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Comprehensive Evaluation on Datong Coal Mine Group Finance Based on the AHP

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Abstract: *Comprehensive Evaluation of Finance makes an comprehensive analysis and evaluation on the profitability, the solvency, the operational capability and the development ability of enterprise, to make a judgment on the financial situation of enterprise. It has a very important role to help investors improve the level of decision-making, and help operators to improve the management efficiency. It is necessary for the government to improve the level of macro-regulation. However, at present , most of financial managers pay more attention to financial and ignore the financial evaluation and analysis ,besides the methods of financial evaluation and analysis lags behind in our country. It is difficult to make a quantitative evaluation on the comprehensive financial strength of listed company. This article will evaluate the comprehensive financial strength of Datong Coal Mine Group by Analytic Hierarchy Process (AHP).*

Keywords: *Comprehensive financial evaluation; AHP*

1. INTRODUCTION

This article will makes an comprehensive evaluation on Datong Coal Mine Group by Analytic Hierarchy Process (AHP). AHP is applied to the quantitative decision problem of which the structure is more complex.AHP divided the decision-making problem into several levels, generally divided into target layer, rule layer, scheme layer. It builds a hierarchical structure model.AHP is an advanced comprehensive evaluation method so far,which solves the comprehensive problem of system with multiple index. This article makes an comprehensive evaluation on Datong Coal Mine Group's financial situation by AHP.The company's financial strength is the comprehensive reflection of financial situation and operating performance.The financial situation reflects the effect of collection and use of corporate capital.The operating performance is the final result of enterprise operating activities.When we evaluate enterprise financial strength,we used some conventional methods,such as ratio analysis, comparative analysis and trend analysis.These evaluation methods are used widely.Though they can make an comprehensive evaluation on corporate financial strength,but they can't make a quantitative evaluation on overall financial strength.

2. THE APPLICATION OF AHP IN COMPREHENSIVE EVALUATION OF DATONG COAL MINE GROUP FINANCE

Establishing analysis model of financial comprehensive evaluation

When we make comprehensive evaluation on company's financial situation by AHP, we must determine index system of financial situation, and then establish a reasonable structure according to the requirements of general targets and nature of index. This article will evaluate the financial situation from four aspects of the profitability, the solvency, the operational capability and the development ability. The hierarchy structure is shown in figure 1.

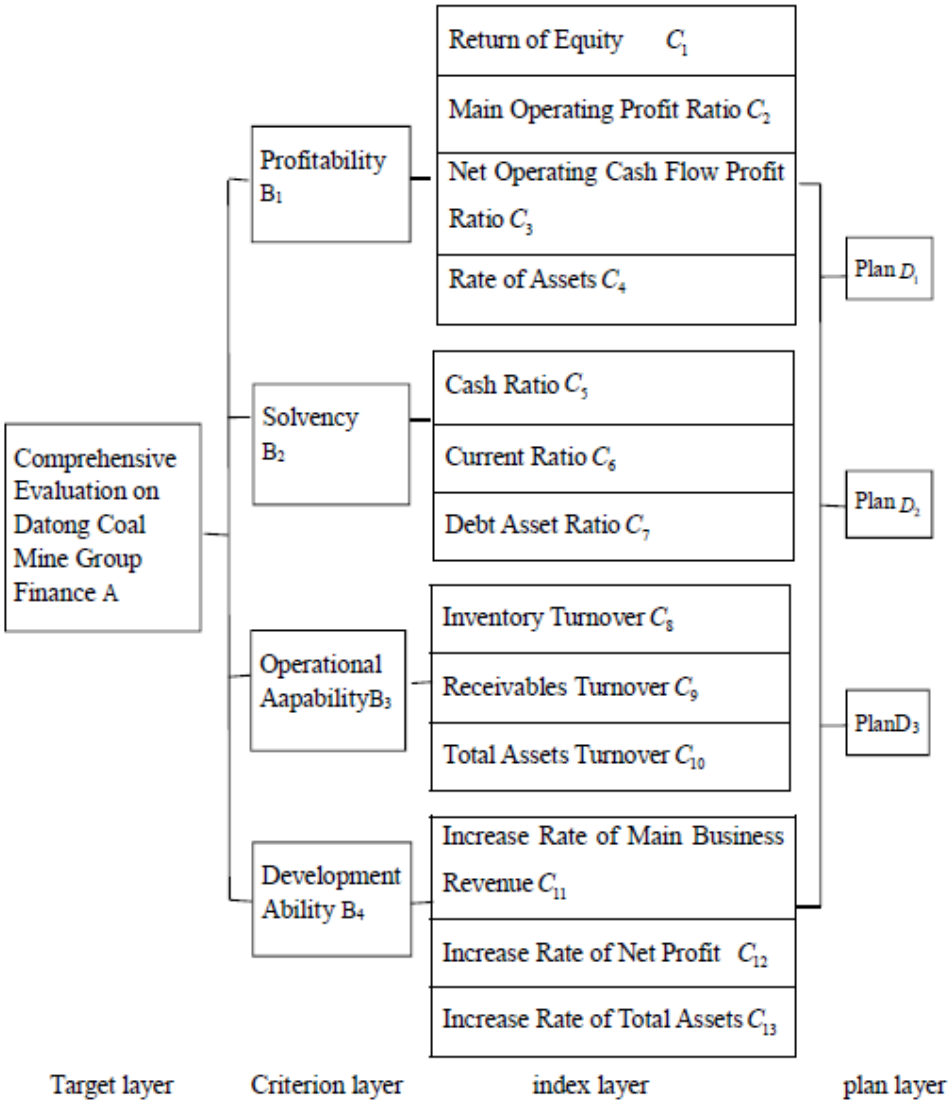

Figure1. *Hierarchy structure diagram of comprehensive evaluation on Datong Coal Mine Group finance*

2.1. Build Judgment Matrix

In order to form a numerical judgment matrix, this article will use the method of 1-9 scale.As shown in Table 1.

Table1. scale of judgment matrix

Sequence Number	Rank of Importance	Assignment of C_{ij}
1	Element i&j are equally important.	1
2	The element i is slightly more important than the element j.	3
3	The element i is significantly more important than the element j.	5
4	The element i is intensely more important than the element j.	7
5	The element i is extremely more important than the element j.	9
6	The element i is slightly more unimportant than the element j.	1/3
7	The element i is significantly more unimportant than the element j.	1/5
8	The element i is intensely more unimportant than the element j.	1/7
9	The element i is extremely more unimportant than the element j.	1/9

This paper takes the judgment matrix of criteria layer to target layer A-B as an example:

$$A=(a_{ij})=\begin{pmatrix} 1 & 3 & 4 & 2 \\ 1/3 & 1 & 2 & 1/2 \\ 1/4 & 1/2 & 1 & 1/3 \\ 1/2 & 2 & 3 & 1 \end{pmatrix}$$

2.2. Calculating the Index Weight of Each Layer

First, $\overline{b_{ij}} = \dfrac{a_{ij}}{\sum_{k=1}^{n} a_{kj}}$

$$\overline{A}=(\overline{b_{ij}})=\begin{pmatrix} 12/25 & 6/13 & 4/10 & 12/23 \\ 4/25 & 2/13 & 2/10 & 3/23 \\ 3/25 & 1/13 & 1/10 & 2/23 \\ 6/25 & 4/13 & 3/10 & 6/23 \end{pmatrix}$$

Second, $\overline{W_i}=\sum_{j=1}^{n}\overline{b_{ij}}$ （i=1,2,・・・，n）.

$\overline{W_i}$ =（1649/885，614/953，281/732，725/654）^{T}

Third，the normalization of $\overline{W_i}$.

W_i =（293/629，24/149，50/521，217/783）^{T}

=（0.466，0.161，0.096，0.277）^{T}

Last，calculating $\lambda_{\max}$ ：

$$\lambda_{\max}=\sum_{i=1}^{n}\frac{(AW)_i}{nW_i}$$

$$=\sum_{i=1}^{n}\frac{\sum_{k=1}^{n} a_{ik}W_{\mathrm{k}}}{nW_i}$$

$$\lambda_{\max}=\frac{1}{4}\left(\frac{1.877}{0.466}+\frac{0.647}{0.161}+\frac{1.385}{0.096}+\frac{1.120}{0.277}\right)=4.031$$

Consistency Indexes: CI=$\dfrac{\lambda_{\max}-n}{n-1}$=0.01

Random Consistency Indexes: RI=0.9

$CR=\dfrac{CI}{RI}=\dfrac{0.01}{0.9}$=0.011<0.1, the consistency is acceptable. So the weight of criteria layer B is (0.466, 0.161，0.096，0.277). Similarly, the weight of other layers is shown from table 2 to table 6.

Table2. *Judgment Matrix A—B*

A	B_1	B_2	B_3	B_4	Weight
B_1	1	3	4	2	0.466
B_2	1/3	1	2	1/2	0.161
B_3	1/4	1/2	1	1/3	0.096
B_4	1/2	2	3	1	0.277
	λ_{max} =4.031 CI=0.01 RI=0.900 CR=0.011				

Table3. *Judgment Matrix B_1—C*

B_1	C_1	C_2	C_3	C_4	Weight
C_1	1	3	4	4	0.495
C_2	1/3	1	3	3	0.287
C_3	1/4	1/3	1	1	0.109
C_4	1/4	1/3	1	1	0.109
	λ_{max} =4.095 CI=0.032 RI=0.900 CR=0.035				

Table4. *Judgment Matrix B_2—C*

B_2	C_5	C_6	C_7	Weight
C_5	1	1/2	3	0.320
C_6	2	1	4	0.557
C_7	1/3	1/4	1	0.123
	λ_{max} =3.018 CI=0.009 RI=0.580 CR=0.016			

Table5. *Judgment Matrix B3—C*

B_3	C8	C9	C10	Weight
C8	1	1	1/3	0.200
C9	1	1	1/3	0.200
C10	3	3	1	0.600
	λ_{max} =3.000 CI=0.000 RI=0.580 CR=0.000			

Table6. *Judgment Matrix B_4—C*

B_4	C_{11}	C_{12}	C_{13}	Weight
C_{11}	1	3	2	0.539
C_{12}	1/3	1	1//2	0.164
C_{13}	1/2	2	1	0.297
	λ_{max} =3.009 CI=0.005 RI=0.580 CR=0.008			

All CR is less than 0.1, so the consistency of the judgment matrix are acceptable

2.3. Total Arrangement of Hierarchy

Calculating the weight of all index,for example, C1 =0.131×0.495=0.065.Similarly, other data are as above.All data are shown in table 7.

Table7.

Index	C_1	C_2	C_3	C_4	C_5	C_6	C_7
Weight	0.231	0.134	0.051	0.051	0.052	0.090	0.020
Index	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	
Weight	0.019	0.019	0.058	0.149	0.045	0.082	

3. Comprehensive Evaluation on Datong Coal Mine Group Finance

This article selects relevant financial data (2013, 2014, 2015), and makes an evaluation on its operation capability. As shown from table 8 to table 11.

Table8. *The analysis of profitability*

Item	2013	2014	2015
Return of Equity	-7.86%	5.42%	-18.90%
Main Operating Profit Ratio	-7.89%	7.65%	-25.65%
Net Operating Cash Flow Profit Ratio	-129.50%	58.67%	86.76%
Rate of Assets	-4.24%	2.69%	-6.92%

Table9. *The analysis of solvency*

Item	2013	2014	2015
Cash Ratio	36.55%	76.71%	78.82%
Current Ratio	73.16%	125.07%	132.72%
Debt Asset Ratio	46.06%	50.31%	63.41%

Table10. *The analysis of operational capability*

Item	2013	2014	2015
Inventory Turnover	14.01	8.11	9.12
Receivables Turnover	5.51	6.41	3.33
Total Assets Turnover	0.54	0.35	0.27

Table11. *The analysis of development ability*

Item	2013	2014	2015
Increase Rate of Main Business Revenue	-190.13%	-177.59%	-375.37%
Increase Rate of Net Profit	-37.25%	-19.99%	-17.84%
Increase Rate of Total Assets	-6.16%	22.08%	7.24%

Comprehensive Evaluation on Datong Coal Mine Group Finance is shown in table 12.

Table12.

Year	C_1	C_2	C_3	C_4	C_5	C_6	C_7
2013	-0.018	-0.011	-0.066	-0.002	0.019	0.066	0.009
2014	0.013	0.010	0.030	0.001	0.040	0.112	0.010
2015	-0.044	-0.034	0.044	-0.004	0.041	0.119	0.013
Year	C8	C9	C10	C11	C12	C13	Summary
2013	0.269	0.106	0.031	-0.284	-0.017	-0.005	0.097
2014	0.156	0.123	0.020	-0.265	-0.009	0.018	0.258
2015	0.175	0.064	0.016	-0.560	-0.008	0.006	-0.173

4.CONCLUSION

From table 12,we can see that the performance of Datong Coal Mine Group of 2014 is most high.In 2013, "golden ten years" of the coal market completely end, coal's prices fell, corporate profits fell sharply, environmental pressure increases, energy structure adjust, the impact of imported coal lead to low price of coal.In 2013, net profit is negative, the company has a loss.In 2014, from a macro perspective, the government canceled expense and collected tax.Besides,the government suspended extraction of deposit of environmental restoration,which greatly reduce the burden of enterprises.In 2015, the trend of coal market development is down, the import coal has an impact on domestic coal.Meanwhile,the coal enterprises themselves have some problems. Coal enterprises compete with each other viciously,coal price deviates from the value curve seriously.In 2015,the production of coal is 36.8 tons,and deceased by 3.5%, more than 90% of the coal mines are have a loss.

REFERENCES

[1] Huanchen Zhao,Shubai Xu.Analytic Hierarchy Process[M].Science Press,1986.

[2] Xiaodong Wang.The application of AHP on the measure of profitability, of listed compan y [J]. Journal of Harbin University of Science and Technology, 2005.

[3] Dong Du,Qinghua Pang.Modern comprehensive evaluation method and case selection[M].T singhua University Press,2005.

[4] Hangbo Zhang.Research and application of method of enterprise financial comprehensive evaluation [D].Nanjing University of Science and Technology, 2007.

[5] Lei Wang.The application of AHP on comprehensive evaluation of company finance [J]. Communication of Finance and Accounting, 2008, vol 03, pp.80-81.