





Category: STEM (Science, Technology, Engineering and Mathematics)

ORIGINAL

Spatial Evolution of Sports Tourism Space: a case study of Shandong Province, China

Evolución Espacial del Espacio del Turismo Deportivo: un estudio de caso de la Provincia Shandong, China

Jiang Jun¹ , Jiang Fugao² 

¹School of International Studies, Krirk University. Thailand.

²School of Sports Science, Qufu Normal University. China.

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ABSTRACT

This study adopted the method of literature, mathematical statistics, logic analysis and GIS spatial analysis, taking the spatial elements of sports tourism in Shandong Province from 2009 to 2018 as the research object, clarified the development status of sports tourism in Shandong Province and the distribution status of spatial elements, sorted out the characteristics of the spatial evolution of sports tourism in Shandong Province, and analyzed the influencing factors of the spatial evolution of sports tourism in Shandong Province. To explore the countermeasures for the development of sports tourism in Shandong province and provide reference for enriching the research plan of sports tourism space in Shandong province and improving the theory of sports tourism space development. It provides empirical reference for optimizing the spatial layout of sports tourism development in Shandong province, balancing the seasonal imbalance of sports tourism in Shandong province, creating high-quality sports tourism brands in Shandong Province, and promoting the development of sports tourism in Shandong province.

Keywords: Shandong Province; Sports Tourism Space; Evolution; Influencing Factors.

RESUMEN

Este estudio utiliza el método de la literatura, el método de la estadística matemática, el método de análisis lógico y el método de análisis espacial SIG, tomando como objeto de investigación los elementos espaciales del turismo deportivo en la provincia de Shandong de 2009 a 2018, aclara el estado actual de desarrollo del turismo deportivo en la misma y la distribución de elementos espaciales. Este artículo analiza las características de evolución del espacio del turismo deportivo en la Provincia de Shandong, analiza los factores que influyen en la evolución del espacio del turismo deportivo, analiza las contramedidas para el desarrollo del turismo deportivo que proporciona referencia para enriquecer el plan de investigación del espacio de turismo deportivo y mejorar la teoría del desarrollo del espacio de turismo deportivo para optimizar la provincia de Shandong. Proporciona una referencia empírica para la distribución espacial del desarrollo del turismo deportivo provincial, equilibrando la estacionalidad, desequilibrio del turismo deportivo en la provincia de Shandong, construir una marca de turismo deportivo de alta calidad en la provincia de Shandong y promover el desarrollo del turismo deportivo en la provincia de Shandong.

Palabras clave: Provincia de Shandong; Turismo Deportivo; Espacio; Evolución; Factores Influyentes.

INTRODUCTION

Basis for Topic selection

With the sustained and rapid development of China's economy, people's needs for life are increasingly diversified, multifaceted and multi-level, and their yearning for a better life is more intense. China's tourism industry has entered the era of mass tourism. According to the calculation of the National Tourism Administration, China's sports tourism industry is currently growing at an average annual rate of about 30 % to 40 %. As a healthy and beneficial way of leisure, sports tourism has become an important part of People's Daily life.^(1,2)

Shandong Province is rich in sports tourism resources, and the sports tourism industry is developing rapidly. However, there is still a gap between the supply of sports tourism products at the present stage and the people's needs for a better life in the new era. The spatial distribution of sports tourism is unbalanced, and it is difficult to form a large-scale agglomeration. Based on this, in order to deeply explore the evolution law of sports tourism space in Shandong province, clarify the development characteristics of sports tourism in Shandong Province, explore the influencing factors of the evolution of sports tourism space in Shandong Province, and promote the development of sports tourism in Shandong province to improve the quality and efficiency, it has become an urgent problem to be solved.⁽³⁾

Research Review

Spatial structure, as an indicator of regional development status, refers to the degree and form of spatial aggregation formed by the interaction of social and economic objects in space. The study on the spatial-temporal evolution of the spatial structure of sports tourism resources is helpful to grasp the law of the development of sports tourism resources, judge the rationality of the development and utilization of tourism resources, and thus provide decision-making reference for the overall planning of tourism destinations and the optimization of regional tourism layout.

As for the study of spatial structure model, Lu Dadao (2002) proposed the point-axis theory of spatial structure system development from a macro perspective, based on W. Christaller's central place theory, and expounded the development model of the point-axis theory. According to Chen Zhijun (2008), the evolution of regional tourism spatial structure can be divided into point-like model, radiating model, condensing model and expanding model. Li Zhaojin et al.⁽¹⁾ analyzed the geographical spatial distribution of tourists in the tourist sources of coastal cities in Shandong Province, the tourism intention of a certain city, and the inter-annual changes of tourism demand, and proposed that Shandong Province should build coastal sports tourism areas with characteristics on the basis of resource sharing and regional linkage.

As for the research on the factors affecting the spatial evolution, Wang Hua and Peng Hua (2004) systematically discussed the main factors affecting the development of hot spring tourism products and proposed that the subjective factors mainly based on the decision maker's behavior and the objective factors mainly based on hot spring resources, economy, transportation, natural and cultural landscape environment constitute the influencing factor system of hot spring tourism development. Wu Wei (2013) quantitatively analyzed the influence degree of tourist source market, economic level, tourism resource endowment and traffic conditions on rural tourism in Shandong Province by using methods such as geographical linkage rate. Jiang Fugao et al.⁽³⁾, from the perspective of holding large-scale events, believes that Rizhao's building of the city name card as the "capital of water sports" will have an important impact on promoting the spatial layout and optimization of urban sports tourism. Kang Yikun et al.⁽²⁾ took Jiangsu, Zhejiang and Shanghai as an example to discuss the main factors affecting the evolution of sports tourism scenic spots, including inter-regional resource differences, economic development level, tourism market demand, government policy promotion and transportation convenience. Ren Jie (2019) used the spatial analysis method to study the spatio-temporal evolution of marathon events in China and proposed that human factors had a greater impact on the spatial distribution of marathon events in China than natural factors.

To sum up, foreign scholars started the research on sports tourism space earlier, focusing on the factors affecting the spatial distribution of sports tourism. The research of domestic scholars on sports tourism space starts from the concept of space, the mode and characteristics of spatial evolution, and the influencing factors of spatial evolution, and the time scale of the research object has gradually changed from static to dynamic. In this regard, this study intends to conduct a more in-depth and comprehensive discussion on the characteristics of the spatio-temporal evolution of sports tourism in Shandong Province, in order to provide valuable theoretical reference for the development of regional sports tourism resources.^(4,5,6)

METHOD

Object of study

This paper intends to study the spatial evolution characteristics and influencing factors of sports tourism in Shandong Province from 2009 to 2018. Considering the scientific, authoritative, industrial and spatial nature

of data acquisition, this paper draws on Professor Jiang Fugao’s doctoral thesis and Zhang Xiuhe’s master’s thesis, and selects ski resorts, golf courses, sports tourism quality projects, sports tourism demonstration units, national mountaineering trails and sports and leisure characteristic towns as the spatial evolution elements from the spatial dimension.⁽⁷⁾ These six types of spatial elements have strong sports tourism attributes, and the forms of the elements are diverse, which can more comprehensively represent the development of sports tourism in Shandong Province.^(8,9)

Research methods

In this paper, literature data, mathematical statistics, GIS spatial analysis and logical analysis are used to collect the materials needed for research, and the growth of spatial elements of sports tourism in Shandong Province from 2009 to 2018 is analyzed, and the evolution stages of sports tourism space in Shandong Province are divided.⁽¹⁰⁾ Measure the spatial distribution type, spatial evolution model, center of gravity shift and spatial agglomeration degree of sports tourism space in Shandong Province at each stage, describe the correlation between the growth of sports tourism spatial elements and various influencing factors, clarify the evolution model of sports tourism space, and explore various factors affecting the spatial elements of sports tourism.^(11,12)

RESULTS

Division of evolution stages of spatial elements of sports tourism in Shandong Province

Considering the characteristics, scale and influence of the spatial elements of sports tourism as well as the availability and authority of data, the spatial elements of sports tourism from 2009 to 2018 are selected from the time dimension. From the spatial dimension, ski resorts, golf courses, sports tourism quality projects, sports tourism demonstration units, national mountaineering trails, sports and leisure characteristic towns are selected as spatial evolution elements.

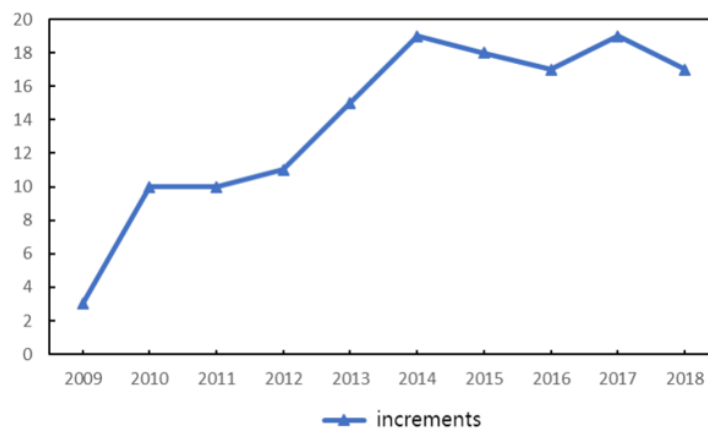


Figure 1. Increase of spatial elements of sports tourism in Shandong Province from 2009 to 2018

As can be seen from figure 1, by observing the annual increase of spatial elements of sports tourism in Shandong Province, the evolution of spatial elements of sports tourism in Shandong Province can be divided into four stages: 2009-2010, 2011-2012, 2013-2014 and 2015-2018.

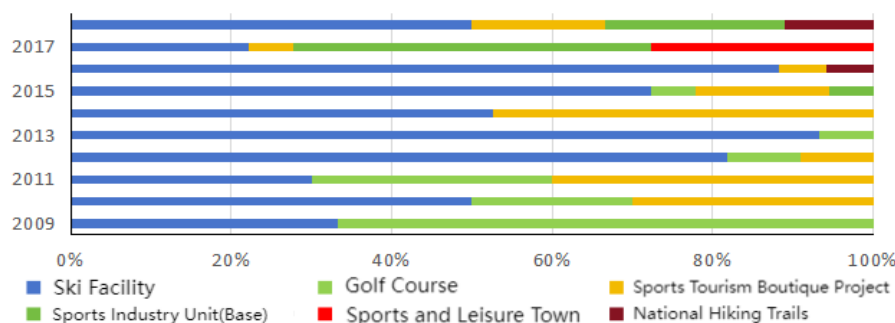


Figure 2. The proportion of various sports tourism spatial factors in Shandong Province from 2009 to 2018

Combined with figure 2 and table 1, it can be seen that the category structure of new sports tourism spatial elements in Shandong Province showed obvious changes from 2009 to 2018. From 2009 to 2014, the types of

newly added sports tourism spatial elements in Shandong were all ski resorts, golf courses and sports tourism quality projects; from 2015 to 2018, the types of newly added sports tourism space elements in Shandong were more diversified, and sports industry demonstration units, sports and leisure characteristic towns, and national hiking trails began to grow.

In summary, the evolution of sports tourism space in Shandong Province from 2009 to 2018 can be divided into four stages, namely: the initial stage (2009-2010), the steady growth stage (2011-2012), the leapfrog growth stage (2013-2014), and the innovative development stage (2015-2018).

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ski Slopes	1	5	3	9	14	10	13	15	4	9
Golf course	2	2	3	1	1		1			
Sports tourism boutique project		3	4	1		9	3	1	1	3
Sports industry demonstration unit							1		8	4
Athleisure Features Town									5	
National Mountaineering Trail								1		2
Total	3	10	10	11	15	19	18	17	18	18

Source: official website of the General Administration of Sport of China

ANALYSIS OF SPATIAL EVOLUTION CHARACTERISTICS OF SPORTS TOURISM IN SHANDONG PROVINCE
 Evolution analysis of spatial distribution characteristics of sports tourism in Shandong Province

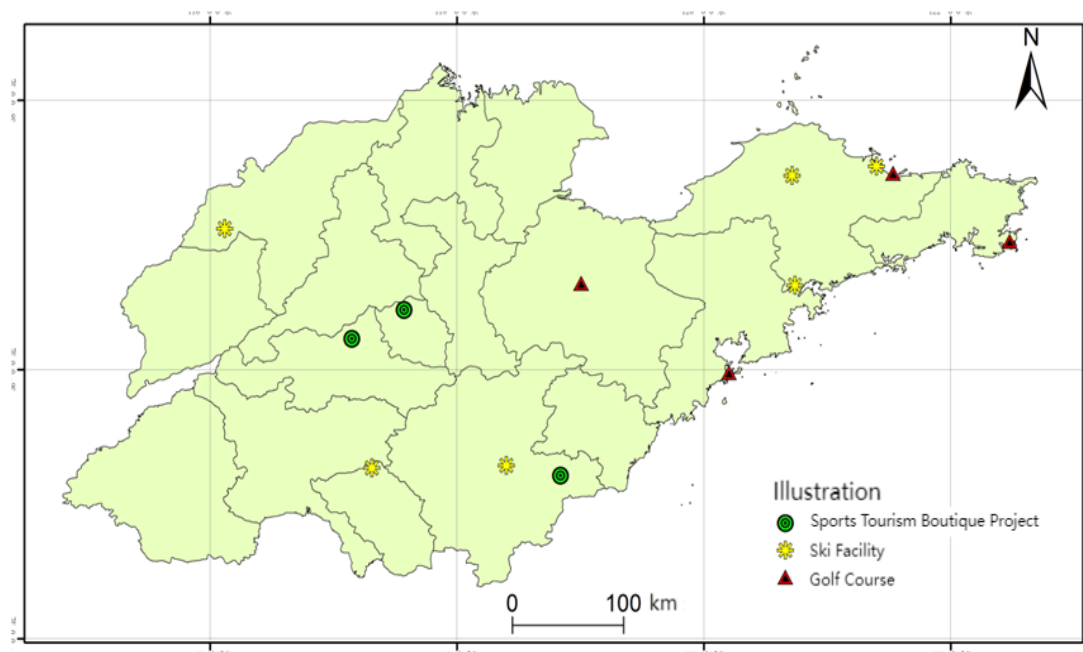


Figure 3. Distribution of new spatial elements of sports tourism in Shandong Province at the initial stage

As shown in figure 3, at the initial stage (2009-2010), the spatial elements of sports tourism in Shandong Province mainly appeared in the regions with developed tourism industry, high economic level and convenient transportation conditions, and showed the spatial characteristics of small distribution range, small number of spatial elements, obvious differences in types between regions, and scattered distribution.

As shown in figure 4, in the steady growth stage (2011-2012), the spatial distribution scope of sports tourism in Shandong Province further expanded, the total amount of spatial elements increased, and the regional differences of types began to decrease. The cities and cities that started sports tourism earlier formed core regions, and the spatial distribution characteristics of the cores were connected by axes.

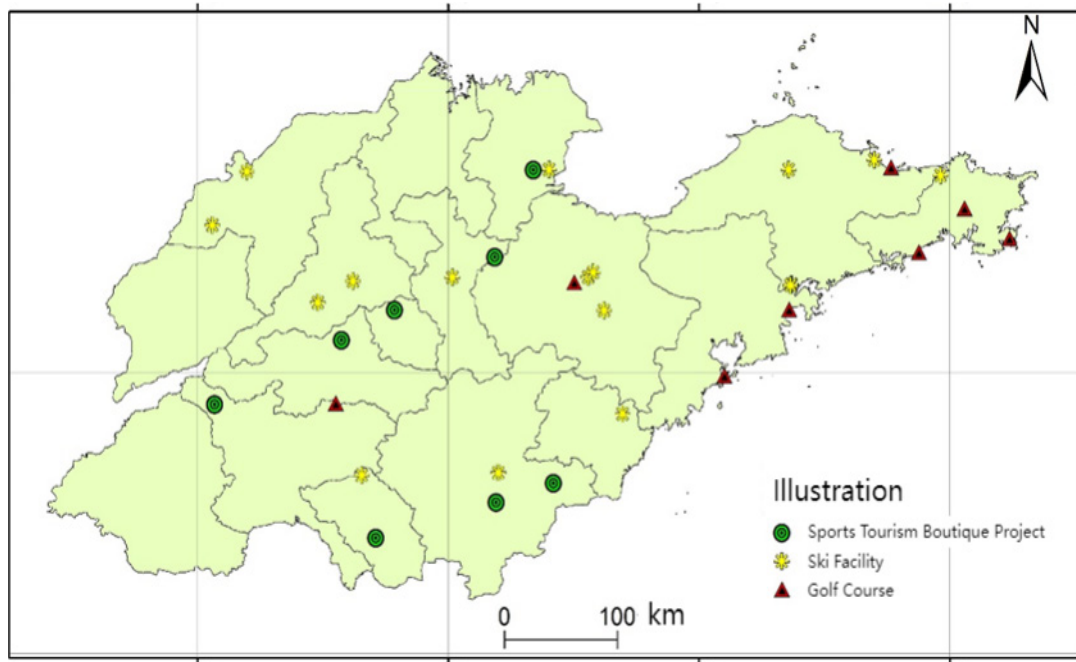


Figure 4. Distribution of new spatial elements of sports tourism in Shandong Province in the stage of steady growth

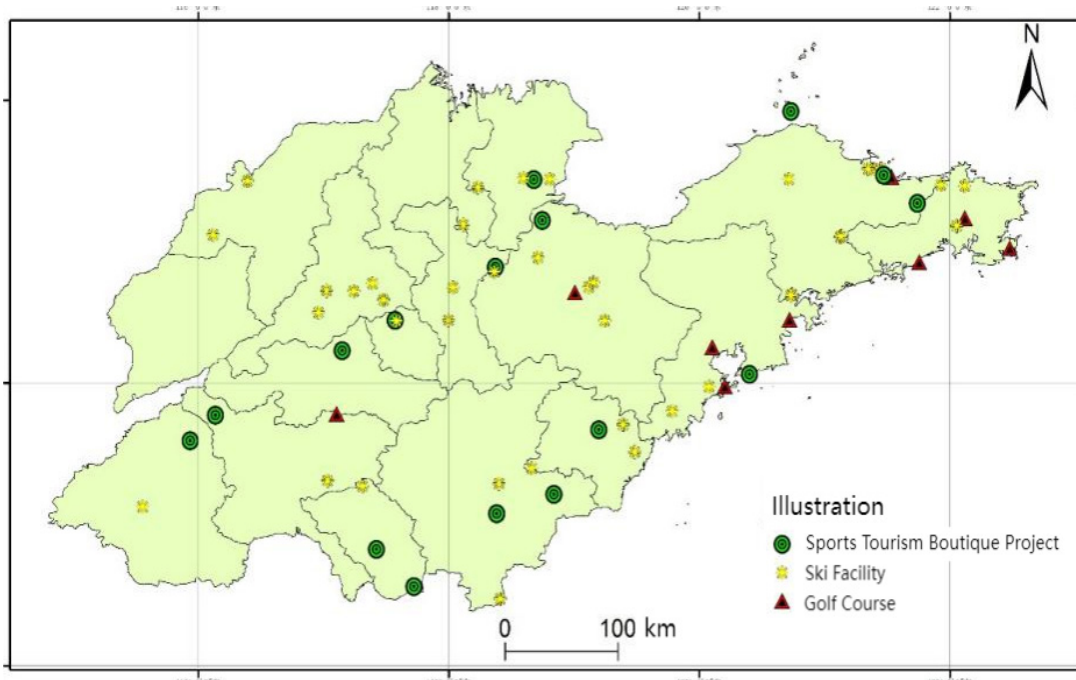


Figure 5. Distribution of new spatial elements of sports tourism in Shandong Province across the growth stage

As shown in figure 5, across the growth stage (2013-2014), the number of spatial elements of sports tourism in Shandong increased significantly, and the regional differences of the types of elements further decreased, initially showing a spatial distribution characteristic of spreading from the core area to the surrounding areas.

As shown in figure 6, in the stage of innovative development (2015-2018), the spatial distribution of sports tourism in Shandong Province expanded to all cities in the province, with the number of spatial factors doubling and the types of factors becoming innovative, showing the spatial distribution characteristics of network diffusion.

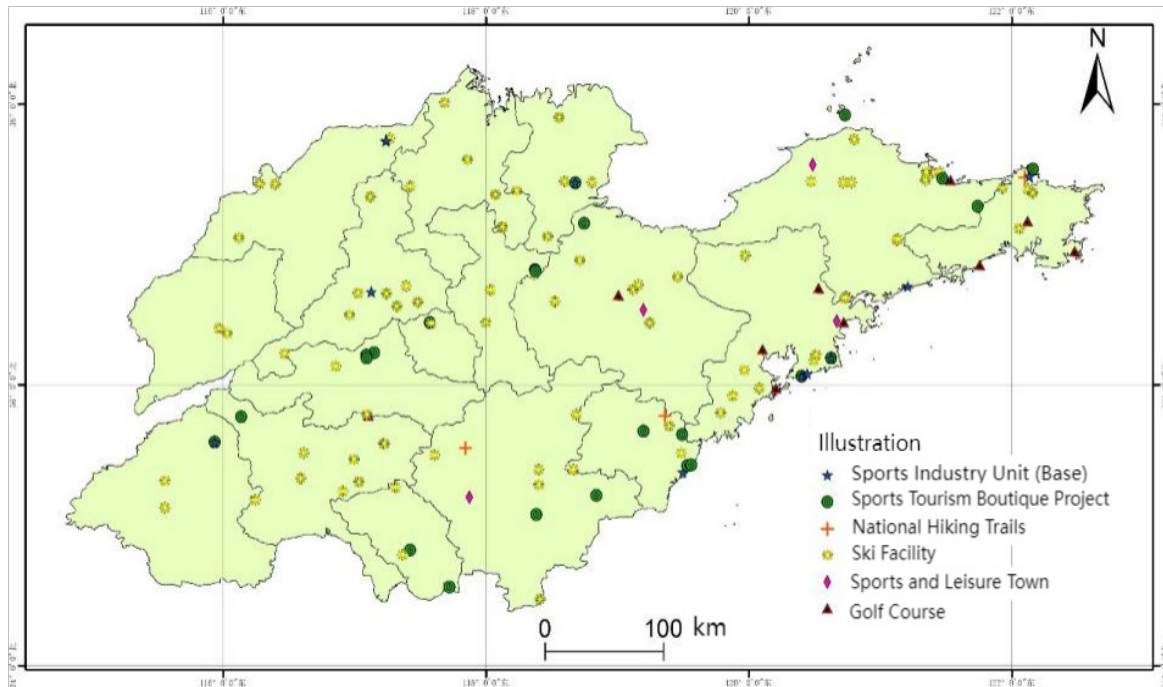


Figure 6. Distribution of new spatial elements of sports tourism in Shandong Province in the stage of innovative development

Analysis on the evolution of spatial distribution pattern of sports tourism in Shandong Province

Analysis based on geographical concentration index

The number of spatial elements of sports tourism in prefecture-level cities of Shandong Province and the total number of spatial elements of sports tourism in Shandong Province are substituted into the geographical concentration index formula to obtain the geographical concentration index of spatial elements of sports tourism in Shandong Province:

Table 2. Change of geographical concentration index of sports tourism spatial factors in Shandong Province				
Stages	T	G	Gi	G-Gi
Initial stage (2009-2010)	13	36,89	24,25	12,64
Steady Growth phase (2011-2012)	34	29,41	24,25	5,16
Leapfrog the Growth phase (2013-2014)	68	29,19	24,25	4,94
Innovation Development Stage (2015-2018)	139	28,08	24,25	3,82

As can be seen from table 2, the spatial concentration of sports tourism in Shandong Province is weakening gradually, with the largest change in 2010-2012, the smallest change in 2012-2014, and the change in 2015-2018.

Based on kernel density analysis

Kernel density analysis shows the agglomeration of spatial elements of sports tourism in Shandong Province. The greater the kernel density value, the more the spatial elements of sports tourism are concentrated in the region. On the contrary, the spatial elements of sports tourism are more dispersed. On the basis of identifying the concentration degree of sports tourism space in different development stages of Shandong Province, ArcGIS was used to generate the spatial kernel density map of sports tourism in Shandong Province at each stage. The results are as follows:

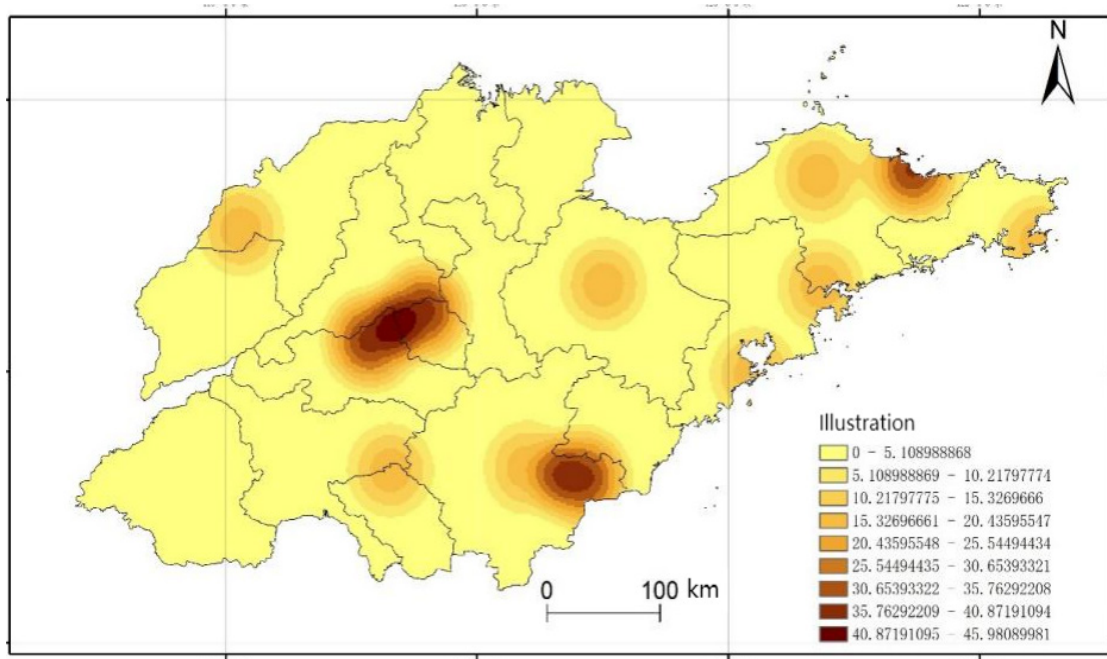


Figure 7. Spatial nuclear density of sports tourism in Shandong Province at the initial stage

As shown in figure 7, at the initial stage, the total amount of spatial elements of sports tourism in Shandong Province was small, and there was a lack of connection among the elements. Therefore, the spatial distribution of sports tourism in Shandong Province showed a typical scattered pattern. Taian- Laiwu-Jinan, Yantai and Linyi City, these three areas form the “three cores” of sports tourism development in Shandong Province. Weihai, Qingdao, Weifang, Zaozhuang and Dezhou form a lower density region.

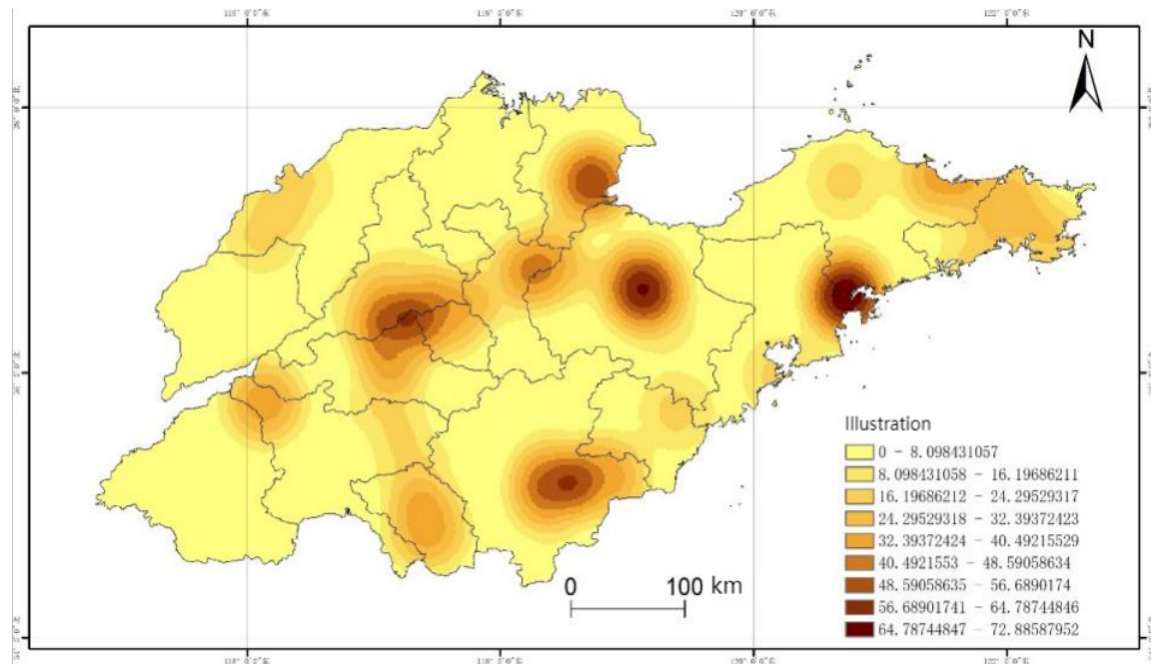


Figure 8. Spatial nuclear density of sports tourism in Shandong Province in the stage of steady growth

As shown in figure 8, in the steady growth stage, the spatial elements of sports tourism in Shandong Province either connect points to form lines or expand their scope, showing an axis and a block pattern. The number of core areas of sports tourism space is further increased, and the level division is more continuous. The spatial development mode of sports tourism in the coastal areas of eastern Shandong Province is still dominated by the fragmented mode.

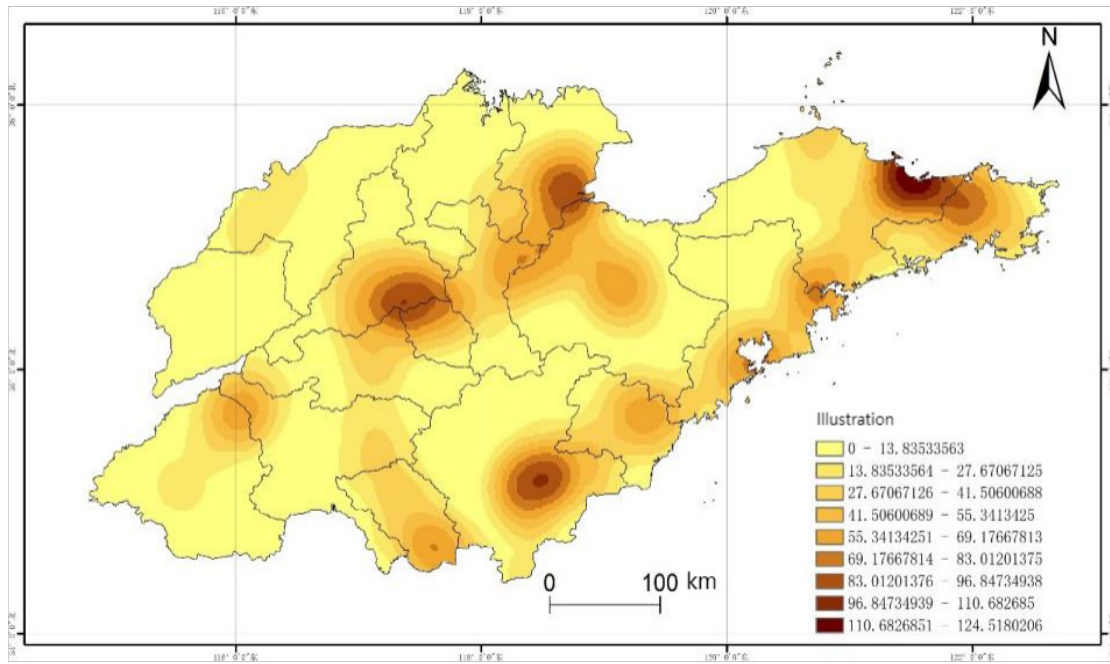


Figure 9. Spatial nuclear density of sports tourism in Shandong Province across the growth stage

As shown in figure 9, across the growth stage, the spatial elements of sports tourism in Shandong Province are more closely related, and the bulk scale gradually expands and extends, forming a large-scale banded distribution pattern. The two belts in Shandong Province have a connection trend at the junction of Zaozhuang and Linyi and will soon form a “J” shaped belt. In addition, the northwest of Jining and the middle of Heze are connected to form a block, and the development of sports tourism is good.

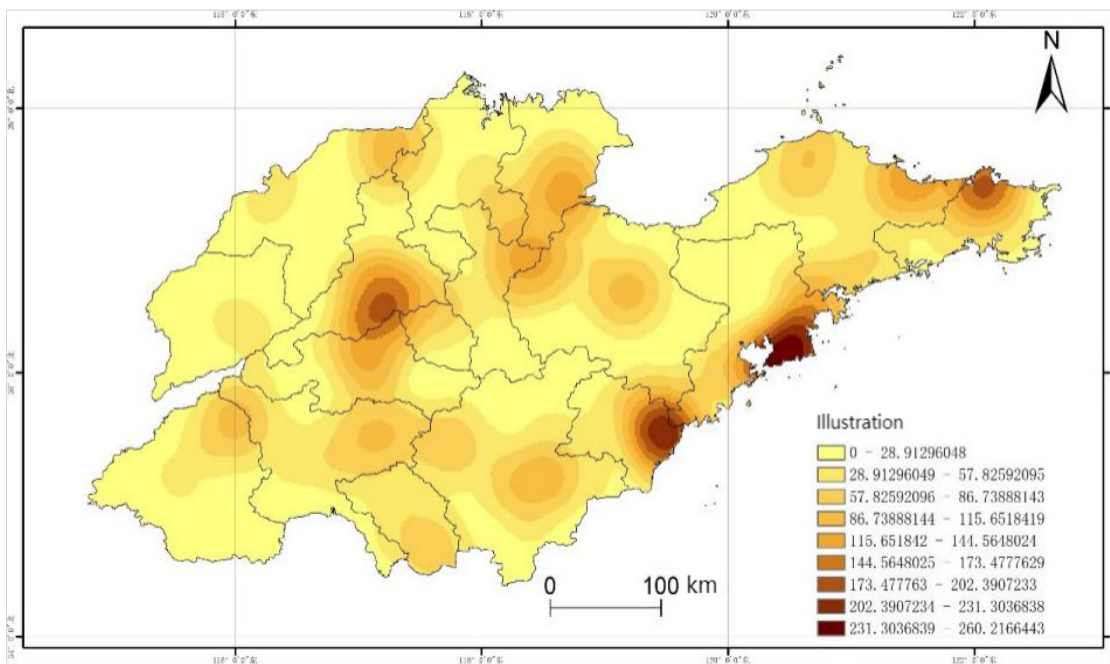


Figure 10. Spatial nuclear density of sports tourism in Shandong Province at the stage of innovative development

As shown in figure 10, at the stage of innovative development, the distribution range of spatial elements of sports tourism in Shandong Province continues to expand, forming a clumpy distribution pattern. At this stage, the diffusion effect of the sports tourism space core area in Shandong Province is obvious, and the influence scope is further expanded. The two main strips in inland and coastal areas are connected to form a “J” shaped strip and are connected with the clumps in southwest Shandong Province. In general, a network sports tourism space area with Qingdao and Jinan as the double core and spreading to the surrounding areas is formed.

Analysis on the evolution of spatial distribution center of gravity of sports tourism in Shandong Province

Identifying the stage characteristics of the development of sports tourism space in Shandong Province and the process of the shift of the center of gravity is of great significance for sorting out the development track of sports tourism space and optimizing the layout of sports tourism space.

Figure 11 shows the migration trajectory of spatial elements of sports tourism in Shandong Province from 2009 to 2018 by ArcGIS:

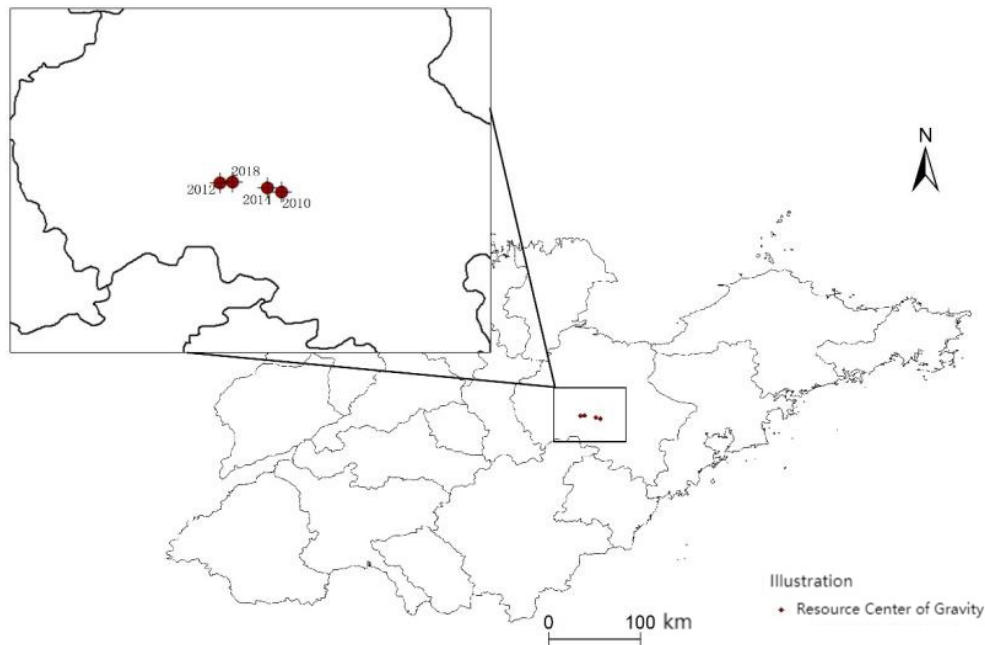


Figure 11. Change of spatial center of gravity of sports tourism in Shandong Province

As can be seen from figure 11, from 2009 to 2018, the center of gravity of sports tourism space in Shandong Province has always been located in Weifang City, and the movement distance in the east-west direction is obvious, while the movement distance in the north-south direction is not large. The movement track is shaped as “one”, indicating that the evolution of sports tourism space in Shandong Province has more obvious east-west fluctuation.

Analysis on the influencing factors of the spatial evolution of sports tourism in Shandong Province

Government policy orientation

Sports tourism policy is a vein to lead the development of sports tourism industry, and an important support to standardize the sports tourism market and promote the rapid development of sports tourism economy. As people’s demand for a better life becomes increasingly strong, the government has issued a series of relevant policies to ensure the high-quality development of sports tourism. Since the implementation of the policy has a lag, the changing characteristics of the sports tourism space may appear later than the promulgation time of the policy.

Government policies play an important leading role in the evolution of sports tourism space, and the types and quantities of new sports tourism space elements change with the guidance of policy contents. Government policies can not only promote the expansion of spatial distribution scale and variety of sports tourism, but also limit the disorderly expansion of sports tourism space according to national needs.

Level of economic development

The level of economic development is the endogenous driving force for the evolution of sports tourism space in a region. In this paper, the gross regional product (GDP), added value of tertiary industry and disposable income of urban residents of various cities in Shandong Province in 2010, 2012, 2014 and 2018 are selected as indicators representing the level of economic development, and the correlation analysis is carried out with the number of spatial elements of sports tourism in various cities in Shandong Province. The results are shown in table 3:

Table 3. Correlation analysis between sports tourism space and economic development level in Shandong Province

Influencing factor		2010	2012	2014	2018
Gross regional product	Pearson value	0,482*	0,662**	0,703**	0,825**
	Sig.	0,050	0,004	0,002	0,000
Tertiary industry Value added	Pearson value	0,404	0,585*	0,650**	0,795**
	Sig.	0,107	0,014	0,005	0,000
Urban households Disposable income	Pearson value	330	583*	0,601*	0,609**
	Sig.	0,196	0,014	0,011	0,009

*. Significant association at 0,05 level (both sides).
 **. Was significantly associated at 0,01 (bilateral) level.

As can be seen from table 3, the improvement of economic development level has laid a strong financial foundation for the development of sports tourism in Shandong Province. The economically developed area sports tourism started earlier, and it is easy to form the core area of sports tourism spatial elements.

The correlation coefficients of sports tourism space and added value of tertiary industry in each stage of Shandong Province indicates that the sports tourism space presents a weak positive correlation with the added value of the tertiary industry in the initial stage of the sports tourism space, and a significant positive correlation between the two after the steady growth period. However, after entering the steady growth period, the two began to show a significant positive correlation.

Conditions of traffic facilities

The condition of transportation facilities is an important factor affecting the spatial distribution of sports tourism. A convenient transportation system helps to strengthen the external communication ability of spatial elements of sports tourism, improve the accessibility of sports tourism places, and is an important support for the development of sports tourism. In this paper, highway traffic mileage and passenger volume, which reflect the traffic development status, are selected as indicators representing the traffic facility conditions of Shandong Province and the number of spatial factors of sports tourism in various cities of Shandong Province are analyzed. The results are shown in table 4:

Table 4. Correlation analysis between sports tourism space and traffic facility conditions in Shandong Province

Influencing factors		2010	2012	2014	2018
Highway miles open to traffic	Pearson value	0,230	0,129	0,061	0,126
	Sig.	0,375	0,620	0,815	0,629
Ridership	Pearson value	440	569*	582*	623**
	Sig.	0,077	0,017	0,014	0,008

*. Significant association at 0,05 level (both sides).
 **. Was significantly associated at 0,01 (bilateral) level.

As can be seen from the table, the correlation coefficients between sports tourism space and highway traffic mileage in different cities of Shandong Province at different stages are 0,230, 0,129 and 0,061, respectively, and the correlation between the two is weak. It shows that although highway construction can improve the accessibility of sports tourism destinations, the increase of highway mileage cannot directly affect the distribution and growth of spatial elements of sports tourism.

The correlation coefficients between sports tourism space and passenger volume in different cities of Shandong Province at different stages are 0,440, 0,569 and 0,582, and the significance values are 0,077, 0,017 and 0,014, respectively, indicating that the two show a weak positive correlation in the initial stage of sports tourism space, and a significant positive correlation after entering the steady growth period.

In order to reflect the relationship between railway traffic and sports tourism spatial distribution in Shandong Province, the buffer zone function in ArcGIS was applied to depict, 5km and 10km buffer zones were established based on railway lines in Shandong Province, and the spatial distribution of sports tourism in Shandong Province from 2009 to 2018 was combined, as shown in figure 12.

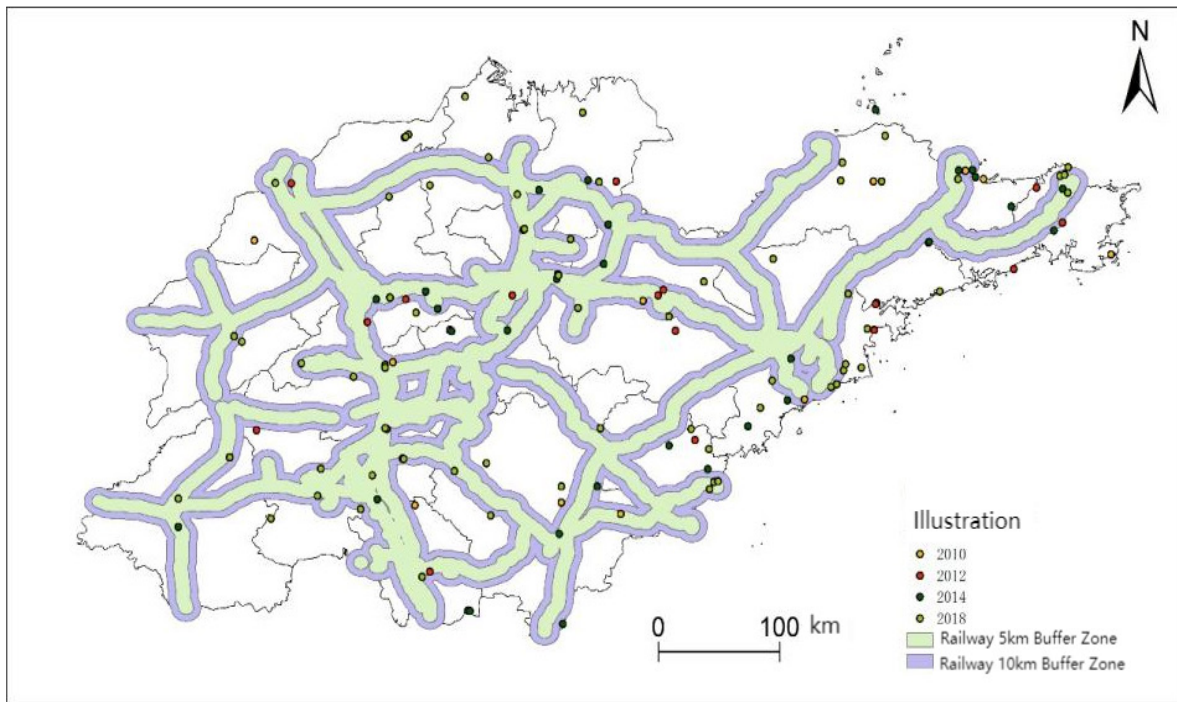


Figure 12. Railway buffer zone map of Shandong Province

The number of spatial elements of sports tourism falling in the buffer zone at each stage is obtained by statistics (see Table 5). The distribution of sports tourism space along the railway in Shandong Province showed an increasing trend in the four development stages, and the proportion of sports tourism space elements increased from 46,15 % to 62,59 %, accounting for about two-thirds of the total sports tourism space elements.

The results show that the spatial elements of sports tourism in Shandong Province have strong dependence on railway traffic, and there is no obvious difference between coastal cities and inland cities. As an important travel mode of domestic tourists, railway transportation is a factor that must be considered in the location of sports tourism destinations. The more convenient the transportation conditions of the tourist destination, the more frequent the flow of information, population and funds, the more development opportunities can be brought.

	2010	2012	2014	2018
Within 5km (place)	3	11	25	47
5-10km (place)	3	8	19	40
Total (place)	13	34	68	139
Percentage in buffer zone (%)	46,15	55,88	64,71	62,59

Level of tourism development

The level of tourism development reflects the popularity and recognition of regional tourism industry. Sports tourism is the product of the integrated development of sports and tourism activities, and it is an excellent way to deepen the development of tourism industry and expand the scale of sports industry. This paper selects the number of domestic tourists, the number of inbound tourists, the consumption of domestic tourists and the consumption of inbound tourists in various cities of Shandong Province as the indicators representing the level of tourism development and makes a correlation analysis with the number of spatial elements of sports tourism. The results are shown in table 6.

As can be seen from the table, the correlation coefficients between sports tourism space and the number of domestic tourists in different cities of Shandong Province at each stage are 0,472, 0,636, 0,609 and 0,744, and the significance values are 0,056, 0,006, 0,010 and 0,001, respectively, indicating that there is a weak positive correlation between sports tourism space and the number of domestic tourists at the initial stage. After entering the period of steady growth, it presents a strong positive correlation, and the fluctuation of the relationship intensity increases. With the increase of Chinese people's demand for leisure and fitness, spectator entertainment and other aspects, the spatial elements of sports tourism develop rapidly in the wave of domestic tourism with increasing scale.

Table 6. Correlation analysis between sports tourism space and tourism development level in Shandong Province

Influencing factors		2010	2012	2014	2018
Domestic visitor numbers	Pearson value	0,472	0,636**	0,609**	0,744**
	Sig.	0,056	0,006	0,010	0,001
Inbound tourist numbers	Pearson value	0,524*	0,640**	0,664**	0,839**
	Sig.	0,031	0,006	0,004	0,000
Domestic visitor spending	Pearson value	0,520*	0,684**	0,681**	0,813**
	Sig.	0,032	0,002	0,003	0,000
Inbound visitor spending	Pearson value	0,524*	0,680**	732**	0,846**
	Sig.	0,031	0,003	0,001	0,000

*. Significant association at 0,05 level (bilateral).
 **. Was significantly associated at 0,01 (bilateral) level.

The correlation coefficients between the sports tourism space and the number of inbound tourists in Shandong Province at each stage are 0,524, 0,640, 0,664 and 0,839, and the significance values are 0,031, 0,006, 0,004 and 0,000, respectively, indicating that the two present a strong positive correlation at each stage, and the correlation is gradually increasing. By further analyzing the destination of inbound tourists in Shandong Province (see Table 7), it is found that Qingdao, Yantai and Weihai receive the largest number of inbound tourists in the four stages.

Table 7. Reception of inbound tourists in some cities in Shandong Province

Prefectures and Cities		2010	2012	2014	2018
Qingdao	Receptions (10,000)	108,05	127,01	128,05	153,6
	Rankings	1	1	1	1
Yantai	Receptions (10,000)	47,20	53,02	54,58	63,8
	Rankings	2	2	2	2
Weihai	Receptions (10,000)	37,26	45,66	44,79	50,7
	Rankings	3	3	3	3

Source: Shandong Tourism Statistics Summary

The correlation coefficients between sports tourism space and domestic tourist consumption in different stages of Shandong Province are 0,520, 0,684, 0,681 and 0,813, and the significance values are 0,032, 0,002, 0,003 and 0,000, respectively, indicating that there is always a significant positive correlation between the two, and this relationship is increasingly close in general. Further analysis of the composition of domestic tourists' consumption shows that although domestic tourists' consumption of sports fluctuates in terms of the proportion of total consumption, the total consumption shows a significant upward trend. The increase of sports and entertainment consumption reflects the growing demand for sports tourism, thus promoting the development of sports tourism space.

Table 8. Sports and entertainment consumption of domestic tourists in Shandong Province

	2010	2012	2014	2018
Consumption of sports and entertainment (100 million yuan)	63,27	97,54	125,08	167,35
Proportion of domestic tourist consumption (%)	2,17 %	2,25 %	2,19 %	1,68 %

Source: Shandong Tourism Statistics Summary

The correlation coefficients between sports tourism space and inbound tourist consumption in different cities of Shandong Province at different stages are 0,524, 0,680, 0,732 and 0,846, with significance values of 0,031, 0,003, 0,001 and 0,000, respectively, indicating that there is always a significant positive correlation between the two and this relationship is gradually close. From the evolution of the number of inbound tourists received in Shandong Province, it can be seen that inbound tourists are concentrated in the eastern coastal areas where sports leisure tourism is relatively developed. Taking the spatial evolution characteristics of golf courses as an example, a total of 10 new golf courses were built in Shandong Province during the research

period, among which 8 were located in Qingdao, Weihai and Yantai. Most inbound tourists in Shandong Province are Japanese and South Korean tourists, and the main purpose of these tourists is golf vacation and other high-end consumption sports tourism forms. Therefore, with the increase of inbound tourists' consumption, the development of sports tourism space in Shandong Province will also be supported by more funds.

Sports culture heritage

Culture is the product of all human spiritual activities, the crystallization of human wisdom, and the inexhaustible vitality of the innovation and development of things. The evolution and distribution of sports tourism space are deeply influenced by local culture. In this paper, sports events, festivals and R&D expenditure of cities in Shandong Province are selected as indicators representing the development level of sports culture in cities in Shandong Province, and the correlation analysis is made with the number of spatial elements of sports tourism. The results are shown in table 9:

Influencing factors		2010	2012	2014	2018
Events Festival	Pearson number	0,343	0,538*	0,749**	0,679**
	Sig.	0,178	0,026	0,001	0,003
R&D expenditure	Pearson value	0,412	0,612**	0,718**	0,792**
	Sig.	0,101	0,009	0,001	0,000

*. Significant association at 0,05 level (bilateral).
 **. Was significantly associated at 0,01 (bilateral) level.

As can be seen from table 9, in the initial stage, sports tourism space presents a weak positive correlation with the number of events and festivals held. After entering the stage of steady growth, the two show a strong positive correlation, indicating that Shandong Province has gradually formed a distinct sports culture through holding sports events, developing sports festivals and other colorful sports theme activities, which has promoted the growth of sports tourism space elements and promoted the development of sports tourism industry. The data show that the sports tourism space and R&D expenditure show a gradually enhanced positive correlation in the whole research stage, indicating that the sports culture achievements produced by scientific research and technological innovation play a strong role in promoting the development of sports tourism space in Shandong Province.

CONCLUSIONS

This paper expounds the significance of the research on the spatial evolution of sports tourism in Shandong Province. Based on the main research methods of spatial theory and spatial analysis, this paper discusses the spatial evolution characteristics and influencing factors of sports tourism in Shandong Province from 2009 to 2018, and draws the following conclusions:

Sports tourism space is the spatial expression of sports tourism activities in tourist destinations and is the spatial projection of the scale and development model of sports tourism. This study analyzes the spatial location and type of new sports tourism in each stage from the dimensions of time, distribution area, quantity and type. The spatial distribution of sports tourism in Shandong Province has gradually developed from a small distribution range, a small number of new sports tourism, and large differences in types between regions to obvious distribution characteristics, a large number of new sports tourism spatial elements, and a wide distribution throughout the province.

From the dimension of spatial distribution characteristics, the evolution characteristics of the spatial distribution pattern of sports tourism in Shandong Province are discussed. The results show that the spatial distribution pattern of sports tourism is scattered in the initial stage, scattered in the stable growth stage, belt-like in the cross-regional growth stage, and cluster-like in the innovative development stage. The spatial center of sports tourism in Shandong Province at each stage is located in Weifang City.

The main factors affecting the spatial evolution of sports tourism in Shandong Province include national policies, economic level, transportation conditions, tourism development level, sports culture atmosphere, etc. The spatial distribution of sports tourism tends to be reasonable. Shandong Province should focus on "integration of multiple plans", use points to lead the whole, use lines to lead the whole, and build a "dual-core, three-belt, and multiple-circle" sports tourism spatial layout.

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CONFLICT OF INTEREST

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AUTHOR CONTRIBUTION

Conceptualization: Jiang Jun, Jiang Fugao.

Data curation: Jiang Jun, Jiang Fugao.

Formal analysis: Jiang Jun, Jiang Fugao.

Research: Jiang Jun, Jiang Fugao.

Methodology: Jiang Jun, Jiang Fugao.

Drafting - original draft: Jiang Jun, Jiang Fugao.

Writing - proofreading and editing: Jiang Jun, Jiang Fugao.