ISSN : 0974 - 7435 Volume 10 Issue 3

BioTechnology
An Indian Journal

FULL PAPER

BTAIJ, 10(3), 2014 [556-561]

New pattern urbanization process sports facility and stadium distribution research

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ABSTRACT

China sports facility demand increasing derives from China national current sports status, every region increases sports facilities and sports stadiums construction. And China new pattern urbanization process speeds up, new pattern urban sports facilities' demands are also increasing year by year. This paper, according to central place theory, it sites and establishes sports facilities or sports stadiums, considering provided sports service items, building site, and then establishes honeycomb model and covers its location area. Analyze new pattern urbanization process, with regard to new pattern urban, it establishes AHP analytic hierarchy process model and gets new pattern urban should reasonable build sports facilities and stadiums, and supplement a focus on sports facilities with sports stadiums.

KEYWORDS

Cellular network;
Central place theory;
AHP analytic hierarchy process;
New pattern urbanization;
Sports facility.

INTRODUCTION

With Beijing Olympic Games held in 2008, China has held lots of sports competitions in recent years, therefore demands on sports stadiums are rapidly increasing, and with people physical exercise consciousness increasing, from housing estate sports facilities to major sporting entries, the demands are increasing year by year, and sports facilities or sports stadiums not only have better humane benefits, but also possess objective economic benefits with regard to sports stadiums[1-3]. With urbanization process speeding up, more and more commercial districts rise straight from the ground, dwelling environment has been largely improved by comparing with the previous ones, but one point has not yet obvious been improved that community public sports facilities are too little, while following by urbanization process speeding up, it will have more and more people enter into urban to live, which would let original insufficient public sports facilities become more scarcity, which is against people's physical health and urban community ecosystem building, as well as harmful for improving people's happiness index, while even more harmful for Chinese dream realization[4-7].

According to "China fields and facilities building industry market research and investment prediction analysis report in 2013 to 2017"[1,8], it predicts until 2015, national each kind of sports fields will arrive at more than 1.2 million, sports fields area per capita will arrive at more than 1.5 square meters, sports fields' facilities will also constantly increase. According to the fifth sports fields general survey result, it shows that compares with the fourth sports fields' general sur-

vey, China sports fields in the total amount, sports fields area, number of possessing sports fields every 100 thousand people and sports fields' area per capita will respectively increase 38.07%, 69.87%, 32.00% and 58.46%. Absolute number of China sports fields are relative plentiful, but relative number is insufficient, especially regional sports fields distribution; it has greater differences[9]. Comparing each region sports field scale, it can find out that in the number of sports fields, sports fields total area and sports fields area per capita aspects, eastern region is higher than western region, middle region is the least, mainly due to eastern region economically developed, abundant in sports fields basis; while for 100 thousand people owned number of sports fields, western region is the highest, middle region is the lowest, which mainly because western region has a vast territory of sparsely population. It can be found that China regional sports fields' amount scale direction is in unbalanced state. Thereupon, middle and western regions' to be exploited sports fields' building industry have greater investment and exploitation potentials[10].

As one of the important linkages in urbanization process, sports facilities building is also related to urbanization qualities, therefore it should combine software and hardware to solve the difficulties properly by starting from management, programming, implementation and other aspects. To domestic sports building status, many sports facilities have improper layout and other problems, and cause government funding lots of waste, therefore correct sports facilities and stadiums building need correct theoretical researches and analyses.

MODEL ESTABLISHMENTS

Central place theory

When applies central place theory into discussing urban sports facilities (in the following it calls sports central place for short) space layout, at first it will use central place model.

This paper makes following hypothesis:

Central place model has discussed central place provided sports services, and it establishes in the center of dense population;

Low level sports central place can reduce sports land, convenient and efficient, it is proper for small size user;

High level sports central place quantities are fewer, and covers large areas, available design range is wide.

Honeycomb model

Sports service needy, from the perspective of number of people, due to coverage area is a round. On the condition that radiation radius r is the same, calculate three shapes housing estates neighboring region distances, housing estate area, crossover region width and crossover region area as TABLE 1 show.

TABLE 1 : Three kinds of graphs comparison

Housing estate shape	Regular triangle	Square	Regular Hexagon
Neighboring region distances	r	$\sqrt{2}r$	$\sqrt{3}r$
Housing estate area	$1.3r^2$	$2r^2$	$2.6r^2$
Crossover region width	r	$0.59r$	$0.27r$
Crossover region area	$1.2\pi r^2$	$0.73\pi r^2$	$0.35\pi r^2$

From TABLE 1, it is clear that regular hexagon shape is the nearest ideal round, it can effective meet cover region, which is most proper, so that takes regular hexagon center as honeycomb structure, extends outside, it process as following Figure 1 show.

From Figure1, we can find diameter d and number N relationships:

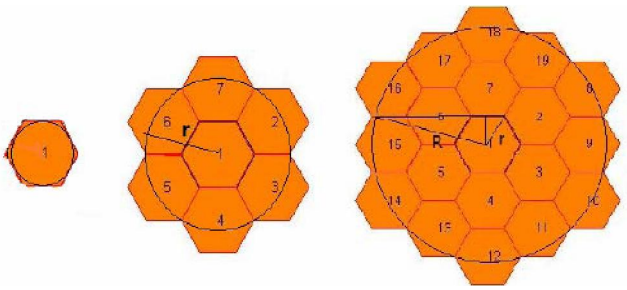

Figure 1 : Regular hexagon center used for honeycomb structure

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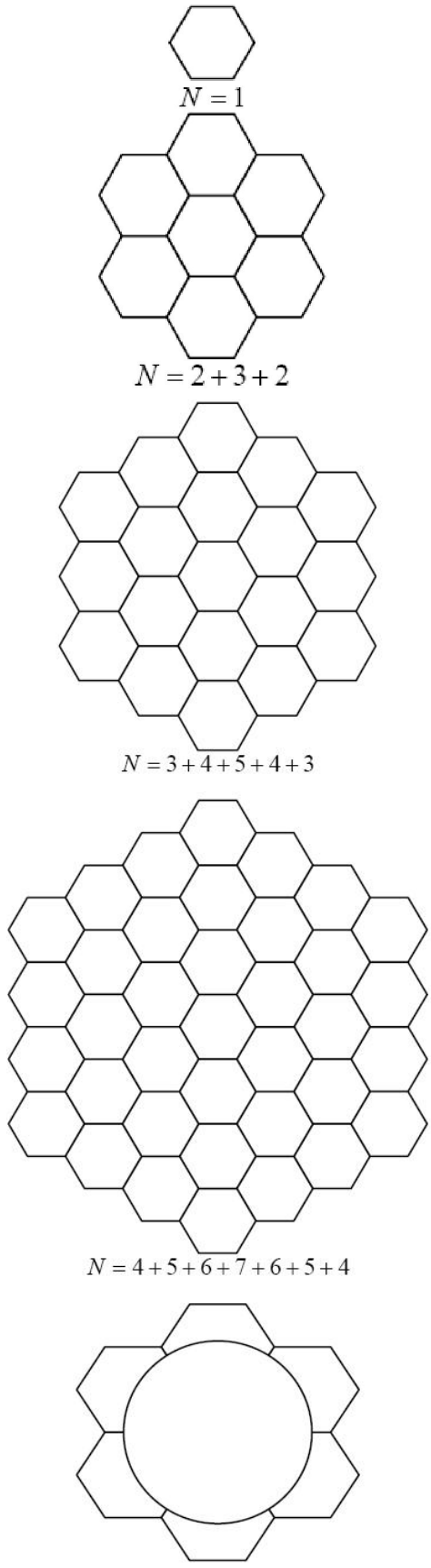

Figure 2 : Round region border

As Figure 1 show, round region border lies in the outermost layer hexagon center, it can get by rules that:

$$N = 12n^2 + 30n + 19$$

Among them, N is overspread round region required numbers of hexagons. n is equal to: $n = \frac{D}{d}$

Among them, D is round region diameter, d is hexagon inscribed circle diameter.

The paper statistics of these data into table, as TABLE 2 show.

Make use of AHP analyzing urban sports building

Establish AHP analytic hierarchy structure: This paper establishes criterion layers from 7 aspects, and establishes AHP hierarchical structure, as Figure 3.

Weighting values according to TABLE 3 proportion values respected definitions, applying paired comparison method, it gets relative weight, and forms into paired comparative matrix.

TABLE 2 : Statistical table

Number of sports facilities or stadiums N	Coverage radius r	Number of sports Facilities or stadiums N	Coverage radius r
1	40	1261	1.859
7	20	1387	1.818
19	11.09	1519	1.701
37	8	1657	1.667
61	7.184	1801	1.568
91	6.667	1951	1.538
127	5.298	2107	1.454
169	5	2269	1.428
217	4.193	2437	1.355
271	4	2611	1.333
331	3.468	2791	1.269
397	3.333	2977	1.25
469	2.957	3169	1.194
547	2.857	3367	1.176
631	2.577	3571	1.126
721	2.5	3781	1.111
817	2.283	3997	1.066
919	2.222	4219	1.053
1027	2.049	4447	1.012
1141	2	4681	1

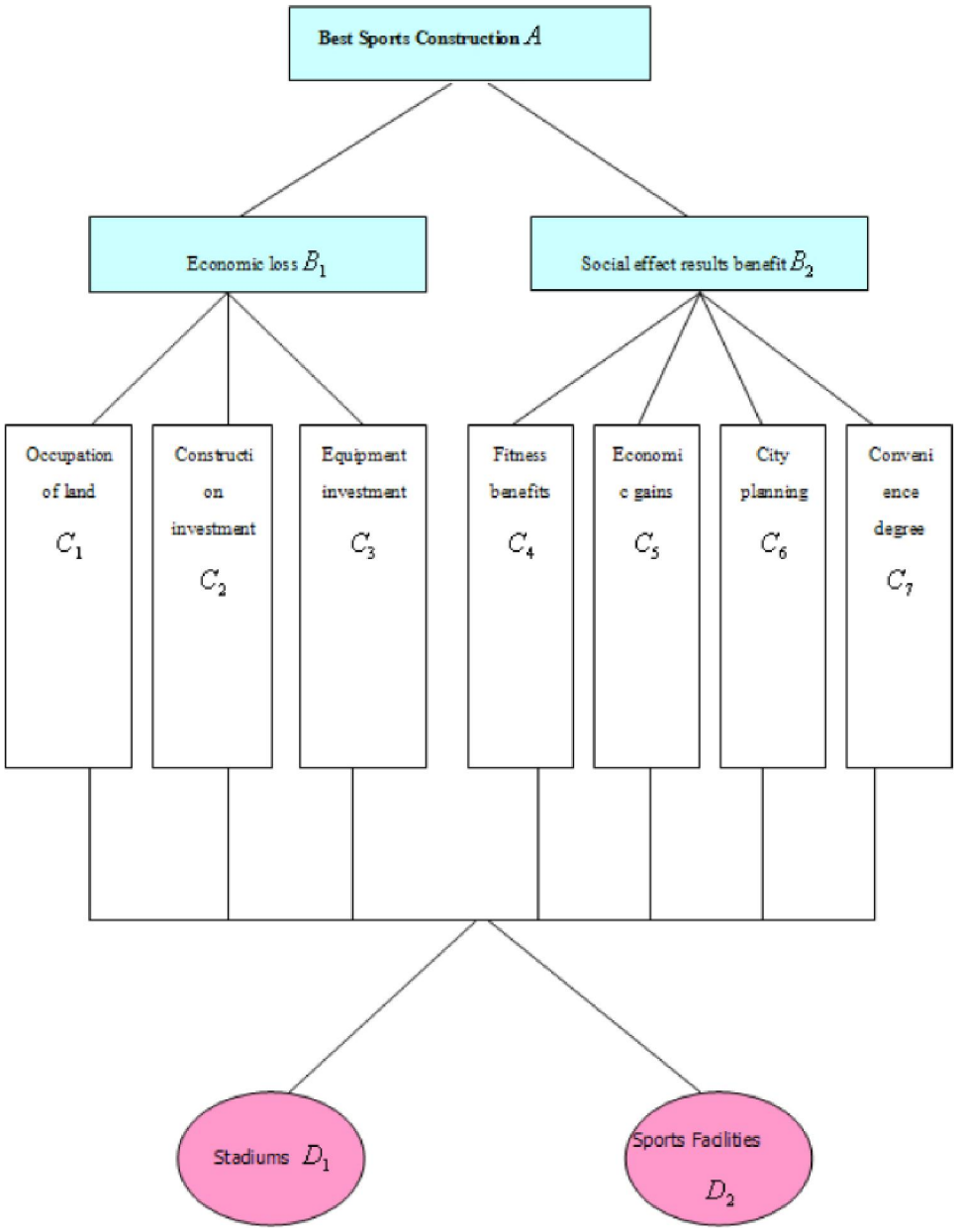

Figure 3 : Urban sports building AHP hierarchical structure

$\alpha_{ij} = 1, \frac{1}{2}, \ldots, \frac{1}{9}$ Represents C_i and C_j importance is just opposite to above figure, and $\alpha_{ji} = \frac{1}{\alpha_{ij}}$

According to recommended experience, it carries out paired comparisons on criterion layer as well as project layer to previous layer each element. Criterion layer B judgment matrix to objective layer A: $A = (\alpha_{ij})_{n \times n}$

Calculate judgment matrix feature vector (hierarchical single arrangement):

Correspond to G maximum feature root $\lambda_{\max}$ feature vector ω is weight vector, then $A\omega = \lambda_{\max}\omega$, it solves weight vector ω, and make normalization by every line dividing arithmetic mean. Given: $\omega = (w)_{n \times 1}$

$$\omega_1^{'} = \frac{\omega_1}{\sum_{i=1}^{n} \omega_i} (i = 1,2,\ldots,n)$$

Consistency indicator: $CI = \frac{\lambda_{\max} - n}{n-1}$

Random consistency indicator is RI, consistency

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TABLE 3 : 1~9 scale table

Scale a_{ij}	Definition
1	Factor i and factor j are equal important
3	Factor i is slightly important than factor j
5	Factor i is relative important than factor j
7	Factor i is quite important than factor j
9	Factor i is absolutely important than factor j
2.4.6.8	Above judgments middle state corresponding scale value
Reciprocal	If factor i compares with factor j, it gets judgment value as a_{ji} =1/ a_{ij} , a_{ii} =1

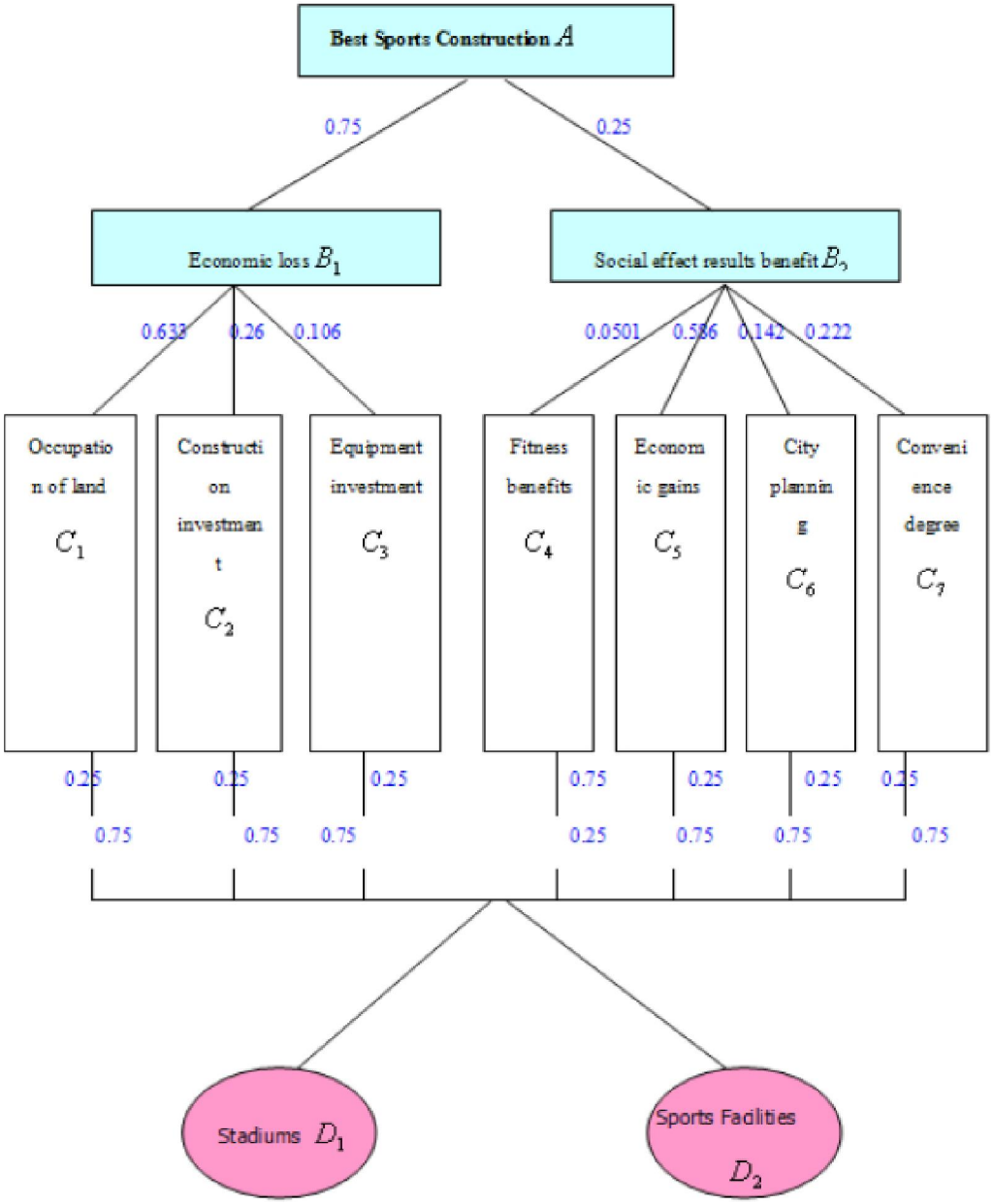

Figure 4 : AHP weight figure

ratio: $CR = \frac{CI}{RI}$, when $CR < 0.1$, it meets consistency test, analyzed result is correct.

Calculate combination weight (hierarchical total arrangement)

Assume criterion layer B two elements B_1 B_2 complete total arrangement, corresponding weights are β_1, β_2. criterion layer C 7 elements $C_1, C_2, ..., C_7$, then corresponds to previous layer element A_j $(j = 1,2)$ single arrangement result is $\gamma_{1j}, \gamma_{2j}, ..., \gamma_{3j}$ project layer D, to previous layer element C_M single arrangement result δ_{1m}, δ_{2m}, then corresponding combination weight:

$$w_i = \sum_{j=1}^{2} \sum_{m=1}^{7} \delta_{im} \gamma_{mj} \beta_j \ (i = 1,2)$$

According to the method, it calculates project layer to objective layer combination weight. When order $n \leq 2$, matrix always has completely consistency. Solved weight values are as Figure 4 show.

By calculation, it gets fixed-line telephone and mobile phone related to providing optimal communicate way service total objective weight are respectively: $w_1 = 0.256$, $w_2 = 0.744$. Result analysis gets that to new pattern urbanization building, sports facilities cover larger proportion that is74.44%, sports stadiums cover 25.6%.

CONCLUSIONS

China has held lots of sports competitions in recent years, therefore demands on sports stadiums are rapidly increasing, and with people physical exercise consciousness increasing, from housing estate sports facilities to major sporting entries, the demands are increasing year by year, and sports facilities or sports stadiums not only have better humane benefits, but also possess objective economic benefits with regard to sports stadiums. However, to domestic sports building status, many sports facilities have improper layout and other problems, and cause government funding lots of waste, therefore correct sports facilities and stadiums building need correct theoretical researches and analyses. Sports facilities building is a kind of complicated system engineering, from planning to designing, then to operation, management, every linkage is closely connected: government, developers, planners, architects, users, every role is indispensible, only by each sector closely cooperation and mutual supporting, the work can be well done, and blueprint will come true, as well as realize high quality urbanization, which is also one of new pattern urbanization objectives, and one important part of implementing new four modernizations and Chinese dream.

REFERENCES

[1] Bing Zhang, S.Zhang, G.Lu; Journal of Chemical and Pharmaceutical Research, **5(9)**, 256-262 **(2013)**.

[2] Liu Hong-Jian, Sun Qing-Zhu, Song Jie; Journal of Shandong Physical Education Institute, **27(6)**, **(2011)**.

[3] Bing Zhang; Journal of Chemical and Pharmaceutical Research, **5(2)**, 649-659 **(2014)**.

[4] Mingming Guo; Journal of Chemical and Pharmaceutical Research, **5(12)**, 64-69 **(2013)**.

[5] Zhao Yuefeng; Sports & Science, **23(5)**, 20-21, 24 **(2002)**.

[6] Liu Rong; Journal of Hubei Sports Science, **26(4)**, 402-404 **(2007)**.

[7] Ma Zhi-He, Ma Zhi-Qiang, Dai Jian, Zhang Lin; Journal of Beijing Sport University, **27(4)**, 445-447 **(2004)**.

[8] Bao Ming-Xiao; Sports Science Research, **27(6)**, 1-9 **(2006)**.

[9] Xiaomin Zhang; Journal of Chemical and Pharmaceutical Research, **5(12)**, 8-14 **(2013)**.

[10] Wang Bo, Zhao Yulin; Journal of Chemical and Pharmaceutical Research, **5(12)**, 21-26 **(2013)**.