standardisation of sports tourism industry development and tourism urbanisation development that are adapted to different regions. This is the basis for promoting the sustainable development of the overall sports tourism industry in regional cities.

This paper adopted 2531 sample data of study cities between 2010 and 2020. The standardisation of sports tourism industry development and the comprehensive tourism urbanisation level provide a research basis for the analysis of the specific degree of coordinated development between the two. Table 2 gives the scores of the standardisation of sports tourism industry development and the comprehensive tourism urbanisation level for a city in Region A during 2010-2020.

Table 2

Scores of the sports tourism industry development standardisation and the comprehensive tourism urbanisation level during 2010-2020

Year	Degree of sports tourism industry development standardisation	Tourism urbanisation level
2010	-1.26	-1.26
2011	-1.48	-1.37
2012	-0.81	-0.75
2013	-0.69	-0.13
2014	-0.25	-0.02
2015	0.31	0.29
2016	0.42	0.22
2017	0.86	0.41
2018	0.74	1.19
2019	0.97	1.42
2020	1.24	0.37

Figure 5. Standardisation of sports tourism industry development compared with the comprehensive tourism urbanisation level

We normalised the calculation results of the coupling function *OH*, the reconciliation index ψ and the coupling coordination degree *OX* between the standardisation of sports tourism industry development and tourism urbanisation. The final results are presented by Table 3. Figure 6 gives a graph of the level of coordinated development between the standardisation of sports tourism industry development and tourism urbanisation. From the figure, it can be seen that there was a poor coordinated development degree of standardisation of sports tourism industry development and tourism urbanisation of the city during 2010-2011, and a large development gap between the two. This is basically consistent with the conclusion drawn in Reference (Kurniati, Khadiyatna, & Angel, 2020). During 2011-2013, the city witnessed synchronization between the standardisation of sports tourism industry development and tourism urbanisation. 2014-2018 saw an increasing coordination between standardisation of sports tourism industry development and tourism urbanisation year by year. Although the value slightly decreases in 2019, the coordination between the two has evolved into high-quality coordination in 2020. In summary, although the stability of the city in the initial stage of the coordinated development of the two was not ideal, the overall performance is optimized year by year, and the relevant personnel need to implement appropriate adjustment strategies for the specific coordinated development situation.

Table 3

Level of coordinated development between standardisation of sports tourism industry development and tourism urbanisation

Year	*OH*	ψ	*OX*
2010	0.85	0.31	0.01
2011	1.15	0.58	1.62
2012	0.96	0.65	1.37
2013	1.24	0.71	1.03
2014	0.95	0.85	1.58
2015	0.92	0.88	1.64
2016	0.97	0.86	1.47
2017	1.27	0.91	1.32
2018	1.32	0.97	1.85
2019	0.96	0.85	1.92
2020	1.47	1.02	2.07

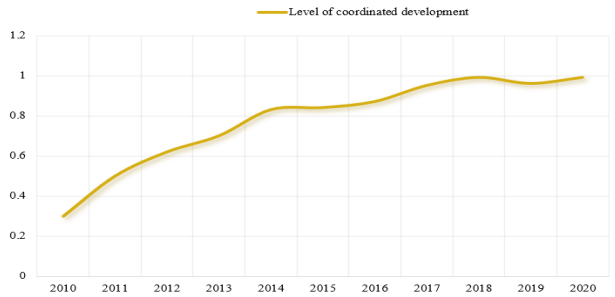

Figure 6. Level of coordinated development between standardisation of sports tourism industry development and tourism urbanisation

6. Conclusion

This paper conducts a study on the coordination of the integrated development between sports tourism industry standardisation and tourism urbanisation. The paper elaborates on the development model of sports tourism industry, and presents a systemic causal loop of their integrated development. It delivers a spatio-temporal relationship analysis on whether there is sustainable integrated interaction between the two and accordingly constructs a spatio-temporal analysis model. Based on Pearson correlation coefficient, cluster analysis and coupling coordination degree, the paper conducts a quantitative analysis to further explore the interaction mechanism between the two, and gives a calculation method for the coordination of their integrated development.

We presented cluster analysis results for the degree of tourism urbanisation and standardisation of sports tourism industry development in different regions. It is inferred that with the promotion of sports tourism industry transfer strategy along with greater tourism transportation convenience, the regional cities with richer talent resources, project resources, venue resources, and natural resources are expected to accumulate their competitive edges in the sports tourism industry development. Based on the constructed mathematical model, we calculated respectively the comprehensive evaluation indexes of sports tourism industry development standardisation and tourism urbanisation in the 15 sub-regions of the study area and the results of the coupling function, reconciliation index and coupling coordination degree between the two. We concluded that to boost the sustainable development of the sports tourism industry in regional cities, one basic requirement is to find a sound mechanism of the standardisation of sports tourism industry development and tourism urbanisation that fit for different regions. The paper presents the estimation and calculation results of the comparison between the standardisation of sports tourism industry development and the comprehensive tourism urbanisation level as well as the coordinated development level between the two. The results show that although the stability of the studied cities in the initial stage of the coordination between the standardisation of sports tourism industry development and tourism urbanisation was not ideal, the overall performance is optimized year by year. This paper has certain significance for improving the correlation between sports tourism industry

standardization and tourism urbanization in the urban research system. In the future, the model could be optimized further to make it more suitable for the research object so that it can more systematically explain the correlation in depth.

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