



Research Article

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Chinese men's basketball team development countermeasure research based on analytic hierarchy process

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ABSTRACT

The paper applies documents literature, mathematical statistics, logical reasoning and analytic hierarchy process; it analyzes Chinese men's basketball team current status, researches on Chinese competitive basketball declined phenomenon causes, and puts forward Chinese men's basketball strategic countermeasures. By analyzing established each layer indicator with analytic hierarchy process approach, it gets Chinese men's basketball team strategic development each indicator weight and weighted value, finally analyzes established three layers' key factors and gets rationality of importance degree ranking by weights. Result shows: Develop Chinese men's basketball team overall advantages and its coaches guiding and training capacity to Chinese men's basketball team as well as improve CBA league training ability to Chinese new generation players are the key to Chinese men's basketball team development.

Key words: Chinese men's basketball team, development countermeasure, analytic hierarchy process, indicator weight

INTRODUCTION

In recent years, Chinese men's basketball team standings have gone from bad to worse. In 2009 Asian championship, Chinese men's basketball team was defeated in Tianjin. In 2012 London Olympic Games, Chinese men's basketball was terribly defeated in five competitions and ranked in last, it hadn't have past glory any more [1-5]. Nowadays, Chinese men's basketball team is in the hardest time, every problem troubles with its development, whether can correct analyze Chinese basketball team existing problems or not is the key to it can restore past glory or not [6-8].

For Chinese team recent years' competition performance constantly falling causes as well as how to change Chinese men's basketball team downturn status, lots of scholars and experts have made analysis and researches on them, from which Xu Bo etc.(2010) applied documents literature and rational thinking approach to research on Chinese men's basketball team development history, and analyzed Chinese men's basketball team standings in 2009 Asian championship, they put forward that improvement of CBA league competitive levels were the prerequisite of Chinese men's basketball team development[1, 9];Yan Hai-Bo (2013)utilized mathematical statistics, video observation and other methods, he analyzed London Olympic Games Chinese men's basketball team and world every country's men's basketball team competition data, comprehensive analyzed Chinese men's basketball team competitive levels status and problems as well as gaps with basketball powers, and presented corresponding opinions[2, 10];Xu Ming (2013) analyzed Chinese basketball team training status, he proposed Chinese basketball team existing main problems in training, and presented corresponding solution[3, 11]; Guo Yong-Bo and others(2004) used logical analysis to analyze Chinese men's basketball team development guiding thoughts formation history and current status, they defined basketball training guiding thought concept, features, and put forward that correct basketball guiding thought was the key to Chinese basketball team got a breakthrough in performance[4, 12]; Gao Zhi(2013) applied expert interview, analytic hierarchy process and other methods, he established competitive basketball training controlled structure, analyzed training process main linkages and details

as well as training process control features, which provided reference for Chinese men's basketball team training[5, 13].

The paper on the basis of previous researches, it makes researches and analysis of Chinese men's basketball team current each kind of problems, and brings forward many opinions about developing Chinese men's basketball team. By utilizing analytic hierarchy process, it analyzes all kinds of opinions about developing Chinese men's basketball team, gets Chinese men's basketball team strategic development each indicator weight and weighted value, makes comparison of every opinion importance degree to Chinese men's basketball team development, in the hope of providing reference for Chinese men's basketball future development.

CHINESE MEN'S BASKETBALL TEAM CURRENT STATUS RESEARCH

There are only three aspects reasons that effect on Chinese men's basketball team competitive performance and development prospects, which are Chinese men's basketball team reserve force, Chinese men's basketball team organic composition and Chinese basketball each kind of talents cultivation. Analyze and research on these three aspects impacts on Chinese men's basketball team development is the key to help men's Chinese basketball team out of competition downturn status.

Chinese men's basketball team organic composition

Whether Chinese basketball team organic composition is reasonable or not, whole team members have their own technical advantages or not, team has its own tactic advantages or not and others are direct factors that affect Chinese men's basketball team standings. A basketball team organic composition can be divided into four parts that are basketball player, basketball coach, team overall advantages and team resource guarantee. To a basketball player, so as to become an excellent basketball player, he not only needs to have good physical quality and superb basketball technique, but also needs to have good psychological quality and basketball awareness. Basketball coach ability has also very big impacts on a basketball team competition performance; an excellent basketball coach not only needs spot command and guiding training ability, but also needs to own considerable scientific research level, organizing management ability and communicative coordination. Meanwhile, in order to better set the pace, a team also needs to have its own advantage, such as team's competition style, tactics application, cooperation among members. Finally, a team's resource allocation is the final guarantee whether the team can normally give training into play or not. A basketball team training and competition need certain material basis, as team's sports facilities, funding, medical security and basketball player selection. Whether it can successfully organize a excellent basketball team is the key to Chinese men's basketball team gets excellent competition performances or not.

Chinese men's basketball team competitiveness reserve force

In order to ensure Chinese men's basketball team sustainable development, it cannot only focuses on current basketball team organizing and training, but also should ensure Chinese men's basketball team reserve talents selection and cultivation. Whether reserve force is enough or not that seriously impacts on Chinese men's basketball team development. According to Chinese men's basketball team features, it analyzes Chinese men's basketball team competitiveness reserve force problems, and can start from four aspects that are CBA league, CUBA league, three-level training network and the public participation impact.

CBA league is Chinese competitive basketball highest grade basketball league, is also Asian regions' highest level basketball league, it undertakes important responsibility of training excellent basketball talents for country. But CBA league development in recent years have appeared lots of problems, as amount of foreign aids increasing and competition time increasing, which greatly impacts on Chinese young players' training opportunities. Not taking Chinese young players cultivation and selection seriously, insufficient training intensity have already become important barriers that CBA league talents cultivation for Chinese men's basketball. And CUBA league needs to focus on divisional series, improve coaches' levels, strengthen commercial motion mechanism, change recruitment system and improve athletes' educational level. Due to quick success conceptual problems, Chinese three-level training network is also constantly shrinking, each kind of sports schools have some reduction in number of training, coaches and so on, which needs us to establish universities high level basketball management system, perfect universities basketball team training and competition system, strengthen basketball teaching staff construction and enhance basketball learning and training. The public participation impact includes outside support, personal motivation and basketball environment such three aspects.

Chinese basketball various kinds of talents cultivation

Chinese men's basketball team competitive levels improvement not only needs to improve top level professional basketball talents levels, but also needs good basketball environment and national strongly support. Only Chinese basketball gets healthy development, Chinese national men's basketball team competitive level can be constantly improved. For national support, it not only needs to provide funding, but also the most important is to perfect

Chinese basketball player participating competition regulation, cultivate and train referees and coaches, so that they can make scientific training and cultivation on Chinese basketball talents, as well as fulfill basketball backup. As for national support to Chinese basketball, it can be summarized from four aspects that are Chinese men's basketball team competition system, coaches, referees and players training.

Perfect Chinese men's basketball team competition system includes competition system, policy orientation, benefit motivation and training system these four aspects. For referees' cultivation, Chinese have problems in training system, it lacks of scientific and effective management system, unfair referees' input and return problem, and imperfect basketball professional receiving and financial management system as well as other problems. In the cultivation of Chinese basketball coaches, it also has great problems, lots of coaches in basketball clubs are directly from ex-service basketball players, Chinese basketball coach mostly masters sports amount and sports intensity by experiences and feelings, and he don't focus on scientific information collection. It needs us to change Chinese basketball coach training system and improve coach overall professional quality. And for sports training, it needs to improve training schematization, focus on psychological training, perfect juvenile basketball competition regulations and improve technical and tactics training levels.

CHINESE MEN'S BASKETBALL TEAM DEVELOPMENT HIERARCHICAL STRUCTURE MODEL

When apply analytic hierarchy process into solving practical problems, firstly it should methodize and layering the problem, construct a hierarchical structure so that simplify the problem. To established hierarchical structure, previous layer's element as a criterion dominates next layer relative elements.

By above analysis, it is clear that for developing Chinese men's basketball team's competitive levels, it can analyze and research from three layers. Model's target layer is improving Chinese men's basketball team competitive level. Its target layer, first grade element indicator and second grade element indicator is as Table 1.

Table 1: Analytic hierarchy process model target layer and first and second grade indicators

Target layer	Develop Chinese men's basketball competitive level		
First grade indicator	A National team organization	B Reserve force	C All kinds of talents cultivation
Second grade indicator	A1 Team's basketball player A2 Team's basketball coach A3 Team's overall advantages A4 Team's resource guarantee	B1 CBA league B2 CUBA league B3 Three-level training network B4 The public participation impact	C1 Competition system C2 Referee cultivation C3 Coach cultivation C4 Player training

To established analytic hierarchy process model, under A1~A4、B1~B4、C1~C3 each second grade indicator, it also respectively has corresponding three grade elements indicators as A11、A12 and A13, the paper selected three grade elements indicators totally have 46, each three grade element indicator is as Table 2 show.

Table 2: Analytic hierarchy process model's three grade indicators

Symbol	Indicator definition	Symbol	Indicator definition	Symbol	Indicator definition
A11	Train player psychological quality	B11	Restrict CBA foreign aid	C11	Perfect competition system
A12	Cultivate player basketball awareness	B12	Optimize CBA player structure	C12	Policy orientation
A13	Exercise player physical quality	B13	Train Chinese players	C13	Benefit motivation
A14	Train player's basketball technique	B14	Improve CBA self level	C14	Reform cultivation system
A21	Improve spot command	B21	Focus on CUBA divisional series	C21	Perfect training system
A22	Improve guiding training ability	B22	Improve coach level	C22	Increase referee income
A23	Improve scientific research level	B23	Strengthen commercial motion mechanism	C23	Perfect management evaluation mechanism
A24	Improve organizing management ability	B24	Change recruitment system	C24	Standardize its expenditure system
A25	Improve communicative coordination	B25	Improve player cultural quality	C31	Perfect training system
A31	Cultivate team competition style	B31	Perfect basketball management system	C32	Improve professional quality
A32	Training team tactics application	B32	Perfect basketball competition system	C41	Improve training scientization
A33	Training cooperation among players	B33	Strengthen teaching staff construction	C42	Focus on psychological training
A41	Improve sports facilities	B34	Strengthen basketball learning and training	C43	Improve technical and tactics level
A42	Increase funding	B41	Increase outside support	C44	Perfect juvenile basketball competition regulation
A43	Provide medical security	B42	Personal motivation		
A44	Strengthen basketball player selection	B43	Create basketball environment		

CHINESE MEN'S BASKETBALL TEAM COMPETITIVE LEVEL DEVELOPMENT HIERARCHICAL ANALYSIS

Construct each layer judgment matrix

Analytic hierarchy process uses existing experiences and data; it can convert practical problems into mathematical problems. Every layer factor relative previous layer one factor's single arrangement problem can be simplified as a series of paired factors judgment and comparison, and define paired judgment matrix. Use a_{ij} ($i, j=1, 2, \dots, n$) to express each factor, from which n is factor number that used to compare. a_{ij} Represents factor a_i and factor a_j ratio's importance degree, it can compose paired judgment matrix by a_{ij} :

$$P = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}$$

When establish $A-U$ judgment matrix, it can apply Saaty(1-9 ratio scale table) to define a_{ij} value. Its scale table is as Table 3 show.

Table 3: Saaty(1-9 ratio scale table)

Scale score	Definition
1	Indicates two factors have equal importance by comparing
3	Indicates the former is slightly more important than the later by comparing two factors
5	Indicates the former is obviously more important than the later by comparing two factors
7	Indicates the former is intensely more important than the later by comparing two factors
9	Indicates the former is extremely more important than the later by comparing two factors
2, 4, 6, 8	Indicates former factor to later factor importance is the middle value between above adjacent judgment
Reciprocal of above values	Indicate later factor to former factor importance degree by comparing the two factors

The paper takes Chinese men's basketball team competitive level improvement influence first grade layer indicator as an example, it constructs paired judgment matrix. By consulting documents, constructed paired judgment matrix is as Table 4 show.

Table 4: First grade indicator's paired judgment matrix

Indicator	A	B	C
A	1	3	4
B	1/3	1	3
C	1/4	1/3	1

Calculate each factor weight

By paired judgment matrix, it can apply feature vector method to calculate weight vector W . That is firstly solving judgment matrix P maximum feature value λ and its feature vector W . Normalize solved feature vector W , and then it can get corresponding weight vector W . It can calculate first grade indicator each factor composed judgment matrix feature value is 3.0735, its feature vector is:

$$w = [0.9027 \quad 0.3043 \quad 0.1722]$$

Make normalization on solved feature vector, and can solve weight as Table 5 show.

Table 5: First grade indicator each factor weight

Indicator	A	B	C
Weight	0.6144	0.2684	0.1172

Judgment matrix consistency test

Consistency proportion CR calculation method is as formula (1) show:

$$CR = \frac{CI}{RI} \quad (1)$$

Among them, CI is judgment matrix consistency indicator: $CI = \frac{\lambda - n}{n - 1} = 0.0367$

Among them, RI is 1-9 order judgment matrix average random consistency indicator, its value size is as Table 6 show.

Table 6: 1-9 order judgment matrix RI value

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

Input $CI=0.58$ into formula(1), it can solve consistency proportion $CR=0.0633$. That established paired judgment matrix consistency proportion is less than 0.10, which conforms to consistency test requirement.

Second, third layer indicator weight defining

Similarly, it can respectively establish paired judgment matrix for second layer indicators and third layer indicators, use solved judgment matrix feature value and feature vector to define each indicator weight. It can solve second layer indicator each factor weight and weighted value as Table 7 show.

Table 7: Second grade indicator weight and weighted result table

Indicator	Weight	Weighted	Indicator	Weight	Weighted	Indicator	Weight	Weighted
A1	0.1028	0.0632	B1	0.5567	0.1494	C1	0.2025	0.0237
A2	0.2800	0.1720	B2	0.2490	0.0668	C2	0.1829	0.0214
A3	0.5442	0.3344	B3	0.1277	0.0343	C3	0.4376	0.0513
A4	0.0729	0.0448	B4	0.0666	0.0179	C4	0.1770	0.0207

Similarly, it can get third grade indicator weight and weighted values as Table 8 show.

Table 8: Third grade indicator weight and weighted result table

Indicator	Weight	Weighted	Indicator	Weight	Weighted	Indicator	Weight	Weighted
A11	0.2047	0.0129	B11	0.3952	0.0590	C11	0.4181	0.0099
A12	0.4094	0.0259	B12	0.1634	0.0244	C12	0.1906	0.0045
A13	0.0965	0.0061	B13	0.1634	0.0244	C13	0.1205	0.0029
A14	0.2895	0.0183	B14	0.2781	0.0415	C14	0.2707	0.0064
A21	0.1226	0.0211	B21	0.1226	0.0082	C21	0.1381	0.0030
A22	0.2826	0.0486	B22	0.2128	0.0142	C22	0.2761	0.0059
A23	0.1226	0.0211	B23	0.3291	0.0220	C23	0.1952	0.0042
A24	0.2826	0.0486	B24	0.1226	0.0082	C24	0.3905	0.0084
A25	0.1896	0.0326	B25	0.2128	0.0142	C31	0.2500	0.0128
A31	0.5936	0.1985	B31	0.3905	0.0134	C32	0.7500	0.0385
A32	0.1571	0.0525	B32	0.2761	0.0095	C41	0.2761	0.0057
A33	0.2439	0.0834	B33	0.1952	0.0067	C42	0.1381	0.0029
A41	0.5000	0.0224	B34	0.1381	0.0047	C43	0.1952	0.0040
A42	0.1667	0.0075	B41	0.1958	0.0035	C44	0.3905	0.0081
A43	0.1667	0.0075	B42	0.4934	0.0088			
A44	0.1667	0.0075	B43	0.3018	0.0056			

Meanwhile, by calculation process, it can get all paired judgment matrix meets consistency test requirements.

CHINESE MEN'S BASKETBALL TEAM DEVELOPMENT FACTORS HIERARCHICAL KEY INDICATORS ANALYSIS

First layer indicator analysis

The first layer totally has three indicators that are respectively national men's basketball team organization, reserve force and all kinds of talents cultivation, which respectively uses A、B and C to represent, their weights are respectively 0.6144、0.2684 and 0.1172 that their importance degree ranking is A、B、C. Whether Chinese men's basketball team organization is reasonable or not directly impacts on Chinese men's basketball team competition performance. At present, Chinese men's basketball team is in the period of temporary shortage, Yao Ming's retirement, Wang Zhi-Zhi and other veteran sportsmen combat effectiveness declining is a main reason that Chinese men's basketball team competition performance declining. As campaign in London Olympic Games, Chinese men's basketball team still relies on Wang Zhi-Zhi, Liu Wei and other veteran sportsmen fight in the field, new generation players cannot play their due roles in key moment. Chinese men's basketball team unreasonable structure and other factors are the direct causes of Chinese men's basketball team combat effectiveness declining and competition

performance constantly falling.

B indicator corresponding content is Chinese men's basketball team reserve force, only possess strong reserve force as supporters, Chinese men's basketball team can healthy and sustainable develop. Nowadays, each kind of factors comprehensive impacts let Chinese men's basketball team reserve force not to be enough, new generation basketball players' selection and exercising have become problems that admit of no delay. C indicator corresponding content is Chinese needs to cultivate all kinds of basketball talents form various aspects, which is Chinese basketball levels development most basic guarantee.

The second layer key indicator analysis

In order to analyze the second layer each indicator impacts on Chinese men's basketball development, the paper ranks the second layer twelve indicators importance degrees as Table 9 show.

Table 9: The second layer indicator importance degree rank table

Indicator	A3	A2	B1	B2	A1	C3
Weighted	0.3344	0.1720	0.1494	0.0668	0.0632	0.0513
Rank	1	2	3	4	5	6
Indicator	A4	B3	C1	C2	C4	B4
Weighted	0.0448	0.0343	0.0237	0.0214	0.0207	0.0179
Rank	7	8	9	10	11	12

By Table 9 ranking, it is clear that the second layer have three indicators that weighted values above 0.1 that are respectively A3 team overall advantages、A2 team basketball coach and B1CBA league. Whether a team has its own advantages has the largest impacts on Chinese men's basketball team development, nowadays, Chinese men's basketball players' physical qualities have got more and more closer to world level, but competition performance becomes worse and worse, it has great connections with Chinese men's basketball losing its traditional advantages. Coach has also great impacts on Chinese men's basketball team, especially in the field, coach's command on competition is very important to competition result. Chinese men's basketball team development B1 indicator is CBA league to Chinese men's basketball team development. Nowadays, sports competition reflects extremely well, systematization, normalization and sequencing features, these features decide athlete competitive entries, competitive ability performing and excellent performance achievement. Chinese new generation basketball players need high level league competitions' training, CBA league as Chinese highest level league, it is crucial for Chinese young players' training. B2 indicator is CUBA league, though its training effects on Chinese young players is inferior to CBA league, it is also very important for Chinese young players' training. A1 team basketball player is competition performance obtaining direct factor, direct play game in the field is basketball player, whether basketball player has its own advantageous technical conditions and others have important impacts on team tactics and advantages so on.

A3 team resource guarantee、B3 three-level training network establishment and B4 the public participation impact are basic guarantees whether Chinese men's basketball team can normally take training and talents selection or not and other works, which decides Chinese men's basketball team sustainable development. C1 competition system、C2 referee cultivation、C3 coach cultivation and C4 player training is basic protection of Chinese basketball whether can have healthy and long-term development, is the basis of Chinese men's basketball team development.

By above analysis, it is clear that if it wants to develop Chinese men's basketball, improve Chinese men's basketball competitive level, competition performance, it should ensure team has reasonable structures, overall advantages, and meanwhile strengthen selection and training on new generation players. Only ensure players organic structures and overall advantages, Chinese men's basketball team can have strengths to compete with world strong teams, only ensure new generation players' selection and training, Chinese men's basketball team can really have healthy and long-term development.

The third layer key indicator analysis

In order to better analyze Chinese men's basketball team development competitive level three grades indicators, and let Chinese men's basketball team competitive level factors cognition to be more clearly, the paper makes importance degree ranking on set thirty-six indicators with their weighted values, and selects their importance degree top ten twelve factors to make key analysis. The paper selects top twelve indicators factors according to weighted ranking from big to small, as Table 10 show.

Table 10: The third layer indicator ranking top twelve key factors table

Indicator	A31	A33	B11	A32	A24	A22
Weighted	0.1985	0.0834	0.0590	0.0525	0.0486	0.0486
Rank	1	2	3	4	5	6
Indicator	B14	C32	A25	A12	B13	B12
Weighted	0.0415	0.0385	0.0326	0.0259	0.0244	0.0244
Rank	7	8	9	10	11	12

By Table 10, it is clear that in the third layer indicators, only A31 that is cultivating team competition style, its weighted value goes beyond 0.1. To get excellent performance in the field, Chinese men's basketball team should have its own advantages, and its own style. Chinese basketball team have ever advocated "relentless, quick, accurate, flexible" technical style and "Self mainly, attacking first, quick primarily" tactics guidance thought, which is essence of Chinese basketball traditional style, and also build firm foundation for Chinese men's basketball team development in the middle and later period of 1970s. But with Chinese men's basketball constantly development, Chinese men's basketball team has gradually paid excess attentions to height development and neglected speed and technique, it causes player awareness indifference, technique roughness and others series of problems, Chinese basketball traditional style essence has been gradually lost.

Meanwhile, by Table 10, it also can see that in Chinese men's basketball team development importance degree top twelve's third layer indicators and cultivate all kinds of basketball talents, only C32 improve coaches professional quality. It is because Chinese many institutions' basketball coaches, especially for three-level training network's basketball coaches, all are ex-service basketball players directly take the charge. These basketball players haven't accepted systematical basketball coaches due training, special qualities are not high, which surely leads to bad impacts on Chinese each grade basketball players' training and restrict Chinese basketball overall level improvements.

In Chinese men's basketball team development indicators that rank top twelve indicators, except for C32 improve coaches' professional quality, all the rest are national team organization and reserve force contents. As ranking in the first, second, fourth such three indicators correspond to A31 cultivate team competition style, A32 training cooperation among players and A33 training team tactics application, these three indicators are contents in the indicator improving team overall advantages. A22 improve Chinese men's basketball team coach training and guiding ability, A24 improve coach organizing management ability and A25 improve coach communicative coordination are put forward targeted Chinese men's basketball team basketball coach. In top twelve other indicators, there are four items that are Chinese reserve force indicators, and all are reserve force indicators regarding CBA league indicators, which is because CBA league is Chinese men's basketball team cultivates new generation talents most important sources. Among them, B11 restrict CBA foreign aids ranks the third in these 12 items third layer indicators, main reason is though CBA foreign aids joining improves CBA team strength and CBA league appreciation, it seriously impacts on Chinese new generation basketball players cultivation, foreign aid restriction is very important for Chinese new generation basketball players' cultivation.

CONCLUSION

The paper puts forward Chinese men's basketball team performance and development influence factors hierarchical structure for Chinese men's basketball competitive performance declining causes and Chinese men's basketball team occurred every kinds of status, in the hope of providing references for Chinese men's basketball team development; on the basis of defining Chinese men's basketball team performance improvement influence and development hierarchical structure, the paper uses documents literature and experts interview method to summarize forty-six third grade indicators correspond to frame second grade indicators, it makes each kind of suggestions about Chinese men's basketball team development; the paper applies analytic hierarchy process to analyze and calculate established Chinese men's basketball team performance improvement and development affected three layers' all indicators weights and weighted values, and uses paper provided consistency test model to test solved weights reliability, it gets the conclusion that weights pass consistency test; By calculating and ranking on each grade indicators weights and weighted values, it analyzes each layer indicators importance degree to Chinese men's basketball team performance improvement and development, which provides basis for subsequent Chinese men's basketball team development important factors analyses; finally, by key analyzing hierarchical structure the third layer indicators, it gets Chinese men's basketball team development overall advantages and their coaches to Chinese men's basketball team guiding and training ability as well as CBA league to Chinese new generation players' training ability improvements are the key to Chinese men's basketball team development.

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