BioTechnology

An Indian Journal

China new pattern urbanization process medium and small towns sports culture development strategy research

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ABSTRACT

With the development of human civilization, sports cultural demands are constantly increasing, to more reasonable establish development mechanism, it should establish development system, while analyze its system merits, it needs to make comprehensive evaluation on the system, targeted at the status, the paper adopts to apply fuzzy mathematical methods to make comprehensive evaluation on China's new pattern urbanization process medium and small towns sports culture development strategy, from which in the aspect of weight defining, the paper also adopts analytic hierarchy process method to define influence factors, and tests them through mathematical statistics, finally it gets China new pattern urbanization process medium and small towns sports culture development strategy evaluation is in the level of good, which proves the China's new pattern urbanization medium and small towns sports culture development strategy are roughly good but it still has some shortcomings, which needs all sectors of society to make further perfection and development.

KEYWORDS

Medium and small towns; Sports culture; Fuzzy evaluation; Analytic hierarchy process; Development strategy.

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INTRODUCTION

China with 13 hundred million population is a great agricultural country, from which nearly0.7 times people are rural people, with the 17th CPC national congress succeeded hosting, " Three rural issues"was regarded as key object in national development, because it related to China future development, and was closely related to improve rural living quality, with rural living quality improvements, people demands on health were also constantly deepening, just in such backgrounds, China new pattern urbanization process medium and small towns sports application emerged, rural sports development was town-oriented, took peasants sports association as bond, with villagers neighborhood committee as basis, and then formed radiative organizational network model, therefore it could really set up ideas of adjusting measures to local conditions and scientific development, which did favor to massive peasants.

Regarding China new pattern urbanization process medium and small towns sports cultural correlation articles, they are emerging in endlessly, main social problems, small towns sports, work on developing China new pattern urbanization process medium and small towns sports is an important indicator to establish small towns, for such similar articles, formers have made lots of efforts, such as in the beginning of the century, China worked on researching on new pattern urbanization process's medium and small towns sports development, medium and small towns influential development factors, medium and small towns sports communities and sports cultural development trend, medium and small towns sports social insurance as well as medium towns sports cultural construction theory frame construction and other problems, so it generated current China towns sports being full of passions and vigor; Xu Feng in the article regarding masses sports demands orientation and development countermeasures, by applying documents literature, mathematical statistics, questionnaire survey and other methods to make analysis and research on one region masses sports social demands, cultural demands, personal demands and ecological requirement as well as others each factor, finally got the region masses sports demands powerful impetus was due to people body and heart building demands as well as pursuit and yearning colorful life, and advocated that masses should positive participate in physical exercises, sports consumption from them, establish a diversified community sports network, strengthen sports fitness apparatus development, and meanwhile should constantly advertise relative knowledge to establish a reasonable,effective community sports service system.

The paper just on the former researches basis, makes further analysis and research on China new pattern urbanization process medium and small towns sports culture development,links theory with practice, based on the principle of seeking truth from fact, it makes efforts in China new pattern urbanization process medium and small towns sports culture development aspect researching.

COMPREHENSIVE EVALUATION ON NEW PATTERN URBANIZATION PROCESS MEDIUM AND SMALL TOWNS SPORTS CULTURE DEVELOPMENT STRATEGY

In town sports development process, constantly expand sports population ratio on whole population has important significances, and is also an important mark to measure a social civilization development, sports culture is quintessence of them, therefore sports cultural research is beneficial to sports rapid development, so it has important significances.

In order to more objective, fair, practical evaluate China new pattern urbanization process medium and small towns sports culture development strategies, the paper adopts fuzzy mathematical methods, its principle is as following show.

Fuzzy evaluation theory

In order to more intuitial present new pattern urbanization process medium and small towns sports culture development strategies, the paper selects fuzzy mathematics method to define its rationality, specific steps are as following show:

(1)Establish factor set U, $U = \begin{pmatrix} U_1 & U_2 & \cdots & U_k \end{pmatrix}$

(2) Establish judgment set V (evaluation set), $V = (v_1, v_2, L, v_n)$

(3) Establish judgment matrix fuzzy mapping from U to V, so it can get fuzzy relation as following,

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & & \vdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix} \tag{1}$$

(4)Establish weight set, $A = (a_1, a_2, \cdots, a_n)$, it meets conditions:

$$\sum_{i=1}^{n} a_i = 1 \quad (0 \le a_i \le 1) \tag{2}$$

(5) Fuzzy relation R every line reflects the line influence factors to object judgment extent, and meanwhile, R every column reflects the column influence factors to object judgment extent.

$$\sum_{i=1}^{n} r_{ij} \quad j = 1, 2, 3, \cdots, m \tag{3}$$

$$B = A \circ R$$

$$= (a_1, a_2, a_3, \cdots, a_n) \circ \begin{bmatrix} r_{11} & r_{12} & L & r_{1n} \\ r_{21} & r_{22} & L & r_{2n} \\ M & M & & M \\ r_{m1} & r_{m2} & L & r_{mn} \end{bmatrix}$$

$$= (b_1, b_2, b_3, \cdots, b_n)$$

In V, fuzzy combination is evaluation set B, here fuzzy operator is using $\circ$ to represent, and b_j represents under v_j states corresponding B subset membership, after doing normalization handling on it, it has $\sum = b_1, b_2, b_3, \cdots, b_n$, then it has:

$$B' = (b_1 / \sum b_2 / L \ b_n / \sum) = (b'_1, b'_2, L \ b'_n)$$

According to maximum membership principle, do selection, apply fuzzy evaluation theory to evaluate selected new pattern urbanization process medium and small towns sports culture development strategies elements, finally define its merits according to evaluation values size.

Fuzzy evaluation application

To new pattern urbanization process medium and small towns sports culture development strategies system selected partial factors, it makes analysis, as following TABLE 1 shows:
By above theory, establish evaluation set that:

$V = \{v_1, v_2, v_3, v_4, v_5\}$
$= \{$excellent, good, general, poor, bad$\}$

After that, for above every factor, it makes judgment, and meanwhile applies analytic hierarchy process to align weights, its principle is as following.

TABLE 1 : New pattern urbanization process's medium and small towns' sports culture development strategies influence factors

New pattern urbanization process's medium and small towns sports culture development strategies factors U	Subjective factor (U_1)	Mass self quality (U_{11})
		Home condition (U_{12})
		Living way (U_{13})
		Values (U_{14})
	Objective factor (U_2)	Community organizations (U_{21})
		Existing facilities (U_{22})
		Natural resources (U_{23})
		Household economy (U_{24})
		Surroundings (U_{25})
	Internal impetus(U_3)	Internal environment (U_{31})
		Structural impetus (U_{32})
		Resource allocation (U_{33})
	Realistic conditions (U_4)	Mass media (U_{41})
		Government sector (U_{42})
	External impetus(U_5)	External environment (U_{51})
		Market factor (U_{52})
		Western culture (U_{53})
		Chinese traditional culture (U_{54})
		Organization management (U_{55})

ANALYTIC HIERARCHY PROCESS THEORETICAL MODEL

AHP features are hierarchizing complicated problems, making clear about primary and secondary, possessing stronger logicality and hierarchical structure, the algorithm mainly is calculating indicators weights. It is applicable to comprehensive assessment system, is a powerful mathematical method that converts problems into quantitative research. Nowadays analytic hierarchy process has already widely used in each field to solve practical problems. China new pattern urbanization process medium and small towns sports culture development strategies comprehensive assessment involves multiple reference indicators, the decision problems is suitable to analytic hierarchy process.

Analytic hierarchy process calculating indicators weight

Construct judgment matrix

For above criterion layer's three kinds of indicators, it makes meticulous comparison of the two's relative importance to construct judgment matrix. Such as :Take T_i, T_j to make important comparison, the structure is using b_{ij} to express, and then all factors after comparing can get judgment matrix U, in formula, b_{ij} the two compared importance uses quantized value to express, uses1—9 number to describe, number representative meaning is as following TABLE 2 show:

TABLE 2 : 1—9 scale meaning

Scale	Meaning
1	Indicates two factors have equal importance to objective
3	Indicates the former is slightly more important than the later by comparing two factors
5	Indicates the former is more important than the later by comparing two factors
7	Indicates the former is relatively more important than the later by comparing two factors
9	Indicates the former is extremely more important than the later by comparing two factors
Even number	Represents importance is between two odd numbers
Reciprocal	Represents factors positive and negative comparison order

Weight vector and maximum feature calculation

According to first grade indicator's judgment matrix vector, carry out normalization with it; solve the sum and then make normalization, then it can get weight vector. According to feature value and feature vector relations, it can solve feature value; its implementation method is as following: Firstly, normalize judgment matrix every column, its result is:

$$b_{ij} = b_{ij} / \sum_{k=1}^{n} b_{kj} (i, j = 1, 2, \cdots, n) \tag{4}$$

Then solve the sum by lines on judgment matrix that makes normalization by column, it can get:

$$\overline{W}_i = \sum_{j=1}^{n} b_{ij} (i = 1, 2, \cdots, n) \tag{5}$$

Above vector $\overline{W} = \left[\overline{W}_1, \overline{W}_2, \cdots, \overline{W}_n \right]^T$ proceeds with normalization processing:

$$\overline{W}_i = \frac{\overline{W}_i}{\sum_{j=1}^{n} \overline{W}_j} (i = 1, 2, \cdots, n) \tag{6}$$

Then:$W=[W_1,W_2,\ldots,W_n]^T$ is solved feature vector.
In addition,calculate maximum feature root, process is:

$$\lambda_{\max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i} \tag{7}$$

In above formula,$(AW)_i$ represents vector AW's the i component.

According to above formula, we can respectively solve China new pattern urbanization process medium and small towns' sports culture development strategies comprehensive assessment analysis first grade indicator, second grade indicator to first grade indicator weight and maximum feature value.

Consistency test

To matrix $U = (b_{ij})_{n*n}$, if matrix element meets $b_{ij} b_{jk} = b_{ik}$,then matrix is consistency matrix. Among them,$b_{ij} > 0$, $b_{ij} = 1/b_{ji}$. In order to use it to calculate factor weight, it requires that matrix inconsistency only under acceptable conditions. When problems are relative complicated, we cannot

take all factors into account, which causes paired comparison construct judgment matrix instant, judgment matrix cannot arrive at ideal state consistency.

Judgment matrix consistency indicator CI, and judgment matrix consistency ratio CR, its computational method is as following formula show:

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{8}$$

Among them, n represent order number of judgment matrix that is also the number of compared factors.

$$CR = \frac{CI}{RI} \tag{9}$$

Among them, RI represents Random Consistency Index value, as following TABLE 3 show.

TABLE 3 : RI value table

n	1	2	3	4	5	6	7	8	9	10	11
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51

When $CR \geq 0.1$, it is thought that judgment matrix occurs inconsistency that needs to make adjustment on judgment matrix again. When $CR < 0.1$, judgment matrix inconsistency is within acceptable range.

By calculation, it gets four judgment matrix consistency indicator CI, and consistency ratio CR, single hierarchical judgment matrix conforms consistency requirements by consistency test, it can think that calculation weight is reasonable. Next step is doing combination consistency testing. Assume in one layer, m pieces of factors weight calculation result is α_m, corresponding consistency indicator value is respectively CI_m, combination consistency test consistency ratio is

$$CR = \frac{\sum_{j=1}^{m} \alpha_j CI_j}{\sum_{j=1}^{m} \alpha_j RI_j} \tag{10}$$

By calculation, combination consistency ratio calculation ratio computational value is:

$$CR < 0.1$$

So the hierarchical total arrangement consistency test meets consistency requirements. It can think that China new pattern urbanization process medium and small towns' sports culture development strategies each indicator weight calculation result is reasonable and can apply to assessment.

Weight calculation arrangement

If in one layer, m pieces of factors weight calculation result is α_m, corresponding consistency indicator value respectively is CI_m, in next layer n pieces of factors to A layer calculation weight is β_{nm}, then in T layer factors total arrangement weight is

$$w_i = \sum_{j=1}^{m} \alpha_i \beta_{ij} \tag{11}$$

By above formula calculating, it gets each indicator weights in total objective.

Application of analytic hierarchy process

According to above process, it can get corresponding judgment matrix, apply above theory, it can calculate and get corresponding weight as following TABLE 4-9 shows:

TABLE 4 : U- U_i Judgment matrix

U	U_1	U_2	U_3	U_4	U_5	ω_i
U_1	1	1/3	1/5	1/7	1/7	0.0400
U_2	3	1	1/3	1/5	1/5	0.0788
U_3	5	3	1	1/3	1/3	0.1616
U_4	7	5	3	1	1	0.3598
U_5	7	5	3	1	1	0.3598
Σ	23	14.333	7.533	2.676	2.676	1.0000

CI=0.0347,CR=0.0310<0.10

TABLE 5 : U_1 - U_{1k} Judgment matrix

U_1	U_{11}	U_{12}	U_{13}	U_{14}	ω_i
U_{11}	1	2	1/5	1/5	0.1168
U_{12}	1/2	1	1/3	1/3	0.1044
U_{13}	5	3	1	1	0.3894
U_{14}	5	3	1	1	0.3594
Σ	11.5	9	2.533	2.533	1.0000

CI=0.0644,CR=0.0716<0.10

TABLE 6 : U_2 - U_{2k} Judgment matrix

U_2	U_{21}	U_{22}	U_{23}	U_{24}	U_{25}	ω_i
U_{21}	1	1	1/3	1/6	1/5	0.0594
U_{22}	1	1	1/3	1/6	1/5	0.0594
U_{23}	3	3	1	1/4	1/3	0.1399
U_{24}	6	6	4	1	2	0.4455
U_{25}	5	5	3	1/2	1	0.2988
Σ	16	16	8.677	15	0.733	1.0000

CI=0.0238,CR=0.0213<0.10

TABLE 7 : U_3 - U_{3k} Judgment matrix

U_3	U_{31}	U_{32}	U_{33}	ω_i
U_{31}	1	1/2	1/3	0.1637
U_{32}	2	1	1/2	0.2973
U_{33}	3	2	1	0.5390
Σ	6	3.5	1.833	1.0000

CI=0.0044,CR=0.0076<0.10

TABLE 8 : U_4 - U_{4k} Judgment matrix

U_4	U_{41}	U_{42}	ω_i
U_{41}	1	1	0.5000
U_{42}	1	1	0.5000
$\sum$	2	2	1.0000

CI=0.0000,CR=0.0000<0.10

TABLE 9 : U_5 - U_{5k} Judgment matrix

U_5	U_{51}	U_{52}	U_{53}	U_{54}	U_{55}	ω_i
U_{51}	1	1/3	1/4	1	1/5	0.0688
U_{52}	3	1	1/2	3	1/3	0.1707
U_{53}	4	2	1	4	1/2	0.2695
U_{54}	4	2	1	4	1/2	0.2695
U_{55}	1	1/3	1/4	1	1/5	0.0688
$\sum$	14	6.667	4	14	2233	1.0000

CI=0.0155, CR=0.0138<0.10

By above tables, we simultaneously can know that every judgment matrix passes consistency test, so it can accept.

Fill above obtained judgment matrix into following Table:

Combine with above factors and link with one company specific status; it gets each indicator evaluation results, as following Table show:

TABLE 10 : Each indicator evaluation result

First grade indicator (U_i)	Second grade indicator (U_{ik})	Evaluation value F_{ikj}				
		Excellent	**Good**	**General**	**Poor**	**Bad**
U_1 (0.0400)	U_{11} (0.1168)	0.10	0.65	0.25	0.00	0.00
	U_{12} (0.1044)	0.00	0.70	0.05	0.25	0.00
	U_{14} (0.3894)	0.00	0.10	0.55	0.35	0.00
	U_{14} (0.3894)	0.00	0.60	0.05	0.35	0.00
U_2 (0.0788)	U_{21} (0.0594)	0.10	0.20	0.65	0.00	0.00
	U_{22} (0.0594)	0.20	0.10	0.70	0.00	0.00
	U_{23} (0.1399)	0.10	0.25	0.65	0.00	0.00
	U_{24} (0.4455)	0.00	0.80	0.10	0.10	0.00
	U_{25} (0.2958)	0.00	0.50	0.10	0.40	0.00
U_3 (0.1616)	U_{31} (0.1637)	0.15	0.20	0.65	0.00	0.00
	U_{32} (0.2973)	0.00	0.70	0.15	0.15	0.00
	U_{33} (0.5390)	0.00	0.85	0.05	0.10	0.00
U_4 (0.3598)	U_{41} (0.5000)	0.00	0.70	0.20	0.10	0.00
	U_{42} (0.5000)	0.00	0.75	0.15	0.10	0.00
U_5 (0.3598)	U_{51} (0.0688)	0.20	0.10	0.70	0.00	0.00
	U_{52} (0.1707)	0.10	0.15	0.75	0.00	0.00
	U_{53} (0.2695)	0.00	0.65	0.10	0.25	0.00
	U_{54} (0.2695)	0.00	0.55	0.35	0.10	0.00
	U_{55} (0.0688)	0.00	0.85	0.10	0.05	0.00

(First grade indicators grouped under overall indicator **U**)

By above table, it can make fuzzy comprehensive evaluation, combine with previous stated formula, it can get its first grade fuzzy evaluation result, as following Table show:

TABLE 11 : First grade fuzzy comprehensive evaluation table

	U_i	Evaluation value b_{ij}				
		Excellent	**Good**	**General**	**Poor**	**Bad**
	U_1	0.0177	0.5501	0.1396	0.2987	0.0000
U	U_2	0.0348	0.5571	0.2453	0.1629	0.0000
	U_3	0.0246	0.6990	0.2780	0.0985	0.0000
	U_4	0.0000	0.7250	0.1750	0.1000	0.0000
	U_5	0.0308	0.6044	0.2694	0.0954	0.0000

After that, combine with previous formula,it makes second grade evaluation,that:

$$B_i = A \circ R$$
$$= (a_1, a_2, L\ a_5) \circ (B_1, B_2, L\ B_5)^T$$
$$= (0.0813, 0.8573, 0.0136, 0.0149, 0.0000)$$

According to maximum membership principle, it can get that 0.85613 is final evaluation result.

CONCLUSION

The paper mainly discusses China new pattern urbanization process's medium and small towns sports culture development strategy influence factors, and applies fuzzy mathematical method to make systematic and objective evaluation on China new pattern urbanization process's medium and small towns sports culture development strategy, from which by applying analytic hierarchy process method,it defines China new pattern urbanization process's medium and small towns sports culture development strategy weights, finally by second grade evaluation, it gets China new pattern urbanization process's medium and small towns sports culture development strategy evaluation is 0.85613 that belongs to good level, but it still has something to be improved, so the writer suggests government sectors should strengthen sports cultural advertising to build good basis for China's tows sports cultural development.

ACKNOWLEDGMENT

Author introduction: Liu Xian (1980-5), male, han ethnic group, from huangshi hubei, hubei institute of technology, associate professor, master, research direction: sports culture, education, research work.

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