

# Reforming study of the financial spending policies of China's state general administration of sports

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**Abstract.** The paper carries on weight calculation and order of word and combinations by using the analytic hierarchy process through computer operation ability according to determined index system of fiscal spending table made by China's state general administration of sports, and get the weight index of the financial expenditure at all levels. So that we can determine the reasonable allocation of fiscal funds, and compare the allocation proportion with the financial capital expenditure statistics results of 2012, so we find out problems of fiscal expenditure, and then puts forward reforming suggestions of the financial expenditure policy made by the state sport general administration.

## 1 Introduction

China's state general administration of sports is the core part of the national sports development leadership department, its main responsibility is to make development strategies related to sports, and plans every link of the whole sports, which helps promoting the development of national sports. China's state general administrations of sports' duties are regulating the important hands, short financial fund allocation and policy making [1-5]. The funds in different sports expenditure play an important role in the development of sports of the related department. A reasonable proportion of fiscal expenditure is of great significance on the development of sports system [6-9].

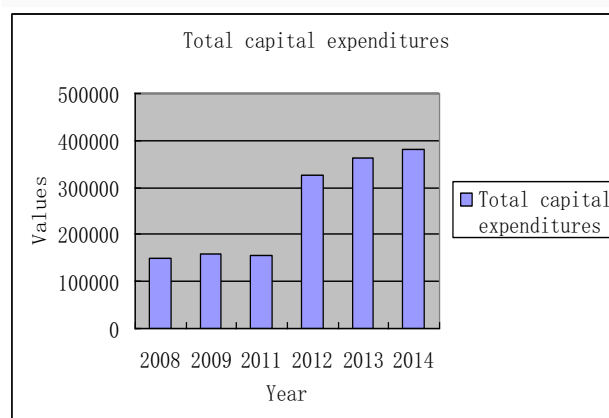
In this paper, on the basis of previous studies and the reference of China's state general administration of sports of fiscal expenditure statement statistics, we establishes a hierarchy of sports expenditure indexes to study the index weights based on the analytic hierarchy process. By calculating the index weights of fiscal expenditure, we study the rationality of the fiscal policy and make recommendations for the financial policy [10].

## 2 The current spending situation of national sports

According to China's sports bureau's data of the fiscal expenditure budget from 2008-2014 we draw a columnar Figure 1 (which failed to get the relevant data of 2010).

The Sports budget in 2012 was bigger, and the rates in 2012-2014 grow steadily. China's general administration of sport had made statistical analysis in 2006-2008 of the national sports of the related industry, on the basis of these studies, we begin increase the investment to the

sports industry in 2012 especially the education investment growth is the largest, from 153 million Yuan in 2008 to 636 million Yuan in 2014.



**Figure 1.** The changes of the financial capital expenditures budget.

According to the fiscal expenditure Table 1 made by China's state general administration of sports, we establish the classification index system, as shown in the follows.

Table 1 shows the index of some cover index, some are not covered. Omit the other item of expenditure in data, and build mainly according to the subject of finance expenditure, finally we calculate the weight.

## 3 Using analytic hierarchy process to calculate the index weight

### 3.1 Construct judgment matrix

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Mainly through the interview of the experts and scholars, we describe important degree of the indicators with quantitative values. We use  $F_i$  to represent the first level, and construct judgment matrix of diplomacy, education, science and technology, sports culture and media, social security and employment, housing security. Then take  $C_i, C_j$  to be compared of the important structure and use get  $a_{ij}$  to represents its result. We can get the judgment matrix A. It is shown in the following:

$$A = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1j} \\ a_{21} & a_{22} & \cdots & a_{2j} \\ \vdots & \vdots & \ddots & \vdots \\ a_{i1} & a_{i2} & \cdots & a_{ij} \end{pmatrix}$$

$a_{ij}$  the quantitative values represent importance of the comparing results, it meaning is shown in the Table 2. Through the above methods of the first level, we get the judgment matrix. It is shown in Table 3.

**Table 1.** The financial expenditure of index system.

First level		Second level	
Serial number	Subjects	Serial number	Subjects
202	Diplomacy		
205	Education		
206	Science and technology	20603	Application research
		20604	Technology research and development
		20605	Science and technology condition and services
		20699	Other spending of science and technology
207	Sports culture and media	20703	Physical education
208	Social security and employment	20805	The reiteration administrative institution
221	The spending of housing security	22102	The spending of housing reformation

**Table 2.** The meaning of 1~9 scale.

scale	meaning
1	Two factors of the target are equally important
3	The former factor is slightly important than the next one
5	The former factor is important than the next one
7	The former factor is more important than the next one
9	The former factor is much more important than the next one
even number	represent the importance between the two Odd numbers
reciprocal	Represent the order of the front-to-back ratio of the factors

**Table 3.** Judgment matrix  $F$ .

	$F_1$	$F_2$	$F_3$	$F_4$	$F_5$	$F_6$
$F_1$	1	1/7	1/5	1/9	1/3	1/2
$F_2$	7	1	2	1	3	4
$F_3$	5	1/2	1	1/2	3	3
$F_4$	9	1	2	1	7	7
$F_5$	3	1/3	1/3	1/7	1	1
$F_6$	2	1/4	1/3	1/7	1	1

**Table 4.** RI value list.

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

**3.2 The calculation of weight vector and maximum eigenvalues**

We normalize the column vector of judgment matrix primary index, and after adding every row, we begin normalization, the weight vector can be obtained [11].

The weight vector of the primary index:  
 $w=(0.034 \ 0.282 \ 0.177 \ 0.368 \ 0.074 \ 0.064)^T$

The calculation of the maximum eigenvalues, we know that:  $Aw=\lambda_{\max} w$

So:  $\lambda_{\max} = 6.100$

### 3.3 Consistency check

The consistency of judgment matrix  $CI$ , and Judgment matrix consistency ratio  $CR$ , computational formula is in the following:

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

Among them  $n$  represents the Order number of the judgment matrix, also means the number of comparisons:

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

Among them  $RI$  represents the number of Random Consistency Index, which is shown in the Table 4.

When  $CR \geq 0.1$ , we think that the inconsistency of judgment matrix appears and need to adjust it. when  $CR < 0.1$ , the inconsistency of the matrix is in an acceptable condition and we can go on calculating. And we calculate the overall level of sorting and consistency check further more.

After calculation we get:  $CI = 0.0201$ ,  $CR = 0.0162 < 0.1$

So there is no logical problem of the weight of index calculation results.

### 3.4 The weight calculation of secondary index

As for the child pointer of the indexes which has only one index, its index weight is the higher weight value. We build up the matrix of the four child pointers and get its weight. The judgment matrix is shown in Table 5.

The calculation of maximum eigenvalues, weight vector and the check results are in the following:

$$\lambda_{\max} = 4.0102$$

$$w=(0.296 \ 0.535 \ 0.109 \ 0.060)^T$$

$$CI = 0.0034 \quad CR = 0.0038 < 0.1$$

Calculate the third-level index of sports culture and media respectively. And calculate the sports media spending and indicators of other culture structure matrix and get its weight:

$$\lambda_{\max} = 4.0102$$

$$w=(0.296 \ 0.535 \ 0.109 \ 0.060)^T$$

$$CI = 0.0034 \quad CR = 0.0038 < 0.1$$

**Table 5.** The judgment matrix  $F_3$ .

$F_3$	$C_1$	$C_2$	$C_3$	$C_4$
$C_1$	1	1/2	3	5
$C_2$	2	1	5	8
$C_3$	1/3	1/5	1	2
$C_4$	1/5	1/8	1/2	1

**Table 6.** The calculation results of Index weight.

First level		Second level	
Subjects	Weights	Subjects	Weights
Diplomacy	0.034		0.034
Education	0.282		0.282
Science and technology	0.177	Application research	0.052
		Technology research and development	0.095
		Science and technology condition and services	0.019
		Other spending of science and technology	0.011
Sports culture and media	0.368	Physical education	0.368
Social security and employment	0.074	The reiteration administrative institution	0.074
The spending of housing security	0.064	The spending of housing reformation	0.064

### 3.5 The order of the weighting calculation

If there have  $m$  weight factors in one layer and its result

is  $\alpha_m$ , the corresponding consistency index is  $CI_m$ , and in the next layer A, there have  $n$  weight factors, and its result is  $\beta_{nm}$ , so the total ordering weights in the layer B

$$is: w_i = \sum_{j=1}^m \alpha_i \beta_{ij}$$

The weight of the various indicators in the overall goal is in the Table 6.

The comparison of the calculated value and actual value, it is shown in Table 7.

**Table 7.** The comparison of the calculated value and actual value.

Project		Result		
Subject	Name of the subject	Spending (thousand)	Proportion	
No.	Total		actual	calculation
		336726.44		
202	Diplomacy	382.59	0.001	0.034
205	Education	43893.36	0.153	0.282
206	Science and technology	4933.88	0.017	0.177
20603	Application research	4730.57	0.01630	0.052
20604	Technology research and development	11.31	0.00004	0.095
20605	Science and technology condition and services	145	0.00050	0.019
20699	Other spending of science and technology	47	0.00016	0.011
207	Sports culture and media	227005.50	0.794	0.368
208	Social security and employment	2602.71	0.009	0.074
20805	The reiteration administrative institution	2602.71	0.009	0.074
221	The spending of housing security	7255.10	0.025	0.064
22102	The spending of housing reformation	7255.10	0.025	0.064

## 4 Conclusion

Through the calculation of this paper, we determines the reasonable allocation proportion limit on the sports financial fund allocation, after comparing with the actual situation of fiscal expenditure in 2012, we found that the actual fiscal spending is not reasonable. Nearly 80% of the money went to the sports culture and the media [11]. However, education, scientific research and other aspects of the investment is too low. The investment is not reasonable and becoming a one-sided situation. This paper suggested that government should increase the investment of education, scientific research and foreign capital, at the same time, reducing the investment of sports culture and media. Thus it can make the fiscal expenditure allocation become more reasonable.

## References

1. B. Liu, S.L. Hu, H.X. Xu, J.H. Gao, Chinese Journal of Health Policy. **2**, 13-17 (2009).
2. D.C. Zhang, M. Li, China Sport Science. **33**, 3-23 (2013).
3. J.T. Cai, B.Y. Fan, J.S. Wang, Journal of Beijing Sport University. (2009).
4. G.H. Wang, W.H. Zhang, Journal of Chengdu Physical Education Institute. **36**, (2010).
5. J. Zhang, Y. Wu, Journal of Shanghai Physical Education Institute. 80-82 (2012).
6. Y. He, M. Xu, Journal of Chengdu Physical Education Institute. **33**, 43-45 (2007).
7. Y. He, M. Xu, Journal of Wuhan Institute of Physical Education. **41**, 40-42 (2007).
8. Y. Chen, G.S. Ma, China Sport Science and Technology. **45**, (2009).
9. Y. He, M. Xu, Journal of Wuhan Institute of Physical Education. **41**, 40-42 (2007).
10. H. Huang, Z.L. Liu, EBM 2010: International conference on engineering and business management. **1-8**, 5186-5189 (2010).
11. S. Yan, Z. Jia, W. Liu, et al., Journal of Coastal Research. **73**, 809-814 (2015).