

Construction and Analysis on Evaluation System of Sports Resources

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Abstract: this paper starts from perspective of resources and makes systematic research, discussion on connotation, classification and evaluation content of sports resources in city mass, it uses the past relevant research outcome to primarily establish evaluation and index system on sports resources for city mass, it also makes index selection through investigation on experts and scholars in aspects such as sports science and sociology etc, and constructs evaluation and index system on sports resources for city mass by integrating expert opinion, in addition, it adopts AHP to confirm weight of index system. From the final weight of index, we can see that material resources of mass sports is the most important in evaluation system on sports resources for city mass, the constructed evaluation system on sports resources for city mass is preliminary try, objective and feasible.

Introduction

With the rapid development in society and economy of China, gradual increase in disposable personal income and health consciousness, the mass population have drastic demand on sports demand, completely relying on government to plan and purchase sports resources can not meet development demand^[1,2] in sports career, they propose new requirements on intensive allocation and sustainable development. Sports resources the carrier and motivation for occurrence and existence of every sports situation, it is not only the base to develop contest sports activity, mass sports and social sports etc, but also the important support for development of sports industry, it can be also regarded as the important base and condition for regional economic development. The intensive allocation of sports resources is the necessary requirement on resources allocation and construction of two-oriented society, it is one of the guarantee measures^[3,4] to realize quick and stable development in sports career as well as the key point of making current sports resources produce social and economic benefit. However, because interest relation among object is so complicated, it will inevitably produce internal consumption in system in the reform process from planned economy to market economy, which will cause low performance in general target of sports resources. This paper uses the reconstructed comprehensive evaluation system on sports resources allocation in city school to get relevant data by site investigation and statistics on Zhengzhou, outline Lorenz curve of sports resources index in city school and get its Gini coefficient, it uses Gini coefficient to reflect evaluation and index system of sports resources for city mass, it also adopts AHP to confirm weight of index system. Material resources of mass sports are the most important in evaluation system on sports resources for city mass. The constructed evaluation system on sports resources for city mass is preliminary try, objective and feasible.

Construction on evaluation system of sports resources

The shortage in sports resources determines one society or area must use certain allocation method and model to distribute limited sports resources to field of society or area, So that it can realize optimal application of resources, which is to use the minimum, consumption to produce practicable sports goods and labor as well as obtain best profit. Scientific construction on evaluation system of sports resources is the base of realizing intensive allocation in sports resources. Construction on evaluation and index system of sports resources should persist in principles of systematic, dynamic, feasibility and operable except to observe the general discipline of statistics,

only this can it establish a set of scientific, feasible and practicable evaluation and index system for sports resources. This paper possibly choose much more indexes and those with higher frequency by referring to full-text data base of Chinese journal and reading research literature on evaluation index construction of sports resources in China, it also makes selection on the repeated index or similar index, it also chooses detailed relevant index by combing with connotation and characteristic of Chinese sports resources as well as frame model of resources evaluation system. It is indicated by diagram 1, this paper finds and analyzes research(such as sport cash award of national mass, index system of progress award, evaluation system of social sports etc) on evaluation system of sports resources in China, it starts from the key content that can reflect evaluation fairness of sports resources for city mass, it mainly carries out experience choice for evaluation index of mass ports resources from aspects such as human resources, finance resources, material resources etc, which forms the evaluation and index system on sports resources for city mass contains 4 indexes of first class, 10 indexes of second class and 19 indexes of third class.

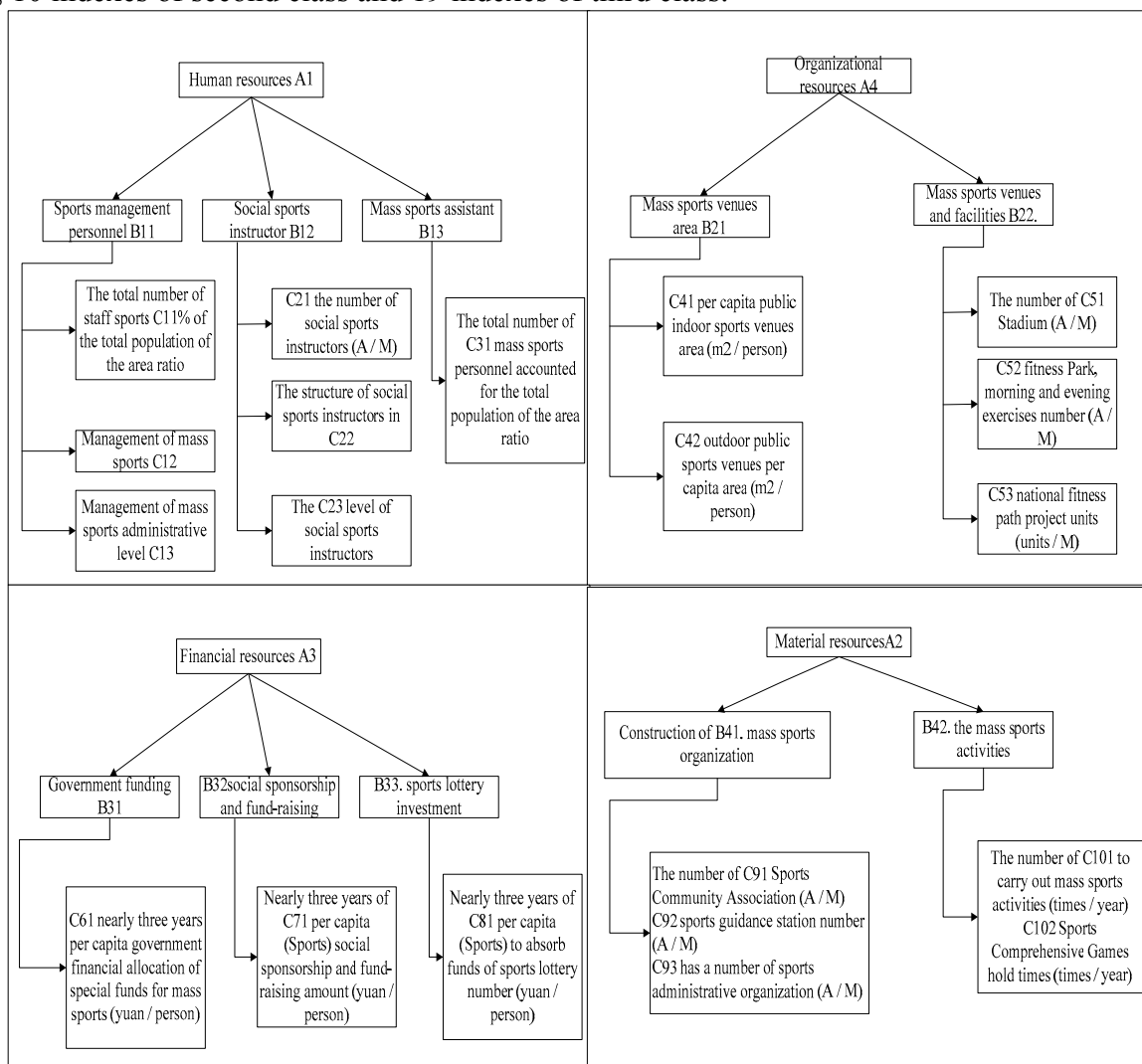


Diagram 1 Evaluation index system on sport resources for city mass

Evaluation analysis on evaluation system of sports resources

Grade standard of evaluation index

It adopts fuzzy analysis method to implement evaluation grade $D = \{d_1, d_2, \dots, d_n\}$ and its subsection function. This paper divides evaluation grade of model into 4 grades, better, good, general, worse, and it also gives the corresponding threshold of each grade $\{d_1, d_2, \dots, d_n\}$, and then it makes comparative analysis on the above threshold according to subsection function, so that it gets

evaluation grade of different indexes. This paper adopts methods of trapezoid distribution and semi trapezoid distribution to establish subjection function [1], and gets distributed subjection function diagram indicated by diagram 2, of which, d_1, d_2, \dots, d_5 is the threshold under different grades, c_1, c_2, \dots, c_5 is respectively the midpoint placed in $[d_1, d_2], [d_2, d_3], [d_3, d_4], [d_4, d_5]$, so it gets threshold corresponds to grade according to the above methods.

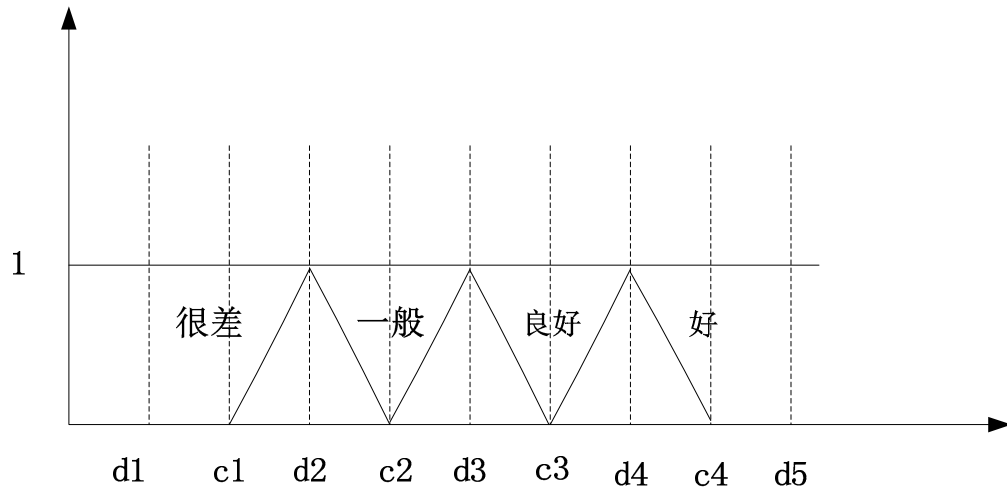


Diagram 2 Distribution Subjection Function Diagram

Confirmation on evaluation index system weight of sports resources

AHP discomposes elements related to determination into target, standard, plan etc, and it makes qualitative and quantitative analysis on determination method. It uses one complicated determination problem with multiple targets as one system to make analysis, discomposes this system into many targets or standards, so that discomposed into plenty of hierarchy with multi-index or standard, restriction. It calculates weight of single sequence and total sequence by fuzzy quantization method of qualitative index and uses it as systematic method for target with multiple indexes, multiple plan optimization. It establishes index weight matrix according to fuzzy hierarchy method, supposes there exists condition with n index element, the symmetric matrix $A = \{A_{ij}\}_{n \times n}$, of which, $A = \{A_{ij}\}_{n \times n}$ indicates importance degree ratio of certain element i on element j , its weight standard is indicated by table 1.

Table 1 Weight standard of index

importance degree of weight element	Grade of fuzziness
Element i is important compared with element j	1
Element i is slightly important than element j	3
Element i is very important than element j	5
Element i is fairly important than element j	7
Element i is much more important than element j	2,4,6

After comparison and analysis on weight ratio, it makes normalization processing on the above-mentioned matrix and gets the comparative weight value. This paper uses root method to make test on weight.

The formula (1) of calculating accordance index CI is indicated as follows:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (1)$$

When $CI=0$, comparative matrix has complete accordance, the bigger of CI , the worse of accordance.

As for judgment matrix in stage from 1 to 9, the average and random accordance index RI value (table 2)

Table 2 RI value corresponds to matrix order

Matrix order (n)	1	2	3	4	5	6	7	8	9
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45

Accordance ratio CR (CR . Consistency Ratio) such as formula (2)

$$CR = \frac{CI}{RI} \quad (2)$$

When CR is less than 10, it indicates that accordance of judgment matrix is acceptable; otherwise it should make adjustment on judgment matrix again until it has satisfied accordance. It gets weight of index corresponds to index of the upper grade by single hierarchy single sequence method, it uses index weight of second grade and corresponding index weight of first grade to make integrated weight, it gets the weight coefficient of index of second grade corresponds to general target, it uses index weight of third grade and corresponding index weight of second grade to make integrated weight, it gets the weight coefficient of index of third grade corresponds to general target.

Demonstration analysis on system evaluation of sports resources

It totally distributes 20 pieces of expert questionnaire in AHP; the experts make matrix comparison on evaluation index of sports resources for mass city according to the above requirement, and it totally takes back 17 pieces and makes data analysis on these 17 pieces of expert questionnaire, as well as calculates index weight of each judgment matrix and makes accordance test, of which, there are 16 pieces of questionnaire with filled data is effective and it can pass accordance test, the accordance ratio CR of all the judgment matrix are all less than 0.1, which indicates accordance in satisfaction. In the following, it uses questionnaire of one expert for example and indicates calculation result of each judgment matrix, it is equal to expert data analysis.

Table 3 Judgment matrix table on evaluation index system of first grade for mass sports resources

	A1	A2	A3	A4	weight w
A1	Human resources	1	1	3	0.3523
A2	material resources	1	1	3	0.3523
A3	finance resources	1/3	1/3	1	0.1822
A4	organization resources	1/5	1/5	1/5	0.1122

$\lambda_{max}=5.1958$, $CI=\lambda_{max}-n/n-1=5.1958-5/5-1=0.0489$, check table $RI=1.12$, gets result that $CR=CI$

$/RI=0.0437 < 0.10$, therefore, makes accordance test on this comparative matrix .

Table 4 Judgment matrix table on evaluation index of second grade for human resources

A1—B	B11	B12	B13	Weight w
B11 Administrative staff of mass sports	1	3	5	0.6483
B12 social sports instructor	1/3	1	2	0.2297
B13 mass sports instructor	1/5	1/5	1	0.1220

Notes: $\lambda_{\max} = 3.0037$, $CR = 0.0036 < 0.10$, this accordance matrix passes accordance test.

Table 5 Judgment matrix on evaluation index of second grade for material resources

A2—B	B21	B22	Weight w
B21 Place square of mass sports	1	1/5	0.1667
B22 stadium facility of mass sports	5	1	0.8333

Notes: $\lambda_{\max} = 2$, $CR = 0 < 0.10$, this accordance matrix passes accordance test.

Table 6 Judgment matrix on evaluation index of second grade for finance resources

A3—B	B31	B32	B33	Weight w
B31 financial allocation of government	1	5	5	0.7143
B32 social support and fund	1/5	1	1	0.1429
B33 Input in sports lottery	1/5	1	1	0.1429

Notes: $\lambda_{\max} = 3$, $CR = 0 < 0.10$, this accordance matrix passes accordance test.

Table 7 Judgment matrix on evaluation index of second grade for organization resources

A4—B	B41	B42	Weight
B41 organization construction for mass sports	1	5	0.8333
B42 Organization and activity development conditions of mass sports	1/5	1	0.1667

Notes: $\lambda_{\max} = 2$, $CR = 0 < 0.10$, this comparative matrix passes accordance test.

According to the above judgment matrix, it calculates weight value on system index by 16 experts, because value cognition of experts has difference, the weight value of each other is different, but after passing accordance test, the credibility of questionnaire is tenable, it is regarded as weight with value. After getting weight value of 16 experts, it gets arithmetic average value of each index by calculation way of arithmetic average, it also makes further general sequencing and calculation by weight of each level, and finally it gets weight table on evaluation index system for mass sports. The research result and analysis indicate that among 5 indexes of first grade, material resources accounts for larger percentage in weight, it is 0.3974, the weight of human resources is 0.1898, weight of material resources is 0.2595 and weight of organization resources is 0.0834, it can be seen that material resources is the most important to make evaluation on resources fairness for city mass.

Summary

Through classified research on sports resources, it makes classification on mass sports resources and confirms research content on mass sports resources according to classification and analysis on mass sports. Meanwhile, it introduces construction principle, construction method on evaluation index system for mass sports; it detailed constructs evaluation index system for mass sports. It calculates the relative importance degree of each index in the whole evaluation index system according to AHP, gets relative weight of each index in evaluation system of mass sports. From the final weight of index, we can see that material resources of mass sports are the most important in

evaluation system for mass sports. The constructed evaluation system on sports resources for city mass is preliminary try, objective and feasible.

Table 8 Weight list on evaluation system of city mass sports resources

Index of first grade	Index of second grade			Index of third grade		
	Index	Relative weight Index weight	Relative to overall Index weight	Index	Relative to upper grade Index weight	Relative to overall Index weight
A1	B11	0.463	0.087	C11	0.4387	0.0385
				C12	0.2602	0.0228
				C13	0.3011	0.0264
	B12	0.3853	0.0732	C21	0.5126	0.0375
				C22	0.2371	0.0174
				C23	0.2503	0.0183
B13	0.1524	0.0289	C31	1.000	0.0289	
A2	C41	0.4667	0.1855	C91	0.4007	0.0743
				C92	0.5993	0.1112
				C93	0.3838	0.0813
	C42	0.5333	0.2119	C101	0.3255	0.0690
				C102	0.2907	0.0616
A3	B31	0.5575	0.1447	C61	1.000	0.1447
	B32	0.1842	0.0478	C71	1.000	0.0478
	B33	0.2583	0.0670	C81	1.000	0.0670
A4	B21	0.6287	0.0524	C41	0.4788	0.0251
				C42	0.5212	0.0273
	B22	0.3713	0.0310	C51	0.6857	0.0213
				C52	0.3143	0.0097
				C53	0.5975	0.024

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