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# Selection of Leading Industry in Anshun Experimental District Based on Analytic Hierarchy Process

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**Abstract** Analytic Hierarchy Process is selected according to the selection method of leading industries by both domestic and foreign scholars. Leading industries which can accelerate the overall economic development of Anshun Experimental District is taken as the target layer; and market demand, efficiency standards and local conditions are taken as the criterion layers, so as to construct the select model of leading industry and to choose the leading industry in Anshun Experimental District. Result shows that the priority order of the leading industry selection in Anshun Experimental District is as follows: tourism > pharmacy > transportation > energy > food processing > characteristic agriculture > package and printing > automobile industry > mining > electric engineering.

**Key words** Anshun Experimental District, Leading industry, Analytic Hierarchy Process, China

Anshun City, Guizhou Province, China belongs to the Central Guizhou Industrial Belt of "Guiyang–Zunyi–Anshun", which is a focus of national regional economic plan and a developing industrial city with relatively great development potential. In recent years, Anshun City has obtained great achievements in assets long-span recombination and its economic quality and efficiency has been improved. In the year 1988, Anshun City established an Anshun Experimental District with the coexistence of various economic compositions, which has relatively good image and wide-ranging influence. At present, energy, pharmacy, chemical engineering, food, automobile industry, mining, electric engineering, transportation, package and printing, tourism and other industrial departments are booming. How to realize the scientific development, to seize time by the forelock, to exert the advantages of experimental zone, and to promote the overall development of economy in Anshun are the major issues needed to be solved urgently. In order to solve these problems, it is necessary to combine the natural, economic, social and technical conditions based on taking the market as the orientation. Moreover, government should combine all the favorable and unfavorable factors, select a number of leading industries with regional advantages and relatively high efficiency, and accelerate the development of regional economy.

## 1 Construction of the selection model of leading industry

**1.1 Model selection** Selection of leading industry is to determine the sequence of industrial development according to the particular stage of economic development, so as to realize the rationalization and high gradation of industrial structure. Both

domestic and foreign scholars have carried out wide-range researches on the selection method of leading industry. They put forward many methods for selecting leading industries from different aspects, such as the comparative advantage benchmark by Li Jiatu, the resources endowment benchmark by ELI. Heckscher and Bertil Ohlin, industrial linkage benchmark by Hirschman, two-way fiducial synthesis method by Liu Zaixing, the six benchmarks by Guan Ai-ping, and the shift-share benchmark by Tong Jianghua<sup>[1–4]</sup>. The method of the shift-share benchmark has been widely applied in practice, such as the empirical study on leading industry in Shenzhen by Lin Junhang, the discussion on selecting the regional leading industry under the restriction of human capital by Shao Yu, the evaluation on rational structure of the tourism industry in Sichuan Province by Xie Pang-xiong, the evaluation and analysis on the evolution of industrial structure characteristics in Qinghai Province in the years 1949–2007 by Zhang Haifeng, and the research on the selection of regional leading industry during the process of new industrialization in Henan Province by Du Enshe<sup>[5–10]</sup>. After comparing these methods, we conclude that the Analytical Hierarchy Process, short for AHP, put forward by the American scientists A. L. Saaty in the 1970s, is a modeling and quantification process of decision-making of a complex system. By using this method, decision maker can divide a complex issue into several factors or layers, simply calculate and compare these factors, and then obtain the weights of different options that provide the basis for the selection of the best program. This method is more applicable during the selection of leading industry. This research selects AHP to carry out preliminary analysis on the selection of leading industry in Anshun Experimental District.

### 1.2 Structure of AHP model

**1.2.1 Target layer (A).** Select a leading industry that can speed up the overall economic development in Anshun Experimental District.

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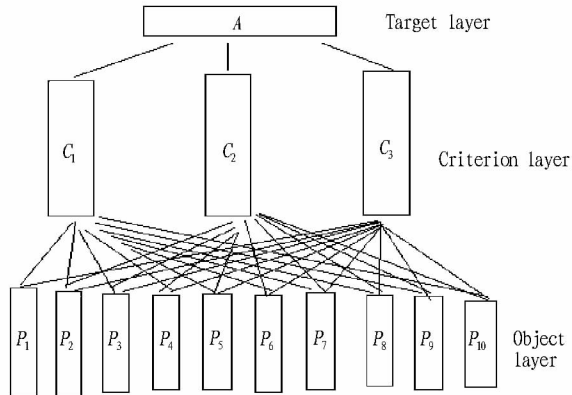
**1.2.2 Criterion layer ( $C$ ).** It includes the following three aspects:

$C_1$ : Market demand, including the market demands status and the long-term market potential.

$C_2$ : Benefit criterion, mainly considering the economic efficiency of industry.

$C_3$ : Adaptation to local conditions, that is, the exertion of regional advantages and the rational use of resources.

**1.2.3 Object layer ( $P$ ).** It includes ten industries: ①  $P_1$  energy industry, ②  $P_2$  transportation industry, ③  $P_3$  food industry, ④  $P_4$  automobile industry, ⑤  $P_5$  mining industry, ⑥  $P_6$  electric engineering, ⑦  $P_7$  pharmacy, ⑧  $P_8$  package and printing, ⑨  $P_9$  tourism industry, and ⑩  $P_{10}$  characteristic agriculture.



Illustrates the hierarchical relationship among factors in target layer, criterion layer and object layer.

**Fig. 1 AHP structure about the selection of leading industry in Anshun Experimental District**

## 2 Result and analysis

**2.1 Hierarchical single sequencing** Establish the judgment matrixes of  $A - C$  and  $C - P$ , and carry out hierarchical single sequencing. According to the model structure mentioned above,  $A - C$  and  $C - P$  judgment matrixes are established based on the expert consultation. And calculate the hierarchical single sequencing.

Table 1 reports the results of  $A - C$  judgment matrixes and their sequencing.

**Table 1  $A - C$  judgment matrixes and their sequencing about the selection of leading industry in Anshun Experimental District**

$A$	$C_1$	$C_2$	$C_3$	$W_A$
$C_1$	1	1/3	3	0.260
$C_2$	1/3	1	5	0.634
$C_3$	3		1	0.106

Note:  $\lambda_{\max} = 3.038$ ;  $CI = 0.019$ ;  $RI = 0.58$ ;  $CR = 0.0328 < 0.10$ .

Table 2 and 4 indicate the results of  $C_1 - P$ ,  $C_2 - P$  and  $C_3 - P$  judgment matrixes and their hierarchical single sequencing.

**2.2 Hierarchical general sequencing** According to Table 1–4, results of hierarchical overall sequencing at object layer are obtained by the calculation of overall sequencing and the consistency check (Table 5).

**Table 2  $C_1 - P$  judgment matrixes and their sequencing about the selection of leading industry in Anshun Experimental District**

$C_1$	$P_1$	$P_2$	$P_3$	$P_4$	$P_5$	$P_6$	$P_7$	$P_8$	$P_9$	$P_{10}$	$W_1$
$P_1$	1	2	3	5	7	8	1/2	8	1/3	6	0.172 3
$P_2$	1/2	1	2	4	5	7	1/3	7	1/4	3	0.119 6
$P_3$	1/3	1/2	1	2	3	5	1/5	4	1/6	2	0.071 6
$P_4$	1/5	1/4	1/2	1	1/2	1/2	1/6	1/3	1/5	1/2	0.025 9
$P_5$	1/7	1/5	1/3	2	1	2	1/7	1/4	1/6	1/3	0.029 4
$P_6$	1/8	1/7	1/5	2	1/2	1	1/6	1/4	1/6	1/2	0.024 8
$P_7$	2	3	5	6	7	6	1	3	1/2	3	0.188 7
$P_8$	1/8	1/7	1/4	3	4	4	1/3	1	1/4	2	0.059 8
$P_9$	3	4	6	5	6	6	2	4	1	7	0.264 5
$P_{10}$	1/6	1/3	1/2	2	3	2	1/3	1/2	1/7	1	0.043 5

**Table 3  $C_2 - P$  judgment matrixes and their sequencing about the selection of leading industry in Anshun Experimental District**

$C_2$	$P_1$	$P_2$	$P_3$	$P_4$	$P_5$	$P_6$	$P_7$	$P_8$	$P_9$	$P_{10}$	$W_1$
$P_1$	1	1/2	1/3	3	3	4	1/5	1/3	1/6	2	0.060 7
$P_2$	2	1	2	3	4	4	1/6	5	1/4	6	0.117 3
$P_3$	3	1/2	1	2	3	4	1/6	2	1/7	4	0.082 0
$P_4$	1/3	1/3	1/2	1	2	3	1/5	1/2	1/7	3	0.046 0
$P_5$	1/3	1/4	1/3	1/2	1	2	1/6	1/3	1/7	2	0.031 9
$P_6$	1/4	1/4	1/4	1/3	1/2	1	1/7	1/2	1/7	2	0.026 2
$P_7$	5	6	6	5	6	7	1	4	1/2	6	0.226 0
$P_8$	3	1/5	1/3	2	3	2	1/4	1	1/6	3	0.065 8
$P_9$	6	4	7	7	7	7	2	6	1	7	0.290 4
$P_{10}$	1/2	6	1/4	1/2	1/2	1/2	1/6	1/3	1/7	1	0.053 7

**Table 3  $C_3 - P$  judgment matrixes and their sequencing about the selection of leading industry in Anshun Experimental District**

$C_3$	$P_1$	$P_2$	$P_3$	$P_4$	$P_5$	$P_6$	$P_7$	$P_8$	$P_9$	$P_{10}$	$W_1$
$P_1$	1	1/2	1/3	1/4	1/4	3	1/6	2	1/8	1/5	0.035 5
$P_2$	2	1	1/2	1/3	1/4	2	1/6	3	1/8	1/2	0.046 0
$P_3$	3	2	1	3	3	5	1/5	2	1/6	2	0.092 2
$P_4$	4	3	1/3	1	2	3	1/7	3	1/7	1/2	0.069 6
$P_5$	4	4	1/3	1/2	1	2	1/8	1/4	1/8	1/3	0.049 5
$P_6$	1/3	1/2	1/5	1/3	1/2	1	1/8	1/3	1/9	1/3	0.020 3
$P_7$	6	6	5	7	8	8	1	3	1/3	3	0.217 5
$P_8$	2	1/3	1/2	1/3	4	3	1/3	1	1/4	1/2	0.056 8
$P_9$	8	8	6	7	8	9	3	4	1	7	0.333 1
$P_{10}$	5	2	1/2	2	3	3	1/3	2	1/7	1	0.079 6

**Table 5 General sequencing of leading industry at selection layer in Anshun Experimental District**

$A$	$C_1$ (0.260)	$C_2$ (0.634)	$C_3$ (0.106)	$W_{Total}$
$P_1$	0.172 3	0.060 7	0.035 5	0.268 5
$P_2$	0.119 6	0.117 3	0.046 0	0.282 9
$P_3$	0.071 6	0.082 0	0.092 2	0.245 8
$P_4$	0.025 9	0.046 0	0.069 6	0.141 5
$P_5$	0.029 4	0.031 9	0.049 5	0.110 8
$P_6$	0.024 8	0.026 2	0.020 3	0.071 3
$P_7$	0.188 7	0.226 0	0.217 5	0.632 2
$P_8$	0.059 8	0.065 8	0.056 8	0.182 4
$P_9$	0.264 5	0.290 4	0.333 1	0.888 0
$P_{10}$	0.043 5	0.053 7	0.079 6	0.176 8

on the resource endowment of sugar and manganese; seize the opportunities of China-East Asia Free Trade region and the comprehensive trade free zone in Pingxiang, Guangxi Province set up by Chinese government; keep a firm grasp on the construction of "Nanning – Singapore" economic corridor, sugar city and green manganese city and the important logistics base of China-East Asia, so as to continuously expand the capacity of employment in southwestern Guangxi Province.

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# 3 Conclusion

(1) According to the sequencing result at layer *C*, criterion for the leading industry selection in Anshun Experimental District should be as follows: firstly, industry benefits, especially the economic benefits, should be considered. Secondly, market demand and long-term market potential should be taken into account. Thirdly, regional advantage should be exerted and the rational use of resources should be considered.

(2) According to the sequencing result at layer *P*, the priority order of the leading industry selection in Anshun Experimental District is tourism ( $P_9$ ) > pharmacy ( $P_7$ ) > transportation ( $P_2$ ) > energy ( $P_1$ ) > food processing ( $P_3$ ) > characteristic agriculture ( $P_8$ ) > package and printing ( $P_{10}$ ) > automobile industry ( $P_4$ ) > mining ( $P_5$ ) > electric engineering ( $P_6$ ).

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