Evaluation of Influence Factors on Asian Sports Industrial Strength

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Abstract — Not only economic development of Asia in 20th century has drawn the attention of the world, but also the rise of Asian sports undertakings has also been the focus of the world. As Asian sports industry being a vigorous sunrise industry, discussion on Asian sports industrial influence factors is of important significance in enhancing its strength. Through analysis of Asian sports industrial development influence factors, taking Asian representative 11 countries in 2014 as sample points, we make factor analysis of each sample influence factors and get main economic development factor, people's life factor and industrial development factor, then we calculate factors scores. According to these factors scores we calculates Asian 11 countries samples areas synthesis scores and ranking, obtains each area development superiorities and constraints, and present correlation suggestions. Taking China as an example, we get the constraint to Chinese sports strength development for people's life fact, where improving people's living standard is the key to improving sports industry strength ranking. Meanwhile we also should make great efforts to economic development and enhance sports competitiveness by referencing China's each factor ranking status.

Keywords - Asian sports; sports industry; synthesis score; factor analysis

I. INTRODUCTION

With the booming Asian sports in recent years, the effects of Asian sports on world sports have also constantly increased. Sports industry has been rather perfected in the developed European countries, they have thorough sports industrial development system, and researches on their sport development influence factors have now entered into scientific. Therefore, Europe and America's sports undertakings development not only has driven relevant economic development but also promoted to the improvement of their own sports undertakings. Sports undertakings are booming in the world, from which Asian sports undertakings development receives most attentions. In recent years, Sports development speed in all countries of Asia is also fast. Though Asian sports industry annual growth rate is great, there is a slight difference between them and other Europe and America developed countries. Therefore, researching on Asian sports industrial competitiveness development issue is of great importance in Asia sports industry at the present stage [1-4]. Sports industry is still in the immature development stage in Asia, lots of constraints are to be solved; some of aspects that affect development are to be promoted. Some Asian countries are in better development by comparing with other Asian countries, apply factor analysis approach to analyze and evaluate on Asian sports industrial strength, the analysis of influence factors correspondingly provides scientific supports for each Asian countries sports development, and offers guidance for other Asian countries in method and thought so that Asian sports can be better and further developed on the existing basis. It can also speed up the development pace of each Asian country's sports industry, and provides scientific guidance and references for worldwide sports great development and prosperity.

II. INDICATORS SELECTION PRINCIPLE

So as to comprehensive, objective and accurate reflect sports industrial environment actual and change trends, the selection of evaluation indicators should follow four principles:

System principle: Asian sports industrial development environment is relative larger and has more influence factors. Therefore, each indicator that is selected not only should have hierarchies but also systematic ness. The constructed evaluation system should cover a wide range and be able to comprehensive reflect sports industrial development influence factors [5-9].

Operability principle: The establishment of sports industrial development influence factors indicators evaluation system should meet the demands of feasibility and operability. Indicators data collection work is the emphasis and also the starting point. Operability contains that first is data's availability and second is data quantifiable nature. It is the premise for subsequent indicators data processing [10, 11].

Effectiveness principle: In the background of systematic principle, effectiveness principle requires that constructed evaluation indicator system could objective and truly reflect evaluated objects connotations and structure, and reflect Asian sports industrial development influence factors. Only construct a relative effective

indicator system then can find out sports industrial development main influence factors.

Comparability principle: One is that criterion to select indicators should have consistency and measuring method that measures and compares data should also have consistency. And so the result will have comparability. Second is when selecting indicators, it adopts relative number so that indicators will have comparability.

III. ASIAN SPORTS INDUSTRIAL EVALUATION SYSTEM

On the basis of sports industrial influence factors evaluation indicators selection system, operability, effectiveness and comparability as well as other principles, by scientific selecting relevant influence factors, apply analytic approach to construct a perfect Asian sports industrial evaluation analysis system. It selects Asian representative 11 countries sports relevant data in 2004, constructs factors evaluation model that affects Asian sorts industry. Finally, make analysis and research on model results, and present sports industrial development corresponding countermeasures and suggestions by comparing 11 samples sports industrial influence factors.

IV. EVALUATION INDICATOR SYSTEM CONTENT

Indicators that are able to reflect sports industrial influence factors are quite a lot, the paper analyses the background and characteristics of Asian sports industry, combines with indicators selection principles and system block diagram, as well as references relevant document literature. The paper constructs indicator system from economic development, people's life and sports industrial factors and else the three aspects.

TABLE I. EACH REGION ALL INDICATORS AFTER STANDARDIZATION

	Japan	South Korea	China	Kazakhstan	Iran	Thailand	North Korea	India	Qatar	Bahrain	Malaysia
Gross GDP	-0.64	-0.92	-0.15	-0.24	-0.51	1.40	0.31	-0.53	1.18	1.57	-1.48
Total local financial revenue	0.04	-0.86	-0.67	-0.08	0.28	1.49	0.11	-0.85	0.46	1.70	-1.63
Whole society fixed assets investment	-0.97	-0.79	0.39	0.61	-1.07	1.51	0.19	-0.34	1.55	0.30	-1.37
Sex ratio	0.11	-1.19	0.00	-0.81	0.83	-1.16	0.00	-0.54	-0.49	1.46	1.79
Natural population growth rate	-0.01	-0.83	0.63	-2.01	-0.22	-0.90	-0.06	0.88	0.07	0.85	1.59
Year's end population	-0.89	-1.08	0.65	-0.20	-0.80	0.84	0.12	-0.39	1.36	1.63	-1.24
Total social retail sales	-0.47	-1.02	-0.24	-0.23	-0.51	1.08	0.39	-0.53	1.28	1.72	-1.47
Per capita GDP	1.27	1.56	-1.27	-0.27	1.17	0.32	0.07	-0.46	-0.51	-0.39	-1.48
Per capita local financial revenue	1.74	0.97	-1.09	-0.18	1.68	-0.11	-0.36	-0.69	-0.81	-0.44	-0.71
Household consumption expenditure	1.16	0.20	-1.59	-0.62	1.69	-0.09	0.56	-0.14	-0.81	0.77	-1.13
Average wages of staff and workers	2.32	0.86	-1.10	-0.87	-0.38	0.22	0.24	0.05	-0.32	0.21	-1.24
Per capita floor space	-0.23	-0.84	-0.47	-0.92	1.50	0.75	1.63	0.75	-0.21	-0.73	-1.23
Per capita reserve balance	0.00	-1.06	-0.04	-0.19	-0.07	0.67	0.35	-0.89	0.40	2.28	-1.45
Average life expectancy	1.64	0.91	-1.31	-0.51	1.69	-0.37	0.26	-0.86	-0.46	-0.45	-0.55
Sports revenue	-0.55	-0.54	-0.66	-0.11	-0.79	2.33	-0.03	-0.19	0.89	0.85	-1.17
Financial supports on cultural and sports publicity	1.22	-1.13	-0.60	-0.16	-0.31	1.43	0.17	-0.90	0.62	1.14	-1.48
The number of sports coaches	-0.60	-0.77	-0.52	0.70	-1.27	0.62	0.03	1.37	0.03	1.67	-1.27
The number of different levels' athletes	-0.36	-0.42	0.56	-0.22	-0.18	0.68	0.91	-0.76	1.52	0.49	-2.21
The proportion that agriculture population covers regional population	-1.42	-1.09	1.36	0.03	-1.64	0.22	0.20	0.46	0.96	-0.09	1.02
Ratio that student at school covers whole state population	1.49	2.21	-0.85	0.05	0.05	0.05	-0.67	-0.31	-0.67	-1.03	-0.31
The number of college graduates	-0.66	-0.94	0.43	-0.11	-0.78	1.48	-0.03	-0.50	1.51	1.03	-1.44

A. Economic Development Factor Indicator

Main effects that Sports industrial development suffers are from national economy. Asian sports industry develops and meanwhile it can promote to Asian other national economic and sports undertakings development and let Asian sports undertakings to better develop. The economic development factors select gross GDP x_1, state revenue x_2, whole society fixed assets investment x_3, sex ratio x_4, natural population growth rate x_5, year's end population x_6, total social retail sales x_7. These seven indicators data can be checked from Asian countries statistics yearbook.

B. People's Life Factor

People is a carrier of each influence factors, is the precondition for all development. People's living quality

also has great connections with sports industrial development. Only people's life is basically guaranteed as having enough to eat and having a shelter then will consider spiritual pursuing. People's life factor indicators select per capita GDP x_8, per capita local financial revenue x_9, household consumption expenditure x_{10}, average wages of staff and workers x_{11}, per capita floor space x_{12}, per capita reserve balance x_{13}, average life expectancy x_{14}. To expand Asian sports industry needs all kinds of material resources and manpower supports. Sports industrial factors select sports revenue x_{15}, financial support on sports x_{16}, the number of sports coaches x_{17}, the number of different levels' athletes x_{18}, the proportion that agriculture population covers regional population x_{19}, ratio that student at school covers whole state population x_{20}, the number of college graduates x_{21}. Sort out these indicators, and then it gets an Asian sports industrial influence factors evaluation system that is composed of 21 specific indicators.

According to selected evaluation indicators, apply factor analysis approach, and carry out practical research on selected Asian 11 representative countries' sports industrial strength levels. Make analysis and research on data, find out influence factors, and then get Asian sports development influence factors.

Screening and integration of data: Due to units for data are different and cannot directly make comparison, it utilizes SPSS19.0 data to implement standardization so that can ignore unit effects on the definition of data and let data to be more reliable. Therefore, it gets following Table I.

V. CHECKING THE RESULTS

Factor analysis needs to define the data can meet the demands of proper factor analysis or not, from which the requirement is KMO>0.5, Bartlett's puerility checking's null hypothesis probability value<0.05. By analysis, it is clear that when the value of KMO gets closer to 1, the data is more proper to factor analysis. Utilize SPSS19.0 and directly can obtain such two values.

TABLE II. KMO VALUE AND BARTLETT'S SPHERICITY CHECKING

	Economic development factor	People's life factor	Sports industrial factor
Take enough degrees of Kaiser-Meyer-Olkin to measure	0.630	0.724	0.632
Bartlett spheroid checking Sig.	0.000	0.000	0.003

As shown above in Table II, it is clear that all the three factors' KMO values are above 0.6, it indicates they rather fit for factor analysis.

VI. FACTOR EXTRACTION

Factor extraction is to define relevant common factors amount through defining common factors' variance contribution rate in total variance. In order to ensure that data can more truly, comprehensive and objective reflect, normally it should ensure that factor variables to own over 70% variance contribution rate [5]. Respectively make factor analysis of economic development factors indicators, people's life factor, sports industrial factor and other sub factors. Sort out the results and get Table III.

TABLE III. EXPLANATORY TOTAL VARIANCE

Explanatory total variance						
Component	Economic development factor variance%	Accumulation %	People's life factor variance %	Accumulation %	Sports industrial factor variance%	Accumulation %
1	64.159	64.159	61.406	61.406	54.921	54.921
2	24.923	89.083	17.508	78.914	23.433	78.354

All the three factors' factor variable variance contribution rate is above 70%. It indicates that the paper extracted common factors can correct reflect each influence factor status. Economic development factor accumulated variance contribution rate gets closer to 90%, it indicates that selected two components can relative correct, objective evaluate evaluation development factor and achieve the purpose of dimension reduction.

VII. CALCULATING FACTOR SCORES

After establishing factor analysis model, it can utilize least square method to calculate factor score, and get a group of components' scores: $F_m = A'X_i$. In formula: F_m - Component score; A' - Component score coefficient matrix, X_i - Original variable matrix $F_i = B'F_m$; In

formula: F_i - Sample point factor score, B' -Factor variance contribution rate coefficient matrix, F_m - Component score. Then use $F_m = A'X_i$ can solve main

component scores, and calculate each sample point factor score. By scores, it can reflect the sample state sports industrial strength level, as Table IV.

TABLE IV. SAMPLE COUNTRIES ALL INFLUENCE FACTORS FACTOR SCORE

	Factor					
	F1 economy	F2 economy	F1 people	F2people	F1 sports	F2sports
Japan	-0.61541	0.08116	1.76023	-0.16683	0.11887	-1.80094
South Korea	-1.1312	-1.1062	1.20252	-1.32065	-0.71077	-1.47411
China	0.02414	0.2806	-1.34591	-0.34467	-0.38764	1.21598
Kazakhstan	-0.2344	-1.56207	-0.45591	-0.63077	-0.05864	0.1172
Iran	-0.50969	0.37389	1.34468	0.51002	-0.52317	-1.00401
Thailand	1.219	-1.07518	-0.12501	0.81384	1.62893	-0.12226
North Korea	0.2421	-0.01612	0.06012	1.11091	0.21197	0.34562
India	-0.55494	0.11386	-0.38622	-0.13079	-0.49197	0.73785
Qatar	1.22338	-0.2141	-0.68989	0.15565	1.01041	0.73275
Bahrain	1.68843	1.4731	-0.52012	1.66199	1.14592	0.42119
Malaysia	-1.35142	1.65108	-0.84449	-1.65869	-1.94392	0.83071

VIII. RESULT ANALYSIS

It can rank according to factor scores, and can compare 11 regions strength levels by ranking. It is also known that each region sports industrial development constraints and present correlation suggestions. We get

the following Table V. Total score is the sum of economic factors, people's life factor and sports industrial factor synthesis scores. Each factor score is achieved by factor analysis; therefore, it has commonality and comparability and can directly add to get total score.

TABLE V. ASIAN 11 COUNTRIES SPORTS INDUSTRIAL DEVELOPMENT INFLUENCE FACTORS SYNTHESIS SCORES AND RANKING LIST

	Economic factor synthesis score	Ranking	People's life synthesis score	Ranking	Sports industrial synthesis score	Ranking	Total score	Ranking
Japan	0.732	2	-0.4	9	0.73	2	1.062	3
South Korea	0.514	3	0.07	5	0.87	1	1.454	2
China	1.45	1	-0.03	6	0.73	2	2.15	1
Kazakhstan	-0.54	10	-0.39	8	0	6	-0.93	9
Iran	-0.234	6	0.92	2	-0.52	9	0.166	6
Thailand	-0.375	8	1.05	1	-0.36	8	0.315	5
North Korea	0.151	4	0.23	4	0.2	4	0.581	4
India	0.085	5	-0.89	11	0.07	5	-0.735	8
Qatar	-1.001	11	0.51	3	-0.74	10	-1.231	10
Bahrain	-0.456	9	-0.81	10	-0.87	11	-2.136	11
Malaysia	-0.328	7	-0.26	7	-0.1	7	-0.688	7

By above Table 5, it is clear that negative number means lower than average level. Take following Asian countries as examples; all the rankings of Japanese economic development factor, people's life factor and sports industrial factor are among the top three. It is clear that Japanese sports industrial strength in 2014 is stronger. Compare to Japan, Indian total score ranks lower intermediate, Indian economic development factor ranks the fifth, which indicates India ranks the intermediate of Asian countries in such year. While its people's life ranks the 11th that lower than the average level of Asia. In 2014, Chinese sports industrial factor score ranks first, it indicates sports industrial factor ranks the intermediate.

With regard to people's life, economic factor and sports industrial factor rankings relative near the top, so that sports strength development constraint for China is people's life factor, improving people's living standards is the key to improve sports industrial strength ranking, and meanwhile it should make efforts to economic development and enhance sports competitiveness.

By comprehensive analysis, it gets that selected 11 samples countries and regions in 2014, the main regions with relative superiority in sports industrial development are China, Japan, South Korea, North Korea and Thailand. Among all influence factors rankings, it can analyse and get each region's development superiority.

Japan: Constraints are economic development factor and sports industrial factor, it has superiority in people's life factor that is rather favourable in the level of people's life, its people's life factor ranks first.

South Korea: Similar to Japan.

China: Economic factor and sports industrial factor's rankings are rather near the top, so as far as China is concerned, its sports strength development constraint is people's life factor, improving people's living standards is the key to improve sports industrial strength ranking.

Kazakhstan: On a whole, its ranking is lower; all influence factors are in the lower level.

Iran: It has the same constraints and superiority as Kazakhstan and China.

Thailand: Sports industrial factor ranks first, it shows sports industrial factor is superiority; the other two are also in the lower intermediate.

North Korea: All the three factors rankings are the fourth. The development is rather coordinated.

India: All the three factors rank the eighth so that it should overall be improved.

Qatar: Economic development factor and sports industrial factor are lower but also its superiorities; constraint is people's life, which shows it should improve people's living standards so as to improve sports industrial strength.

Bahrain: Constraint is people's living standards, it is the same as Thailand but it is stronger than Thailand in overall strength.

Malaysia: All the rankings lag behind; it should be improved overall, so sports industrial strength is weaker.

IX. CONCLUSION

According to the paper's analytic approaches, except for continuing to give superiority factors into play, it should also weaken constraints that affect comprehensive strength. That is making good for deficiency, and it also should enhance government supports and control on sports industry Especially for China, though it is main sports country, presently it has more development issues such as sports industry is not developed enough, sports supporting construction is not perfect and so on, it still should constant to explore and develop. Asian sports development has its own characteristics and superiorities, all countries in Asia develop in all-round while also should focus on their own cultural characteristics events development and popularization. By the paper's analysis, it is clear that Asian sports development mainly is related to all Asian countries economic development level. Therefore, only integrate economic development, the promotion of people's living standards and popularization of sports undertakings then can better drive Asian sports development.

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