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The analysis and study of the inherit mechanism of the minority's traditional sports culture in the eastern hubei province

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ABSTRACT

The traditional sports culture of a country is the important showing of the advance extent in its social development, and it's also a precious treasure of a nation. But the traditional sports culture started to be ignored by this technologically advanced social. To solve this problem in some region, this article studied the best tactics by the following steps: build the Analytic Hierarchy Model firstly, and figure out the proportion of the influential factors of considering the protection of nation feature tradition, protect the culture handed down from our ancestors, obtain the profit, social stability and so on in the inherit of the Minority's traditional sports culture in the eastern Hubei Province. We figured out that in the aspect of the inherit of the Minority's traditional sports culture in the eastern Hubei Province, private enterprise mostly have the purpose of profit gaining, but social organization mostly have the objective of social welfare creating, and so it reduced the enthusiasm. As the result, it needs the government's intervene. Then we figured out the best tactics of the government, private enterprise and social organization in the problem of the inherit of the Minority's traditional sports culture in the eastern Hubei Province by the Game Theory analysis and Evolutionary Stable Strategy analysis.

KEYWORDS

Analytic hierarchy process; Game theory, The Minority; Traditional sports; Inherit mechanism.

INTRODUCTION

The sports culture, it is the artistic integration of a nation even a country in thousands of years. The abundant of the sports culture can show the thrive of the country. China is a big family have all the 56 nations, and its sports culture is abundant. Every nation have their own feature sports culture, and it is not only stand for the custom, habit and interest of the nation, but also stand for their faith and beliefs. After China step in the technological advanced society, the development of the country became more important. But at the same time, the concept of traditional sports culture is fading, too. Especially among the relatively weakness nations, the inherit of the traditional sports culture even fall in crisis. To persist and inherit the feature culture and to develop the comprehensive power of our country, this article is going to analysis and study the inherit and persist problems of the traditional sports culture in the eastern Hubei Province where gathered many national minorities.

THE CONSTRUCTION OF THE HIERARCHICAL MODEL OF THE MINORITY'S TRADITIONAL SPORTS IN THE EASTERN HUBEI PROVINCE

Build the hierarchical structure

To analyze the situation of the inherit of the Minority's traditional sports culture in the eastern Hubei Province, we need to find out the main object of the tradition sports culture inherit, and find out every units' contribution degree.

Objective tier: the inherit of the Minority's traditional sports culture in the eastern Hubei Province.

Standard tier: the factors that the project influenced, e_1 stands for persist feature tradition of the nation, e_2 stands for protection of the culture that hands down from our ancestors, e_3 stands for profit gaining, e_4 stands for social stability.

Project tier: k_1 stands for public departments inherit, k_2 stands for private enterprise inherit, k_3 stands for the social organization inherit, and we get the hierarchical structure as Figure 1.

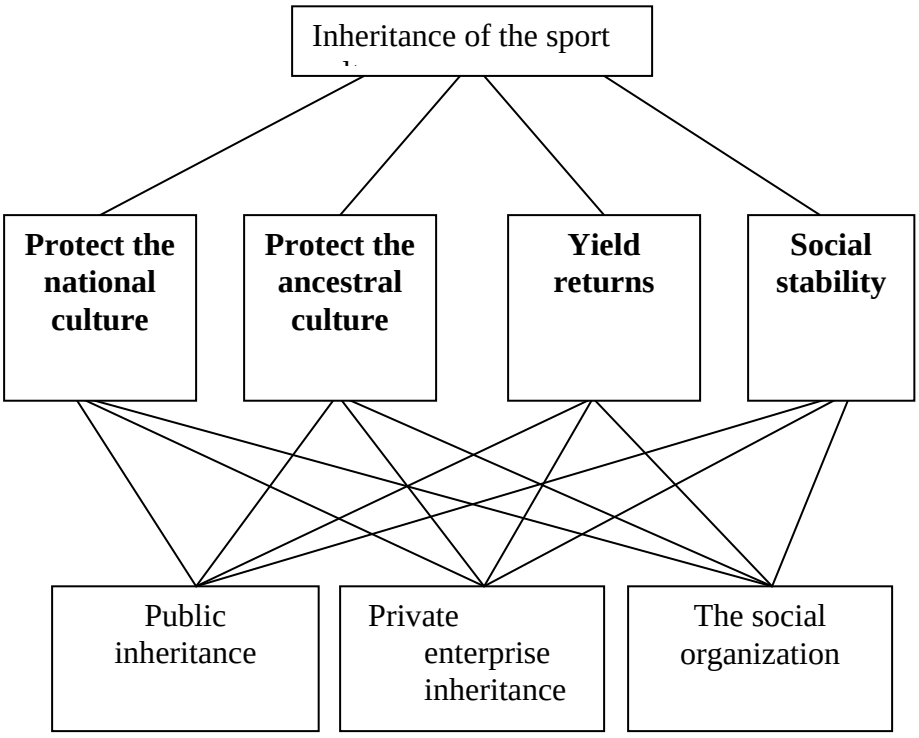

Figure 1 : Hierarchical structure

Structure the judgment matrix

According to the experiences of many experts, and a lot of references. We get the Judgment Matrix as TABLE 1-5 under the pair of compare matrixes by the scale set of 1-9.

TABLE 1: compare matrix G

G	e_1	e_2	e_3	e_4
e_1	1	1/7	6	5
e_2	7	1	7	5
e_3	1/6	1/7	1	1
e_4	1/5	1/5	1	1

TABLE 2: compare matrix e_1

e_1	k_1	k_2	k_3
k_1	1	1	1/4
k_2	1	1	1/6
k_3	4	6	1

TABLE 3 : Compare matrix e_2

e_2	k_1	k_2	k_3
k_1	1	3	4
k_2	1/3	1	5
k_3	¼	1/5	1

TABLE 4 : Compare matrix e_3

e_3	k_1	k_2	k_3
k_1	1	5	5
k_2	1/5	1	8
k_3	1/5	1/8	1

TABLE 5: compare matrix e_4

e_4	k_1	k_2	k_3
k_1	1	7	6
k_2	1/7	1	4
k_3	1/6	1/4	1

Inspection of the consistency

We use inspection of the consistency index inspected the formula is: $CI = \frac{\lambda_{\max} - n}{n-1}$ And $\lambda_{\max}$ is the eigenvalue of maximum of the Comparative Matrix, n is the order of the Comparative Matrix. We can get that the Judgment Matrix is inversely proportional to the value of CI .

$$C = \begin{Bmatrix} 1 & 1/7 & 6 & 5 \\ 7 & 1 & 7 & 5 \\ 1/6 & 1/7 & 1 & 1 \\ 1/5 & 1/5 & 1 & 1 \end{Bmatrix}$$

$$\xrightarrow{\text{列向量归一化}} \begin{Bmatrix} 0.213 & 0.182 & 0.4 & 0.4 \\ 0.076 & 0.567 & 0.3 & 0.3 \\ 0.123 & 0.114 & 0.1 & 0.1 \\ 0.211 & 0.114 & 0.1 & 0.1 \end{Bmatrix}$$

$$\xrightarrow{\text{按行求和}} \begin{Bmatrix} 1.076 \\ 2.23 \\ 0.368 \\ 0.3368 \end{Bmatrix}$$

$$\xrightarrow{\text{归一化}} \begin{Bmatrix} 0.5340 \\ 0.3202 \\ 0.0854 \\ 0.0819 \end{Bmatrix} = W^{(0)}$$

$$CW^{(0)} = \begin{Bmatrix} 1 & 1/7 & 6 & 5 \\ 7 & 1 & 7 & 5 \\ 1/6 & 1/7 & 1 & 1 \\ 1/5 & 1/5 & 1 & 1 \end{Bmatrix} \begin{Bmatrix} 0.5340 \\ 0.3202 \\ 0.0854 \\ 0.0819 \end{Bmatrix} = \begin{Bmatrix} 4.434 \\ 3.532 \\ 0.520 \\ 0.580 \end{Bmatrix}$$

$$\lambda_{\max}^{(0)} = \frac{1}{4}\left(\frac{3.432}{0.533} + \frac{2.536}{0.3013} + \frac{0.480}{0.0829} + \frac{0.480}{0.0829}\right) = 5.34$$

$$w^{(0)} = \begin{pmatrix} 0.445 \\ 0.333 \\ 0.106 \\ 0.116 \end{pmatrix}$$

The Judgment Matrix is:

$$C_1 = \begin{Bmatrix} 1 & 1 & 1/4 \\ 1 & 1 & 1/4 \\ 4 & 4 & 1 \end{Bmatrix}, C_2 = \begin{Bmatrix} 1 & 3 & 3 \\ 1/3 & 1 & 5 \\ 1/3 & 1/5 & 1 \end{Bmatrix}, C_3 = \begin{Bmatrix} 1 & 6 & 7 \\ 1/6 & 1 & 5 \\ 1/7 & 1/5 & 1 \end{Bmatrix}, C_4 = \begin{Bmatrix} 1 & 4 & 5 \\ 1/4 & 1 & 5 \\ 1/5 & 1/5 & 1 \end{Bmatrix}$$

The corresponding eigenvalue of maximum and eigenvector is in proper order as following :

$$\lambda^{(1)}{}_{\max} = 3.63, w^{(1)}{}_1 = \begin{Bmatrix} 0.354 \\ 0.354 \\ 0.481 \end{Bmatrix}$$

$$\lambda^{(2)}{}_{\max} = 3.54, w^{(1)}{}_2 = \begin{Bmatrix} 0.556 \\ 0.247 \\ 0.097 \end{Bmatrix}$$

$$\lambda^{(3)}{}_{\max} = 2.23, w^{(1)}{}_3 = \begin{Bmatrix} 0.550 \\ 0.232 \\ 0.142 \end{Bmatrix} \lambda^{(4)}{}_{\max} = 3.31, w^{(1)}{}_4 = \begin{Bmatrix} 0.594 \\ 0.305 \\ 0.243 \end{Bmatrix}$$

We get value of RI based on $CI = \dfrac{\lambda_{\max} - n}{n-1}$, see in TABLE 6.

TABLE 6 : Value of RI

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

For Judgment Matrix C, $\lambda^{(0)}{}_{\max} = 3.54, RI = 0.74$

$$RI = \frac{3.54-3}{3-1} = 0.027$$

$$CR = \frac{CI}{RI} = \frac{0.027}{0.74} = 0.03 < 0.1$$

So the inconformity degree stand for C is in the extent of permit, and now we use eigenvector of C instead of weight vector.

It is the same that, for judgment matrix C_1, C_2, C_3, C_4, all passed the Inspection of the consistency in using the same theory. So the result calculated from objective tier to project tier is in Figure 2.

$$\begin{Bmatrix} 0.354 \\ 0.354 \\ 0.481 \end{Bmatrix}, \begin{Bmatrix} 0.556 \\ 0.247 \\ 0.097 \end{Bmatrix}, \begin{Bmatrix} 0.550 \\ 0.232 \\ 0.142 \end{Bmatrix}, \begin{Bmatrix} 0.594 \\ 0.305 \\ 0.243 \end{Bmatrix}$$

The result is as follow:

$$w = w^{(1)} w^{(0)}$$

$$= \begin{Bmatrix} 0.354 & 0.556 & 0.550 & 0.594 \\ 0.354 & 0.247 & 0.232 & 0.305 \\ 0.481 & 0.097 & 0.142 & 0.243 \end{Bmatrix} \begin{Bmatrix} 0.445 \\ 0.333 \\ 0.106 \\ 0.116 \end{Bmatrix}$$

$$= \begin{Bmatrix} 0.453 \\ 0.366 \\ 0.191 \end{Bmatrix}$$

$$w^{(1)} = (w_1^{(1)}, w_2^{(1)}, w_3^{(1)}, w_3^{(1)})$$
$$= \begin{Bmatrix} 0.354 & 0.556 & 0.550 & 0.594 \\ 0.354 & 0.247 & 0.232 & 0.305 \\ 0.481 & 0.097 & 0.142 & 0.243 \end{Bmatrix}$$

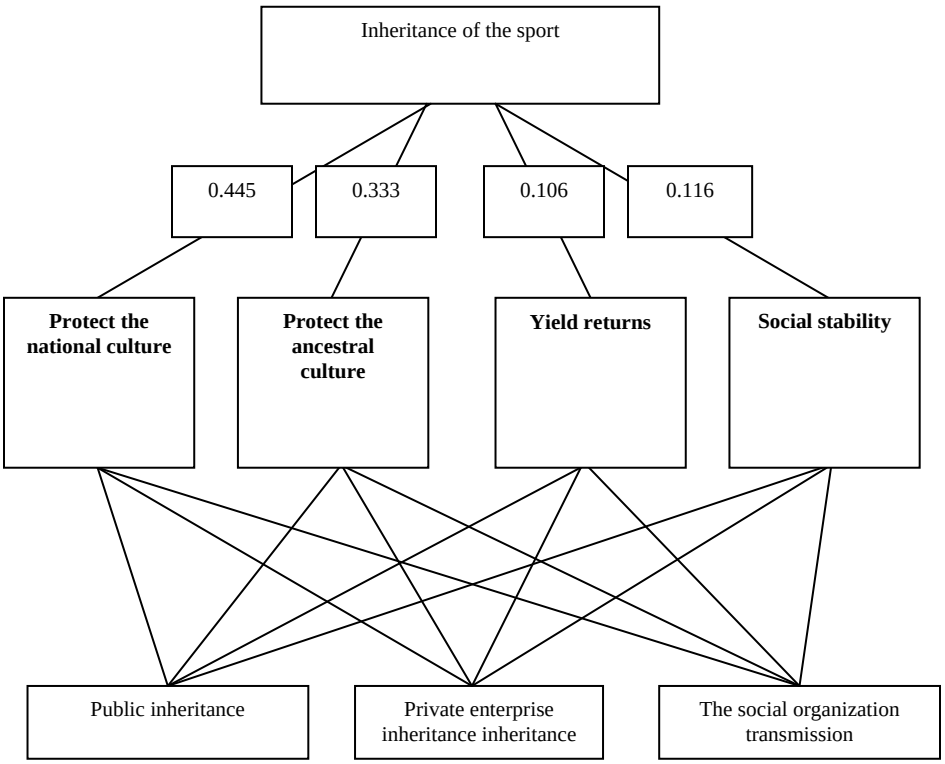

Figure 2 : Result calculated from objective tier to project tier

The game theory analysis of the inherit mechanism of the minority's traditional sports culture in the eastern hubei province

We can analyze from the last step that the inherit mechanism of the Minority's traditional sports culture in the eastern Hubei Province is in the subject of public departments and private enterprise. And the social organization and most of the non-profit organizations are in a minority proportion. To improve this kind of inherit mechanism, we need the outside force of the government's sustain and supervise. According to the Game Theory Analysis we can roughly treat the government and the social organizations as the main part of the Game. And there is two tactics for every part: sustain of the government and the nonsupport of the government. We set the situation of the sustain of the government and the non-inherit of the social organization, the profit of government gaining is R_1, the profit of the social organization gaining is 0; and in the opposite, in the situation of the nonsupport government and the inherit social organization, the profit of the social organization gaining is $R_1^{'}$, the profit of government gaining is R_2. It is because that although the government did not sustain, the inherit of the social organization have the benefit of the construction of socialism harmonious society. When both the social organization and the government hold their sustaining, the profit of government gaining is R, the profit of the social organization gaining is $R^{'}$; and if neither of the two parts show their sustaining, then both of them will get profit of 0. TABLE 7 is the matrix of the profit of the government and social organization in inherit.

TABLE 7 : The matrix of the profit of the government and social organization in inherit

		Social organizations	
		Inherit	**Non-inherit**
The government	Sustain	$R, R^{'}$	$R_1, 0$
	Non-support	$R_2, R_1^{'}$	0,0

In this form, $R > R_1 > R_2$ but we can't ensure the value of $R^{'}, R_1^{'}$, in that this article will use Evolutionary Stable Strategy to analyze the actual situation of the government's and social organizations' inherit of the Minority's traditional sports culture in the eastern Hubei Province, and we can adjust the tactics for each of them.

The evolutionary stable strategy analysis of inherit of the minority's traditional sports culture in the eastern hubei province

Because of the government and the social organization chose the tactics independently and randomly and could us Game many times in inherit of the Minority's traditional sports culture in the eastern Hubei Province. Therefore, we set the probability in the government's sustain to the social organizations is p, and the probability of nonsupport is $1-p$; the probability of the social organizations' inherit is q, and the probability of non-inherit is $1-q$. According to the Malthusian theory we can get that the growth rate of the times of the government tactics choosing is $\frac{\dot{p}}{p}$, the difference of the fitness $E_w Y\{f, 1-q\}^T$ and the average fitness $\{p, 1-p\} Y \{q, 1-q\}^T$.

When support rate of the government is 1, the profit gaining matrix is :

$$Y = \begin{bmatrix} R & R_1 \\ R_2 & 0 \end{bmatrix}$$

Figure out $\dot{p} = p(1-p)\{1, -1\} Y \{q, 1-q\}^T$ we get:

$$\dot{p} = p(1-p)\left[(R - R_1 - R_2)q + R_1\right]$$

It is the same that the growth rate of the times of the social organizations tactics choosing is $\frac{\dot{q}}{q}$, the difference of the fitness $E_J U \{q, 1-q\}^T$ and the average fitness $\{q, 1-q\} U \{p, 1-p\}^T$.

$E_J = [0,1]$, when inherit rate of the social organization is 1, the profit gaining matrix is :

$$U = \begin{bmatrix} R^{'} & 0 \\ R_1^{'} & 0 \end{bmatrix}$$

Figure out $\dot{q} = q(1-q)\{-1, 1\} U \{t, 1-q\}^T$ we get:

$$\dot{q} = q(1-q)\left[R_1^{'} + (R^{'} - R_1^{'})p\right]$$

So when $\dot{p} = 0, \dot{q} = 0$, $(0,0),(0,1),(1,0),(1,1)$ are the equilibrium points of the inherit of the Minority's traditional sports culture in the eastern Hubei Province. Base on the matrix stability, we analyze the local stability of these equilibrium points, calculate the partial derivative in $\dot{p}$ for p and $\dot{q}$ for q, the matrix is:

$$X = \begin{bmatrix} \partial\dot{P}/\partial P & \partial\dot{P}/\partial q \\ \partial\dot{q}/\partial p & \partial\dot{q}/\partial q \end{bmatrix} = \begin{bmatrix} (1-2p)\left[(R-R_1-R_2)q+R_1\right] & p(1-p)(R-R_1-R_2) \\ q(1-q)(R^{'}-R_1^{'}) & (1-2q)p \end{bmatrix}$$

And:

$$\det X = (1-2p)(1-2q)\left[(R-R_1-R_2)q+R_1\right]\left[R_1^{'}+(R^{'}-R_1^{'})p\right] - pq(1-p)(1-q)(R-R_1-R_2)(R^{'}-R_1^{'})$$

$$trX = (1-2p)\left[(R-R_1-R_2)q+R_1\right] + (1-2q)\left[R_1^{'}+(R^{'}-R_1^{'})p\right]$$

TABLE 8 is the local stability of the equilibrium points

TABLE 8 : Local stability of the equilibrium points

Equilibrium points (p,q)	$\det X$		trX		Stability
$(0,0)$	$R_1 \bullet R_1^{'}$	+	$R_1 + R_1^{'}$	+	Unstable point
$(0,1)$	$-(R-R_2)\bullet R_1^{'}$	-	$R - R_2 - R_1^{'}$	unknown	Saddle point
$(1,0)$	$-R_1 \bullet R^{'}$	-	$R^{'} - R_1$	unknown	Saddle point
$(1,1)$	$(R-R_2)\bullet R^{'}$	+	$-(R-R_2+R^{'})$	-	Stable point

We can get from TABLE 8 that point $(0,0)$is unstable point, $(0,1)$ and $(1,0)$ are saddle points, evolutionary stable point is $(1,1)$. Figure 3 is the figure of evolutionary tactics.

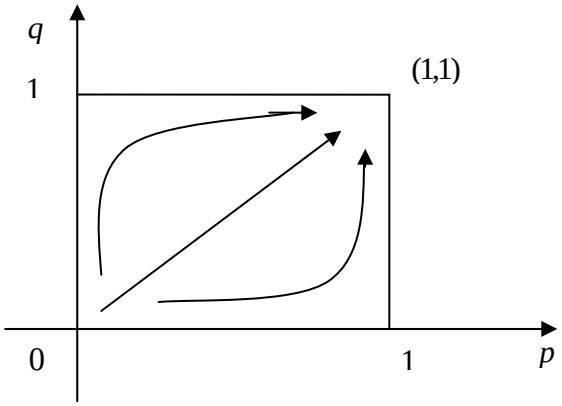

Figure 3 : The figure of evolutionary tactics

We can get from Figure 3 that the best tactic for the government and the social organization is the social organization participate in inherit positively in inherit of the Minority's traditional sports culture in the eastern Hubei Province. And the private enterprise should mostly focus on inherit of social welfare. The government should also support and supervise the inherit of the social organizations and the private enterprise for the Minority's traditional sports culture in the eastern Hubei Province.

CONCLUSION

This article firstly constructed the analytic hierarchy model, and figure out the proportion under the influential factors of considering the protection of nation feature tradition, protect the culture handed down from our ancestors, obtain the profit, social stability and so on in the inherit of the Minority's traditional sports culture in the eastern Hubei Province. And the proportion of public departments is 0.453, the proportion of private enterprise is 0.366 and the proportion of social organization is 0.191. And we figured out that in the aspect of the inherit of the Minority's traditional sports culture in the eastern Hubei Province, private enterprise mostly have the purpose of profit gaining, but social organization mostly have the objective of social welfare creating, and so it reduced the enthusiasm. As the result, it needs the government's intervene. And then we used Game Theory and Evolutionary Stable Strategy analyzed the best tactics for the government and the social organization in inherit of the Minority's traditional sports culture in the eastern Hubei Province is: the social organizations should positively participate in the inherit, the private enterprise should mostly focus on the social welfare, and the government should support and supervise the social organizations and the private enterprise in the inherit of the Minority's traditional sports culture in the eastern Hubei Province.

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