The Coordinated Development of Sports Industry and Tourism under the Perspective of Soft Power: A Case Study of Henan Province

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Abstract As an industry representing soft power, the coordinated development between sports industry and tourism plays an important role in promoting economic growth. Using the cointegration theory, we carry out empirical test of economic growth, the output value of sport and tourism income; using the coordination theory, we carry out the evaluation of the coordinated development between sports industry and tourism. It is found in the study that there is a long-term stable dynamic equilibrium relationship among economic growth, the output value of sport and tourism income. The sports industry and tourism in Henan Province have undergone six stages (imbalance-on the verge of imbalance – barely coordinated-primarily coordinated – moderately coordinated – well coordinated). In the process of coordinated development, sports industry significantly lags behind tourism, so it is necessary to strengthen the sports industry personnel's quality, and optimize the coordination between the sports industry and tourism, so as to promote economic development level.

Key words Sports industry, Tourism, Granger test, Cointegration theory, Entropy method

Soft power is a concept developed by Joseph Nye of Harvard University to describe the ability to attract and co-opt rather than coerce, use force or give money as a means of persuasion. Nye coined the term in a 1990 book, *Bound to Lead: The Changing Nature of American Power*. He further developed the concept in his 2004 book, *Soft Power: The Means to Success in World Politics*. The term is now widely used in international affairs by analysts and statesmen. For example, in 2007, CPC General Secretary Hu Jintao told the 17th Communist Party Congress that China needed to increase its soft power, and the US Secretary of Defense Robert Gates spoke of the need to enhance American soft power by " a dramatic increase in spending on the civilian instruments of national security – diplomacy, strategic communications, foreign assistance, civic action and economic reconstruction and development. " According to the IfG – Monocle Soft Power Index the United Kingdom currently holds the top spot in soft power thanks to a combination of international perception, global reach of British media, inventions like the world wide web, architecture, international diplomacy, students seeking to study in the UK, cultural missions and the number of highly publicized international events held there.

In 2010 Annette Lu, former vice-president of the Republic of China (Taiwan), visited South Korea and advocated the ROC's use of soft power as a model for the resolution of international conflicts. General Wesley Clark, when discussing soft power, commented that " it gave us an influence far beyond the hard edge of traditional balance-of-power politics. "

In economics, soft power means the long-term development potential of the industry, which produces the slow effect, and determines the long-term future. Soft power is a manifestation of enhanced regional competitiveness. For the Central Plains Economic Zone, the development of Henan Province plays an invaluable role. Sports industry and tourism are regarded as the representative industries of soft power. The coordinated development of sports industry and tourism plays a significant role in promoting the regional economic development, and is also the manifestation of regional competitiveness.

1 Current situation of development of sports industry and tourism in Henan Province

1.1 Current situation of development of tourism in Henan Province In recent years, the domestic tourism market in Henan Province has experienced rapid development, showing a trend of sustained, comprehensive and rapid growth. But in terms of the development of the international tourism market, there is a gradually widening gap between Henan Province and the advanced provinces. This gap is mainly manifested in the inbound tourism market.

As of the end of 2011, Henan Province received 1.6829 million inbound tourists, an increase of 42.14%; the tourism earned foreign exchange of about $ 549 million, an increase of 12.4%; it received 305.99 million domestic tourists, an increase of 18.7%; the total domestic tourism revenue was 276.6 billion yuan, an increase of 23.25%. The number of inbound tourists exceeded 1.5 million for the first time and the number of domestic tourists exceeded 300 million.

Currently, the number of inbound tourists received in Henan Province is ranked 14th in the country, and the foreign exchange earnings from tourism are ranked 18th in the country. The contribution rate of tourism income to the province's GDP shows an overall volatile upward trend, as shown in Fig. 1.

Currently, tourism is regarded as a pillar industry of the national economy and a new growth point in Henan Province. In
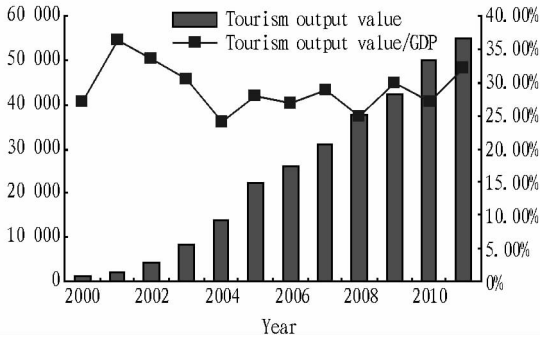
Fig. 1   The tourism income and its contribution to GDP in Henan Province during the period 2000 −2011

June 2011, Henan provincial government made a decision on speeding up the development of tourism in Zhengzhou, Kaifeng, Luoyang, Sanmenxia and other tourist cities along Yellow River. In June 2011, the Henan provincial government made a decision on speeding up the development of tourism in Zhengzhou, Kaifeng, Luoyang, Sanmenxia and other tourist cities along Yellow River. Zhengzhou, Luoyang, Kaifeng and Sanmenxia travelling route is located in the junction of eastern and western tourism development, with convenient transportation and rich tourism resources, as well as supporting industrial system. The advantages of key tourism areas are very obvious.

1. 2   Current situation of sports industry development in Henan Province   With the improvement of the economic development and people's living standards, diversified and multi-level development of sports industry has become an inevitable trend. In recent years, on the basis of investing heavily in the construction of sports industry facilities, Henan Province has continuously relied on the sports facilities and sports resources, to provide the products integrating body building, recreation, leisure and other services for the tourists in the tourism process, which effectively organically combines tourism and sports industry.

However, due to higher requirements of tourism and sports industry, it lacks appropriate market supply in Henan Province, and particularly the shortage of high-quality sports and tourism practitioners has severely inhibited the rapid development of sports and tourism.

2   Study of the impact of sports industry and tourism on the economy

The sports industry and tourism are regarded as the representative industries of soft power, having great growth potential and making great contribution to the economic development, indicating that the development of sports industry and tourism is an inevitable trend of future development. In order to study the elasticity of sports industry and tourism to economic growth, respectively, we take the logarithm of the above indicators, respectively. The data are from Henan Statistical Yearbook in 2012. For time-series data, in order to avoid spurious regression problem, we should first check the stationarity of time-series data, namely whether there is

unit root in the series. In this article, we use Augmented Dickey −Fuller (ADF) test method to test the economy (LNGDP), the output value of sport (LN TY) and tourism income (LN LY). Test results are shown in Table 1.

Table 1   Unit root test

Variable	t value	5% critical value	10% critical value	P value	Conclusion
LNGDP	−1.344 6	−3.020 7	−2.650 4	0.587 7	Non-stationary
DLNGDP	−3.666 0	−3.020 7	−2.650 4	0.013 5	Stationary
LNTY	−1.068 4	−3.000 5	−2.642 2	0.709 2	Non-stationary
DLNTY	−3.619 1	−3.012 4	−2.646 1	0.014 4	Stationary
LNLY	−0.502 9	−3.012 4	−2.646 1	0.877 2	Non-stationary
DLNLY	−3.245 3	−3.012 4	−2.646 1	0.042 9	Stationary

Note: The data are calculated based on Eviews 6.0.

Table 2   The regression results

Variable	coefficient	Std. Error	t-statistic	Prob.
C	0.578 6	0.124 7	4.640 6	0.000 2
LNLY	0.898 7	0.044 8	20.081 5	0.000 0
LNTY	0.066 5	0.048 4	1.374 1	0.004 6

Note: The data are calculated based on Eviews 6.0.

$R^2 = 0.994\ 9$, corrected $R^2 = 0.994\ 4$, and F statistic is 1 957.04. Various test parameters are significant, and the regression results are quite good. The regression equation is as follows:

$LNGDP = 0.578\ 5 + 0.898\ 7 \times LNLY + 0.066\ 5 \times LNTY$

So the residual sequence is as follows:

$e_t = LNGDP_t − 0.5785 − 0.8987 LNLY_t − 0.0665 LNTY_t$.

Then using ADF method, we carry out stationary test on the residual sequence, and the test results are shown in Table 3.

Table 3   Unit root test results of residuals

Residuals	T statistic	5% critical value	10% critical value	P value	Conclusion
e_t	−3.4482	−3.0124	−2.6461	0.0206	Stationary

According to the test results on the stationarity of residuals in the table, we know that P value of residuals is less than 0.05, so at the 5% significance level, it should reject the null hypothesis with one unit root, that is, this residual sequence is stationary, $e_t − I(0)$. So there is a long-term dynamic equilibrium relationship between LNGDP and LN LY, LN TY. Although there is a long-term dynamic equilibrium relationship between economic growth, sports industry development and tourism income, we can not validate the causality between them. According to the Granger causality test, we get the following results (Table 4).

From the Granger test, in the lag period of 3, it is found that when the null hypothesis is "tourism income does not Granger cause economic growth", P value is 0.0485, less than the critical value of 0.05 at 5% significance level, so it rejects the null hypothesis, and it is believed that tourism income does Granger cause economic growth.

Similarly, in the lag period of 4, it is found that when the

null hypothesis is "sports industry does not Granger cause economic growth", P value is 0.026 2, less than the critical value of 0.05 at 5% significance level, so it rejects the null hypothesis, and it is believed that sports industry does Granger cause economic growth.

In summary, it is found that both tourism income and sports industry does Granger cause economic growth. According to the regression results, it can be derived that for each additional 1% in the tourism income, GDP will increase by an average of 0.898 7%; for each additional 1% in the output value of sport, GDP will increase by an average of 0.0665%, so increasing tourism income and the output value of sport can to some extent accelerate economic development.

Table 4　Causality test of sports industry, tourism income and economic growth

The null hypothesis	Number of samples	F statistic	P value	Conclusion
Tourism income does not Granger cause the economic growth	19	3.5322	0.0485	Reject
Sports industry does not Granger cause economic growth	18	4.6375	0.0262	Reject

3　The empirical analysis of coordination between sports industry and tourism

From Granger causes and multiple regression analysis, it is found that the development of tourism income and sports industry is an important factor affecting economic growth, and affects the economic growth in varying degrees, then the impact of the coordinated development between sports industry and tourism on economic growth will become increasingly important.

In this article, on the basis of the system collaboration and the development of tourism and sports industry, we introduce the coordinated development degree model, and make objective evaluation of the coordinated development between tourism and sports industry in Henan Province, in order to provide a reference for promoting the rapid economic development.

Based on the principles of scientificity and operability, we build the indicator system of tourism system and sports industry system, respectively. The specific indicators are shown in Table 5.

Table 5　The evaluation indicator system for the coordinated development between tourism and sports industry in Henan Province

Goal layer	Subsystem	First level indicators	Second level indicators
The evaluation indicator system for the coordinated development between tourism and sports industry in Henan Province	Tourism system	Tourism economy	Total tourism income
			Tourism income/GDP
			The total number of employed persons in tourism/The total number of employed persons in the tertiary industry
			The total number of tourist
		Tourism resources	Regional forest coverage
			Garbage treatment rate
			The number of star-rated hotels
			The number of main tourism resources points
	Sports industry system	Sports industry scale	Sports industry's total income
			The total number of sports industry practitioners
			Net fixed assets value of the sports industry at the end of the year
		Sports industry development efficiency	Growth rate of sports practitioners
			Per capita consumption of sports/Total expenditure
			Sports R & D expenditure/local fiscal expenditure

The data selected for the coordination study are the time-series data in the period 2000-2011, and we must first standardize the raw data, and carry out dimensionless standardization of the indicators.

The specific steps of the processing are as follows:

(ⅰ) Assuming the original series has m rows and n columns, the initial data can form the following matrix:

$$X = (x)_{m \times n}$$

where m is the time axis; n is the number of indicators.

(ⅱ) Using the formula $Y_{m \times n} = x / \sum_{i=1}^{m} x_{in}$, the original data are standardized.

After the standardization of the above-described series, we further determine the weight of the indicators. Before determining the weight, we calculate the entropy value of indicator n.

We can use the following formula to calculate the entropy value of indicator n.

$$En = -\frac{1}{\ln m} \sum_{i=1}^{m} Y_{in} \times LNY_{in}.$$

Then we further determine the information utility coefficient of indicator n, using the formula $Un = 1 - En$, and the formula $fn = Un / \sum_{i=1}^{m} U_i$.

The unit of the indicator and the corresponding weight results are shown in the following table.

In this article, we select the calculation formula of coordination degree proposed by Yang Shihong (2011) in Urban Ecological Environment Study, to reflect the coordination between sports

industry and tourism development. The formula is as follows:

$$C_v = S/X = \sqrt{2\left[1 - \dfrac{x \times y}{\left(\dfrac{x+y}{2}\right)^2}\right]},$$

where x and y are the overall level of development of tourism and sports industry, respectively; C_v is the coefficient of variation, and the smaller the value, the higher the coordination degree.

Based on the above formula, we can find that if C_v is smaller, $C = \dfrac{x \times y}{\left(\dfrac{x+y}{2}\right)^2}$ will be larger and better, so we can establish the model of coordination as follows:

$$C = \left[\dfrac{x \times y}{\left(\dfrac{x+y}{2}\right)^2}\right]^2$$

This coordination degree can reflect the quality of coordination between tourism and sports industry development, but the overall level of both is not interconnected, so it is difficult to be more realistic to evaluate the coordination degree as a whole.

On this basis, it is necessary to introduce the integrated development model of coordination degree as follows:

$$D = \sqrt{C \times (ax + by)}$$

where $ax + by$ is the linear combination of tourism and sports industry; a and b are the additional factors of influence of tourism development and sports industry on economy, respectively, and if the value is larger, it indicates that the degree of influence is higher, but the size of its value is not equal to the size of elasticity.

The influence of tourism development and sports industry on the economy is very important, but the degree of influence is somewhat different. From the preceding regression, it can be seen that tourism has a great impact on the economy, so let the weight $a = 0.6$, $b = 0.4$. The greater the value of D, the larger the degree of coordination.

According to the calculation step of entropy method, we use the weight of various indicators that has been derived and the weighted average method, to calculate the overall level of tourism and sports industry, respectively. The calculation results are shown in Table 7.

Table 6 Distribution of unit and weight of second-level indicators

Second-level indicators	Unit	Weight
Total tourism income	10^8 yuan	0.172
Tourism income/GDP	%	0.024
The total number of employed persons in tourism/The total number of employed persons in the tertiary industry	%	0.148
The total number of tourist		0.007
Regional forest coverage	%	0.024
Garbage treatment rate	%	0.069
The number of star – rated hotels		0.096
The number of main tourism resources points		0.005
Sports industry's total income	10^8 yuan	0.165
The total number of sports industry practitioners		0.046
Net fixed assets value of the sports industry at the end of the year	10^8 yuan	0.203
The growth rate of practitioners	%	0.008
Per capita consumption of sports/Total expenditure	%	0.014
Sports R & D expenditure/local fiscal expenditure	%	0.177

Table 7 The overall level of tourism and sports industry

Year	2000	2001	2002	2003	2004	2005
X	0.1793	0.189 9	0.231 9	0.267 5	0.318 7	0.351 4
Y	0.1658	0.176 2	0.192 0	0.231 9	0.337 9	0.564

Year	2006	2007	2008	2009	2010	2011
X	0.4127	0.479 2	0.558 9	0.651 6	0.808 4	0.959 3
Y	0.5801	0.461 2	0.615 9	0.439 2	0.410 0	0.418 4

Based on the coordinated development degree, the classification reference table is as follows:

Table 8 The classification reference table of coordinated development degree

Coordinated development degree	0 – 0.39	0.40 – 0.49	0.50 – 0.59	0.60 – 0.69
Coordination level	Imbalance	On the verge of imbalance	Barely coordinated	Primary coordination

Coordinated development degree	0.70 – 0.79	0.80 – 0.89	0.90 – 1
Coordination level	Medium coordination	Good coordination	High quality coordination

According to the coordination degree of tourism and sports industry in Henan Province and the classification reference table of the coordinated development, we can derive the status of coordination between tourism and sports industry in the period 2000 – 2011, and make lag comparison according to the size of comprehensive development level.

The specific results are as follows:

Table 9 The coordination level results of sports industry and tourism

Year	Coordination degree	Coordinated development level	Coordination type	Year	Coordination	Coordinated development level	Coordination type
2000	0.131 7	Imbalance	Sports lag	2006	0.558 8	Barely coordinated	Sports lag
2001	0.158 3	Imbalance	Sports lag	2007	0.615 9	Primary coordination	Sports lag
2002	0.212 7	Imbalance	Sports lag	2008	0.635 2	Primary coordination	Tourism lags
2003	0.439 1	On the verge of imbalance	Sports lag	2009	0.651 6	Primary coordination	Tourism lags
2004	0.479 2	On the verge of imbalance	Tourism lags	2010	0.715 4	Medium coordination	Sports lag
2005	0.562 4	Barely coordinated	Tourism lags	2011	0.808 6	Good coordination	Sports lag

4　Conclusions

Based on the development status of Henan Province, we carry out the study of coordination between sports industry and tourism and its impact on economy, and we draw the following conclusions:

(i) Through the empirical research of impact of tourism development and sports industry on economy, it is found that the tourism and sports industry have a significant impact on economic growth, and the elasticity of impact factor is 0.8987 (tourism) and 0.0665 (sports industry).

So improving the level of development of tourism and sports industry will play a significant role in promoting economic development to a certain extent.

(ii) From the development of tourism and sports industry in the period 2000 – 2011, the development trend of coordination between the two experienced the process of imbalance to well coordinated development. Over the time, the coordinated development between tourism and sports industry also continues to improve.

According to the coordinated development levels, the sports industry and tourism in Henan Province have undergone six stages (2000-2002, imbalance – 2003-2004 on the verge of imbalance – 2005-2006, barely coordinated – 2007-2009, primarily coordinated – 2010, moderately coordinated – from 2011, well coordinated).

In the period 2000-2002, the coordinated development grew at a normal rate; in the period 2003-2009, the coordinated development grew rapidly; in the period 2010-2011, the coordinated development grew at the highest rate.

(iii) Through the study of coordination between tourism development level and sports industry in Henan Province, it is found that the tourism development and the development of sports industry underwent the phenomenon of dislocation, and the coordination experienced five stages (sports lag-tourism lags-sports lag-tourism lags-sports lag).

In the period 2000-2003, the development of the sports industry lagged behind the development of tourism, and underwent the process of "imbalance-on the verge of imbalance". In the period 2005-2009, the coordinated development changed from marginal imbalance to primary imbalance, and the development of sports industry was changed, even tending to exceed the tourism development.

In the period 2009-2011, the tourism development accelerated, from primary coordination to well coordination, and tourism gradually developed by leaps and bounds.

To further enhance the level of coordination between tourism and sports industry and achieve high-quality coordination stage, we can cultivate high-quality tourism and sports industry talent. The important issue is to innovate on the basis of the implementation to meet higher level needs of the people.

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actual demand, causing saturation of agricultural machinery stock, and low utilization efficiency of agricultural machinery power resources.

(ii) There are great differences in the utilization efficiency of agricultural resources in Hebei Province. The utilization efficiency of agricultural resources is the best in Baoding City, and the utilization efficiency of agricultural resources is the worst in Zhangjiakou City.

And the utilization efficiency of agricultural resources in Zhangjiakou City is mainly reflected in the utilization efficiency of arable land resources, so it is necessary to strengthen the development and protection of land resources in Zhangjiakou City, and improve the utilization efficiency of land resources.

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