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Research on AHP-based cheerleading effects on construction of campus culture

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ABSTRACT

Cheerleading is a relative newly-developed sports event in China, due to its unique advantages, is well-received by more and more people. Cheerleading construction has huge values in broadly universities, it can promote students' physical and psychological health, and meanwhile promote campus cultural construction, different cheerleading organization implementation and organization ways impacts on every aspect are not the same. In universities, schemes are mainly establishing cheerleading association, organizing and advertising, organizing cheerleading activities and so on that can promote and enhance campus spiritual civilization construction as well as develop students' self-confidence and morality. The paper studies on cheerleading different organizational forms impacts on campus cultural construction aspect by AHP method, and use quantization value to express, result thinks school should take classroom education as auxiliary, and take organizing cheerleading activities as primary to stimulate cheerleading construction effects on campus culture.

KEYWORDS

Cheerleading; Analytic model; Campus culture; Physiological indicators; Mental mechanism; Mathematical model.

INTRODUCTION

Cheerleading is originated from America; China develops domestic cheerleading activities by referencing American experiences in cheerleading. Cheerleading combines with aerobics, yoga, gymnastics and others features, and has its own unique clothing and movement features. Due to started late in cheerleading, China shows backwardness in cheerleading arrangement, music matching and clothing selection. Cheerleading culture has inseparable relations with universities campus culture; the two complement one another and pursue common development. Cheerleading cultural values on universities, lots of scholars have made a great deal of researches.

Among them, Xu Xiao-Gang (2013) further analyzed cheerleading values in campus sports culture construction on the basis of referencing American researches, result thought cheerleading had important effects on establishing positive university sports teaching forms, and was beneficial to students' physical and psychological health. Ren Xiao-Feng and others (2008) in researching cheerleading effects on universities sports culture, they pointed out campus culture and cheerleading culture reinforced each other, and the two helped each other forward. Zhou Ling (2013) by analyzing Cheerleading and campus culture effects, she thought that cheerleading could propel to campus cultural construction.

With formers basis, the paper makes reasonable defining hierarchical structure in analytic hierarchy process method by researching on campus culture and cheerleading culture function mechanism, and gets research results by making quantitative analysis of judgment matrix impacts on different schemes and different aspects campus cultures. It provides suggestions and references for cheerleading and campus cultural construction.

CHEERLEADING CULTURE

Cheerleading actually is during the situation with music as background athletes wearing specific various beautiful clothes to carry on complete set of movements accompanying by music rhythm. The event is in team cooperative form, it requires having higher team awareness. Cheerleading divides into technical cheerleading and dance cheerleading. Research shows that cheerleading has important promotions in setting up hard struggle spirits, cultural attainments, aesthetic awareness as well as confidence aspects. And campus culture interweaves with that. So cheerleading organizing will surely have impacts on campus culture. Cheerleading culture and campus culture effects table are as following TABLE 1.

TABLE 1 : Culture construction effects table

Cheerleading culture	Campus culture
Promote spiritual civilization	Improve students' ethical standard
Enrich spare time life	
Enhance students' cultural literacy	Promote school spiritual civilization
Strengthen students' confidence	
Improve ethical standard	Cultivate students' aesthetic awareness

ANALYTIC HIERARCHY PROCESS METHOD

American famous scholar Saaty proposed a kind of quantitative and qualitative, subjective and objective combined system hierarchical mathematical analysis method in the seventies of last century that is AHP. The core of the algorithm is weights calculating. It specially fits for multiple targets problems, complex system decision-making problems, is a powerful mathematical method to convert problems into quantitative research. Its features are simple thought, well arranged, broad applying range and so on; nowadays analytic hierarchy process has already been widely spread in each field for solving

practical problems. Analytic hierarchy process method procedures are mainly as three procedures. That are 1, establish hierarchical structure, 2、construct judgment matrix, 3, hierarchical arrangement and consistency test. Computing flow chart is as following Figure 1 shows.

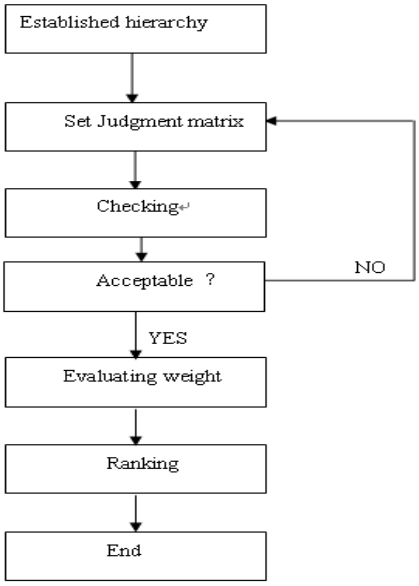

Figure 1: Algorithm flow chart

Step-1 Hierarchical structure establishment

In analytic hierarchy process, hierarchical structure generally has three layers, 1, target layer(S)that is final target or final expected result in problem solving, 2, criterion layer(f_m) that is requirement and criterion to complete problem, criterion layer can be one layer and also can be multiple layers, 3, scheme layer (p_n) that is all methods to solve the problems. Calculate scheme layer different schemes weights and ranks, defines best scheme. Generally, in practical problems, it selects maximum weight scheme as best scheme.

Step-2 Construct judgment matrix

In hierarchical structure, assume the next layer has n pieces of factor $C=(C_1,\ C_2,\ \cdots\ C_n)$ that causes impacts on previous layer target or criterion, all factors carry out paired comparison, express comparison result with quantization values, for example C_i, C_j importance comparison structure is using a_{ij} to express, then all factors carry out comparison and then can get judgment matrix A. Its expression is as following.

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

Among them, a_{ij} value is respective expressed by 1-9 numbers and their reciprocals, after Saaty researching, it is thought that using 1-9 scale to express comparison structure conforms to people judgment ability in psychology. Number respective expressive definitions are as following TABLE 2.

TABLE 2: 1~9 scale meaning

Scale	Meaning
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 more important than the later by comparing two factors
7	Indicates the former is relative 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 orders.

Step-3 Consistency test and weight vector calculation

Consistency matrix definition: to matrix $A=(a_{ij})_{n*n}$, if elements in matrix meet $a_{ij}a_{jk}=a_{ik}$, then matrix is consistent matrix. Among them, $a_{ij}>0$, $a_{ij}=1/a_{ji}$. In order to use it to calculate factors weights, it only requires matrix inconsistency within permissible condition. When problems are relative complex, we cannot take all factors into consideration, which causes judgment matrix cannot arrive at consistency in ideal state when carry out paired comparison to construct judgment matrix.

Judgment matrix consistency indicator CI, and judgment matrix consistency rate CR, its computational method is as following formula shows: $CI=\dfrac{\lambda_{\max}-n}{n-1}$

Among them, n represents judgment matrix order number, that is also the number of comparison factors, $CR=\dfrac{CI}{RI}$

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 appear inconsistency and needs to adjust judgment matrix again. When $CR<0.1$, judgment matrix inconsistency is within acceptance range, it can go ahead with next step calculation. Further calculate hierarchical total arrangement and combination consistency test.

Assume in layer A that m pieces of factors values computational result is α_m, corresponding consistency indicator value is respectively CI_m, in next layer B, n pieces of factors to layer A computational weight is β_{nm}, then layer B factors total arrangement weight is: $w_i=\sum_{j=1}^{m}\alpha_i\beta_{ij}$

Combination consistency test consistency ratio is: $CR=\dfrac{\sum_{j=1}^{m}\alpha_j CI_j}{\sum_{j=1}^{m}\alpha_j RI_j}$

Weight calculation. Calculate judgment matrix weight vector has many methods such as definition calculation, computer iteration, power method and harmonization method, from which the relative simple one is harmonization method. Assume judgment matrix An pieces of factors weight s weight vector is as following: $W=(w_1,w_2,w_3\cdots w_n)$

Then judgment matrix is expressed as following:

$$A=\begin{pmatrix} w_1/w_1 & w_1/w_2 & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \cdots & w_2/w_n \\ \vdots & \vdots & \ddots & \vdots \\ w_n/w_1 & w_n/w_2 & \cdots & w_n/w_n \end{pmatrix}$$

According to above matrix property, it can have step 1, firstly make normalization on all column vectors of A and get matrix D:

$$D=\begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{pmatrix} \bullet \begin{pmatrix} 1/\sum_{i=1}^{n} a_{i1} & 0 & \cdots & 0 \\ 0 & 1/\sum_{i=1}^{n} a_{i2} & \cdots & 0 \\ 0 & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & 1/\sum_{i=1}^{n} a_{in} \end{pmatrix}$$

Solve matrix every line sum after normalization. It gets matrix E:

$$E=D\bullet\begin{pmatrix}1 & 1 & \cdots & 1\end{pmatrix}_{1\times n}^{T}$$

$$E=\begin{pmatrix}e_{11} & e_{12} & \cdots & e_{1n}\end{pmatrix}^{T}$$

Normalize matrix E that is weight vector:

$$W=\begin{pmatrix}w_1 & w_2 & \cdots & w_n\end{pmatrix}=\begin{pmatrix} e_{11}/\sum_{i=1}^{n} e_{i1} & e_{12}/\sum_{i=1}^{n} e_{i1} & \cdots & e_{1n}/\sum_{i=1}^{n} e_{i1} \end{pmatrix}$$

Calculate maximum feature value: $\lambda_{\max}=\frac{1}{n}\sum_{i=1}^{n}\frac{(AW)_i}{w_i}$

CHEERLEADING ANALYTIC HIERARCHY PROCESS

According to cheerleading effects and campus cultural construction, it establishes hierarchical structure, top layer: Cheerleading form of education. Criterion layer is improving ethical standards f_1, promoting spiritual civilization f_2, literacy training f_3, develop self-confidence and fighting spirit f_4. Scheme layer divides into classroom language teaching p_1, cheerleading association established p_2, cheerleading organized activities p_3. Hierarchical structure is as following Figure 2.

Carry out paired comparison of criterion layer four factors, compared structures compose judgment matrix.

S	$\mathbf{f_1}$	$\mathbf{f_2}$	$\mathbf{f_3}$	$\mathbf{f_4}$
f_1	1	3	7	8
f_2	1/3	1	5	5
f_3	1/7	1/5	1	3
f_4	1/8	1/5	1/3	1

According to harmonization method, the computed weight vector $w=(0.575\ 0.276\ 0.097\ 0.052)^T$, matrix conforms to consistency by testing.

Criterion layer and scheme layer respectively construct judgment matrix and respectively solve weight vector.

f_1	p_1	p_2	p_3
p_1	1	2	5
p_2	1/2	1	2
p_3	1/5	1/2	1/3

f_2	p_1	p_2	p_3
p_1	1	1/3	1/8
p_2	3	1	1/3
p_3	8	3	1

f_3	p_1	p_2	p_3
p_1	1	1	3
p_2	1	1	3
p_3	1/3	1/3	1

f_4	p_1	p_2	p_3
p_1	1	1/5	1/3
p_2	5	1	3
p_3	3	1/3	1

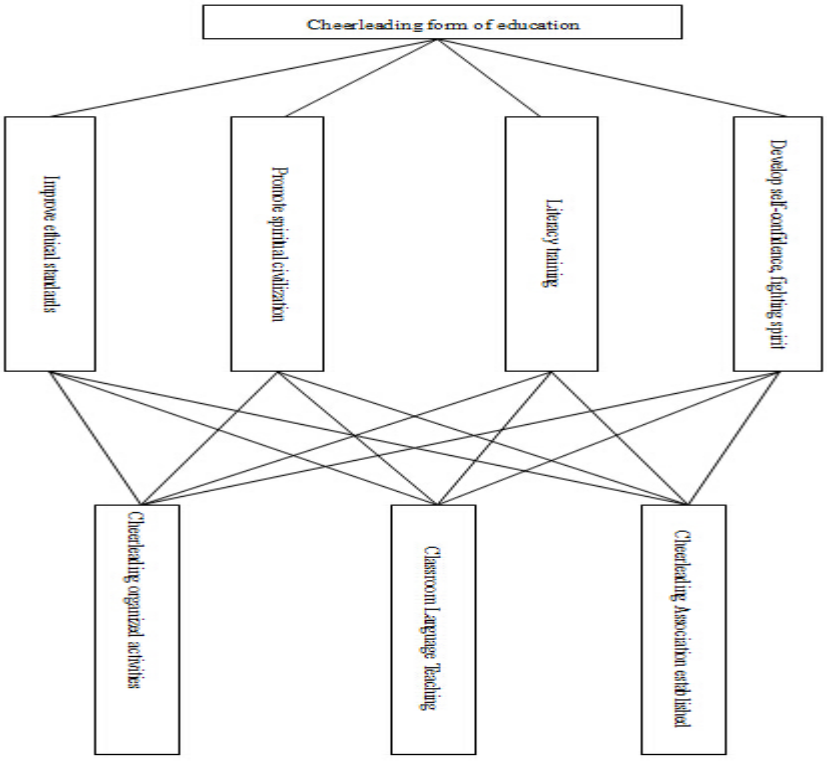

Figure 2: Hierarchical structure of Cheerleading impacts on campus culture construction

Similarly according to harmonization method's computational method respectively compute matrix weight vector, maximum feature value and consistency indicators. Combined weights rank is as following Table 4. By testing, matrix and combination consistency test conform to requirements.

TABLE 4 : Weights total arrangement

Hierarchy	f_1	f_2	f_3	f_4	P hierarchy weight
	0.575	**0.276**	**0.097**	**0.052**	
p_1	0.595	0.082	0.429	0.105	0.412
p_2	0.275	0.237	0.429	0.637	0.298
p_3	0.130	0.681	0.142	0.258	0.290

CONCLUSION

Scheme weights arrangement gets that organize cheerleading activities has stronger effects on promoting campus culture construction, secondly is cheerleading classroom language teaching. In view of comprehensive consideration, school should take classroom education as auxiliary, and take organizing cheerleading activities as primary to stimulate cheerleading construction effects on campus culture.

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REFERENCES

[1] Wang Kun, Wei Wen-yi; Biomechanical Research on Specific Ability of Takeoff in Long Jump. China Sport Science, **25(1)**, 42-45 **(2005)**.

[2] Li Hong-bo, Liv Hao; Research development of special physical competence theory of aerobics. Journal of Sports Adult Education, **27(2)**, 55-57 **(2011)**.

[3] Yang Fengjuan; Researches on Traumas of Competitive Aerobic Dancing Athletes. Journal of Beijing Sport University, **4**, **(1998)**.

[4] Dai Li-PingL; Biomechanical Analysis on Jumping Typical Difficulty Elements in Sports Aerobics. Fujian Sports Science and Technology, **31(3)**, 27-30 **(2012)**.

[5] Shan Xinhai, Dai Yusheng, Cai Guojun, Jin Jichun; The Comparison Of Biomechanical Variables Of The Takeoff Performances Of Three Atheltes With Different Jumping Abilities. Sports & Science, **18(4)**, 22-26 **(1997)**.

[6] Cheng Wan-xiang et al.; Changing Character of the Ground Reaction Force and Joint Torque of Lower Limbs During Landing from Different Height. Journal of Chengdu Physical Education Institute, **36(3)**, **(2010)**.