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Contemporary Chinese legal education dilemma's analytic hierarchy process and its way out game study

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ABSTRACT

Law is foundation of a country's governing. However, Chinese legal education always has lots of problems, which lead to Chinese legal education cannot move forward. To solve the problems, the paper firstly establishes analytic hierarchy process model, solves Chinese current legal education main obstacles are the low efficiency of education, the lack of features and being divorced from reality when considering multiple influence factors. Subsequently by game analysis and evolution game analysis, it solves government and law teaching institutions optimal strategy in Chinese modern legal education problems is teaching institutions should positive carry out characteristic education reformation that conforms to Chinese national situation, and government should also positive carry out coordination. Now transform status that modern legal education quantity-oriented to quality-oriented, and strengthen legal education characteristic education, and strengthen theory and practice combinative ability.

KEYWORDS

Legal education; Analytic hierarchy process; Game analysis; Education dilemma; Mathematical model.

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INTRODUCTION

Law is foundation of governing a country, however China as a main cultural country with a long history, it always hasn't had very concrete laws and regulations since ancient times, but taken contemporary traditional ideology and contemporary ethics to constraint national and also relied on them to judge national behaviors. But only rely on these could just handle with contemporary partial crime cases that were some criminal events and larger civil disputes, while for most of folk daily life's disputes, it generally eliminated them by each kind of paths without clear fair judgment. In the period of late Qing Dynasty, due to western capitalistic power expansion, it led to Chinese traditional feudal social attribute to start changing, in order to consolidate national position, Chinese started to put emphasis on law relative occupations, and made lots of reformation schemes, but due to Chinese national overall were mostly peasants and economy wasn't developed at that time, their consciousness on laws and regulations were still very weak, and practice of law was poor, legal education forms lacked of objective scientificity by comparing to traditions. Until new China was founded, Chinese legal education then gradually improved, after opening-up and reforming, Chinese legal education has even got great results, but it still is incorrect in some aspects cognition, many problems also appear in its execution efficiency, so Chinese legal education is still in the dilemma, in order to let Chinese legal education to develop towards more correct orientation, the paper will analyze Chinese legal education dilemma targeted at the problems, and find out its way out in future.

MODEL ESTABLISHMENT

Construct hierarchical structure

In order to analyze Chinese modern legal education dilemma main causes, it should firstly finds out main obstacles that lead to Chinese modern legal education to be in dilemma, and finds out individual contribution degrees. Therefore, the paper firstly on the basis of analytic hierarchy process, it makes quantization on Chinese modern legal education main obstacles. Establish target layer, criterion layer and scheme layer relations.

Target layer: The obstacle of legal education.

Criterion layer:scheme influence factors, c_1 is the lack of professional, c_2 is teaching way monotonous, c_3 is academic narrow field of vision, c_4 is the poor adaptability.

Scheme layer: a_1 is the low efficiency of education, a_2 is the lack of features, a_3 is divorced from reality. It gets hierarchical structure as Figure1shows.

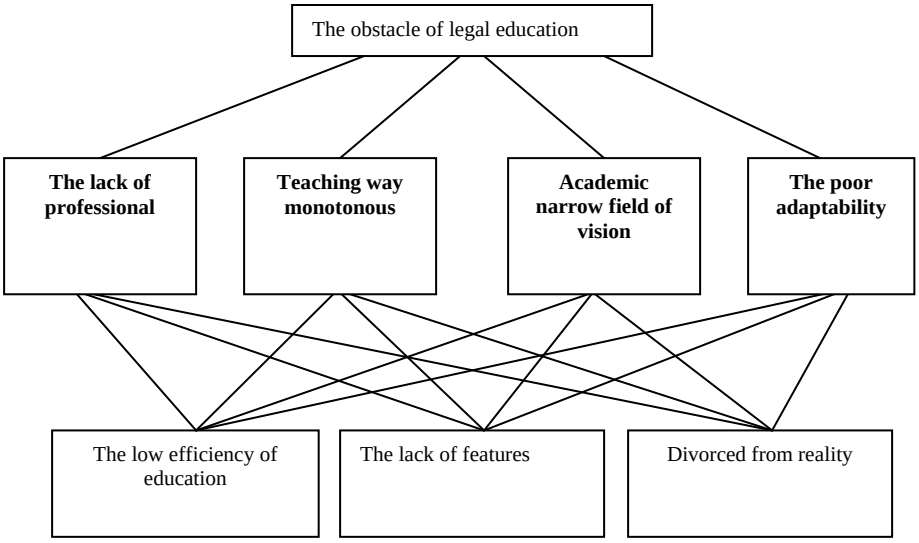

Figure 1 : Hierarchical structure

Construct judgment matrix

According to lots of experts experiences and referencing lots of documents as well as 1~9 scale setting, it gets paired comparison matrix that is judgment matrix as TABLE 1-5.

TABLE 1 : Comparison matrix G

G	c_1	c_2	c_3	c_4
c_1	1	1/3	3	5
c_2	3	1	5	3
c_3	1/3	1/5	1	1
c_4	1/5	1/3	1	1

TABLE 2 : Comparison matrix c_1

c_1	a_1	a_2	a_3
a_1	1	1	1/4
a_2	1	1	1/5
a_3	4	5	1

TABLE 3: Comparison matrix c_2

c_2	a_1	a_2	a_3
a_1	1	5	4
a_2	1/5	1	5
a_3	1/4	1/5	1

TABLE 4 : Comparison matrix c_3

c_3	a_1	a_2	a_3
a_1	1	4	5
a_2	1/4	1	6
a_3	1/5	1/6	1

TABLE 5 : Comparison matrix c_4

c_4	a_1	a_2	a_3
a_1	1	6	6
a_2	1/6	1	5
a_3	1/6	1/5	1

Consistency test

Use consistency test formula as: $CI = \frac{\lambda_{\max} - n}{n-1}$. Among them, $\lambda_{\max}$ is maximum feature root value of comparison matrix, n is comparison matrix order. It is clear that judgment matrix and CI value are in inverse proportion.

$$C = \begin{Bmatrix} 1 & 1/3 & 3 & 5 \\ 3 & 1 & 5 & 3 \\ 1/3 & 1/5 & 1 & 1 \\ 1/5 & 1/3 & 1 & 1 \end{Bmatrix}$$

$$\xrightarrow{\text{Column vector normalization}} \begin{Bmatrix} 0.222 & 0.171 & 0.3 & 0.5 \\ 0.667 & 0.571 & 0.5 & 0.3 \\ 0.067 & 0.114 & 0.1 & 0.1 \\ 0.044 & 0.143 & 0.1 & 0.1 \end{Bmatrix}$$

$$\xrightarrow{\text{Solve sum by line}} \begin{Bmatrix} 1.193 \\ 2.038 \\ 0.381 \\ 0.387 \end{Bmatrix}$$

$$\xrightarrow{\text{Normalization}} \begin{Bmatrix} 0.298 \\ 0.510 \\ 0.095 \\ 0.097 \end{Bmatrix} = U^{(0)}$$

$$CU^{(0)} = \begin{Bmatrix} 1 & 1/3 & 3 & 5 \\ 3 & 1 & 5 & 3 \\ 1/3 & 1/5 & 1 & 1 \\ 1/5 & 1/3 & 1 & 1 \end{Bmatrix} \begin{Bmatrix} 0.298 \\ 0.510 \\ 0.095 \\ 0.097 \end{Bmatrix} = \begin{Bmatrix} 2.489 \\ 5.212 \\ 1.114 \\ 1.230 \end{Bmatrix}$$

$$\lambda_{\max}^{(0)} = \frac{1}{4}\left(\frac{2.489}{0.298} + \frac{5.212}{0.510} + \frac{1.114}{0.095} + \frac{1.230}{0.097}\right) = 4.23$$

$$u^{(0)} = \begin{pmatrix} 0.248 \\ 0.519 \\ 0.111 \\ 0.122 \end{pmatrix}$$

Judgment matrix is:

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

Corresponding maximum feature value and feature vector are in order as:

$$\lambda^{(1)}{}_{\max} = 4.84, u^{(1)}{}_1 = \begin{Bmatrix} 0.356 \\ 0.356 \\ 0.482 \end{Bmatrix} \lambda^{(2)}{}_{\max} = 3.74, u^{(1)}{}_2 = \begin{Bmatrix} 0.574 \\ 0.256 \\ 0.069 \end{Bmatrix}$$

$$\lambda^{(3)}{}_{\max} = 3.24, u^{(1)}{}_3 = \begin{Bmatrix} 0.502 \\ 0.237 \\ 0.185 \end{Bmatrix} \lambda^{(4)}{}_{\max} = 4.13, u^{(1)}{}_4 = \begin{Bmatrix} 0.567 \\ 0.324 \\ 0.265 \end{Bmatrix}$$

According to $CI = \dfrac{\lambda_{\max} - n}{n-1}$ it gets RI value that can refer to TABLE 6.

TABLE 6 : RI value

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, $\lambda^{(0)}{}_{\max} = 4.84, RI = 1.07$

$$RI = \frac{4.84 - 4}{4 - 1} = 0.028$$

$$CR = \frac{CI}{RI} = \frac{0.028}{1.07} = 0.03 < 0.1$$

It represents C inconsistency extent is within permissible range, now it can use C feature vector to replace weight vector.

Similarly, to judgment matrix C_1, C_2, C_3, C_4, utilize above principle, all pass consistency test. Therefore target layer to scheme layer computational result can refer to Figure 2.

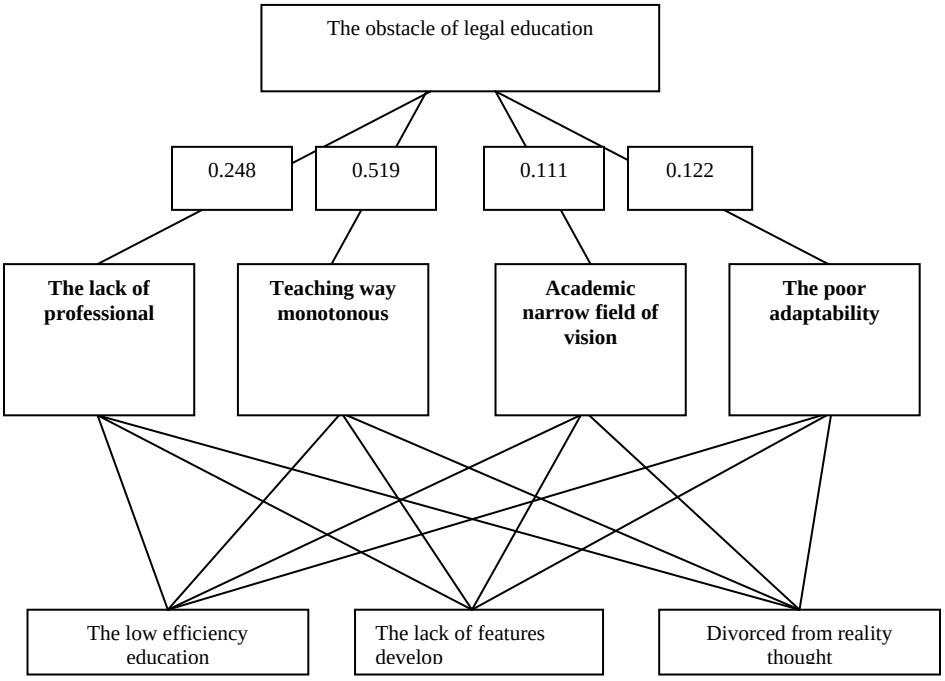

Figure 2 : Target layer to Scheme layer calculation result

$$\begin{Bmatrix} 0.356 \\ 0.356 \\ 0.482 \end{Bmatrix}, \begin{Bmatrix} 0.574 \\ 0.256 \\ 0.069 \end{Bmatrix}, \begin{Bmatrix} 0.502 \\ 0.237 \\ 0.185 \end{Bmatrix}, \begin{Bmatrix} 0.567 \\ 0.324 \\ 0.265 \end{Bmatrix}$$

Calculation structure is as following:

$$u^{(1)} = (u_1^{(1)}, u_2^{(1)}, u_3^{(1)}, u_3^{(1)})$$
$$= \begin{Bmatrix} 0.356 & 0.574 & 0.502 & 0.567 \\ 0.356 & 0.256 & 0.237 & 0.324 \\ 0.482 & 0.069 & 0.185 & 0.265 \end{Bmatrix}$$

$$u = u^{(1)}u^{(0)}$$
$$= \begin{Bmatrix} 0.356 & 0.574 & 0.502 & 0.567 \\ 0.356 & 0.256 & 0.234 & 0.324 \\ 0.482 & 0.069 & 0.185 & 0.265 \end{Bmatrix} \begin{Bmatrix} 0.248 \\ 0.519 \\ 0.111 \\ 0.122 \end{Bmatrix}$$
$$= \begin{Bmatrix} 0.154 \\ 0.453 \\ 0.393 \end{Bmatrix}$$

By above, it can get that Chinese modern legal education being dilemma main obstacles are the low efficiency of education, the lack of features and being divorced from reality and others, respective proportions are 0.154, 0.453 and 0.393.

Legal education way out game analysis

In modern legal education way out problem, it takes government and teaching institutions as main influence subjects, therefore below game analysis can roughly regard government and teaching institutions as game's main parts, their implementing strategies are both as two kinds, government strategy is coordination and don't coordinate. Government and teaching institutions game process is as Figure 3 shows.

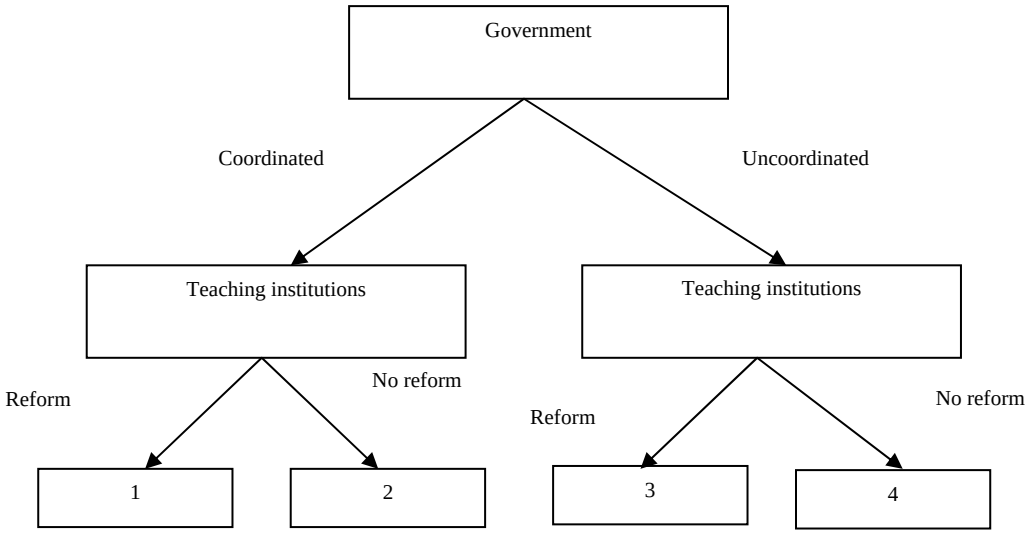

Figure 3 : Government and school game tree schematic diagram

Set in case government coordinates institution reformation while institutions don't reform, government earnings is C_1, institutions earnings is 0;and institutions carry on reformation while government don't play coordination roles, institutions earnings is $C_1^{'}$, government earnings is C_2. When both government and institutions are with positive attitudes, government earnings is C, institutions

earnings is $C^{'}$;if both government and institutions are not positive, then the two earnings are 0. TABLE 7 is government and teaching institutions characteristic reformation earnings matrix.

TABLE 7 : Government and teaching institutions characteristic reformation earnings matrix

		Teaching institutions	
		Reform	**Don't reform**
Government	Coordinate	$C, C^{'}$	$C_1, 0$
	Don't coordinate	$C_2, C_1^{'}$	$0,0$

Among them, $C > C_1 > C_2$, but size of $C^{'}, C_1^{'}$ cannot define, therefore the paper will adopt evolution game analysis to analyze government and teaching institutions characteristic reformation institutionalization practices, and make respectively strategies adjustment.

Modern legal education way out evolution game analysis

Due to government and teaching institutions positive and negative strategic selection in legal education problem are both independent and random, and can carry on repeated games. Therefore, set government supporting institutions reformation probability as p, probability that don't support is $1-p$;and institutions reformation executing probability is q, probability that don't reform is $1-q$. According to Malthusian theorem, it is clear that government strategies support times selection growth rate should be $\frac{\dot{p}}{p}$ that is difference between fitness $E_w W\{f, 1-q\}^T$ and average fitness $\{p, 1-p\} W \{q, 1-q\}^T$. $E_w = [1,0]$, when government support probability is 1, its earnings matrix is: $W = \begin{bmatrix} C & C_1 \\ C_2 & 0 \end{bmatrix}$

Simplify $\dot{p} = p(1-p)\{1,-1\} W \{q, 1-q\}^T$ and get $\dot{p} = p(1-p)[(C - C_1 - C_2)q + C_1]$

Similarly, institutions strategy of reformation selection times growth rate should be $\frac{\dot{q}}{q}$ that is difference between fitness $E_J Y \{q, 1-q\}^T$ difference between fitness $\{q, 1-q\} Y \{p, 1-p\}^T$. $E_J = [0,1]$, When institutions reformation probability is1, its earnings matrix is

$$Y = \begin{bmatrix} C^{'} & 0 \\ C_1^{'} & 0 \end{bmatrix}$$

Simplify $\dot{q} = q(1-q)\{-1,1\} Y \{t, 1-q\}^T$ and get

$$\dot{q} = q(1-q)\left[C_1^{'} + (C^{'} - C_1^{'}) p \right]$$

Therefore when $\dot{p} = 0, \dot{q} = 0$, $(0,0)$, $(0,1)$, $(1,0)$, $(1,1)$ are balance points of institutions characteristic reformation institutionalization. According to matrix stability, analyze these balance points partial stability, solve partial derivatives of $\dot{p}$ to p, and partial derivatives of $\dot{q}$ to q, matrix is

$$V=\begin{bmatrix} \partial \dot{P}/\partial P & \partial \dot{P}/\partial q \\ \partial \dot{q}/\partial p & \partial \dot{q}/\partial q \end{bmatrix}=\begin{bmatrix} (1-2p)\left[(C-C_1-C_2)q+C_1\right] & p(1-p)(C-C_1-C_2) \\ q(1-q)(C^{'}-C_1^{'}) & (1-2q)p \end{bmatrix}$$

Among them

$$\det V=(1-2p)(1-2q)\left[(C-C_1-C_2)q+C_1\right]\left[C_1^{'}+(C^{'}-C_1^{'})p\right]$$
$$-pq(1-p)(1-q)(C-C_1-C_2)(C^{'}-C_1^{'})$$

$$trV=(1-2p)\left[(C-C_1-C_2)q+C_1\right]+(1-2q)\left[C_1^{'}+(C^{'}-C_1^{'})p\right]$$

TABLE 8 is balance point partial stability.

TABLE 8 : Balance point partial stability

Balance point (p,q)	trV		$\det V$		**Stability**
$(0,0)$	$C_1+C_1^{'}$	+	$C_1\bullet C_1^{'}$	+	Unstable point
$(0,1)$	$C-C_2-C_1^{'}$	-	$-(C-C_2)\bullet C_1^{'}$	Unknown	Saddle point
$(1,0)$	$C^{'}-C_1$	-	$-C_1\bullet C^{'}$	Unknown	Saddle point
$(1,1)$	$-(C-C_2+C^{'})$	+	$(C-C_2)\bullet C^{'}$	-	Stable point

By above TABLE 8, it is clear $(0,0)$ point is unstable point, $(0,1)$ and $(1,0)$ are saddle points, evolution stable point is $(1,1)$. Therefore, government and law teaching institutions optimal strategy in Chinese modern legal education problems is teaching institutions should positive carry out characteristic education reformation that conforms to Chinese national situation, and government should also positive carry out coordination. It can transform modern legal education quantity-oriented status to quality-oriented, and strengthen legal education characteristic education, and strengthen theory and practice combinative ability.

CONCLUSION

The paper firstly through establishing analytic hierarchy process model, it solves that Chinese modern legal education main obstacles are the low efficiency of education, the lack of features and being divorced from reality and others when considering multiple influence factors, and respective proportions are 0.154, and 0.393.

And then by game analysis and evolution game analysis, it solves that government and law teaching institutions optimal strategy in Chinese modern legal education problems is teaching institutions should positive carry out characteristic education reformation that conforms to Chinese national situation, and government should also positive carry out coordination. It can transform modern legal education quantity-oriented status to quality-oriented, and strengthen legal education characteristic education, and strengthen theory and practice combinative ability.

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