The Evaluation of Production System Based on an Energy Enterprise

Wu Hongmai[*,1], Sun Jing[1], Yang Aiping[1], Ji Hongyi[1], Lyu Hui[2], Lyu Chumeng[3],

[1]*College of Mechanical and Electrical Engineering, Beijing Union University, Beijing, 100020, P.R. China*
[2]*Beijing Longxin Industrial Technological Development Co., Ltd, Beijing, 100083, P.R. China*
[3]*P. C. Rossin College of Engineering and Applied Science, Leigh University, Bethlehem, PA, 18015, U. S. America*

Abstract
Energy is the basic source related to the people's livelihood. China has a population of 1.3 billion, second-largest economy in the world, is especially acute for energy demand and consumption. According to British Petroleum (BP) energy statistics, China's coal reserves ranked third in the world, primary energy consumption ratio of 75%, above the global average more than 1 time. China is a coal country, environmental pollution and energy security has always been a double-edged sword, as well as the use of existing technology to energy saving and emission reduction, and reasonable resource allocation through industrial adjustment in real time. We need continuous innovation, and make it become the core plate of perfecting the national strategy once again. Based on the production system, strategic management theory and actual situation, there uses the quantitative method of Analytic Hierarchy Process (AHP) to identify the advantage and disadvantage industries and clear the priority order of 8 industries for development.
Keywords: AHP, PRODUCTION SYSTEM, EVALUATION

1. Introduction

Shangdong Energy Group can build an index system of sustainable development capacity, clear the function of each index in order to determine the importance of each industry. At the same time, quantification of sustainable development capacity, also helps the government know about development of the enterprise, and provides a tool for government policy-making and macro-control[1].

1.1. Construction of Evaluation Index System of Sustainable Development Capability

In order to develop strategic direction of Shandong Energy Group, evaluate sustainable development capability of the enterprise[2], and determine importance of industries and prospects of business, we should proceed from reality to establish the evaluation indexes and system, and research on sustainable development by reasonable evaluation methods.

1.1.1. Construction of Evaluation Index

By analysis of internal and external environment of the enterprise[3], we preliminary recognize and grasp enterprises the strengths and weaknesses in general. But getting more comprehensive and more rational evaluation of sustainable development capability of business, it needs to establish evaluation index, which requires construction of hierarchical structure. In general, AHP requires the hierarchical structure consists of the following, the objective, standard and measure layer.

Evaluation of sustainable development of the enterprise is goal, the target level of AHP[4]. In general, there are many factors affecting evaluation of sustainable development of enterprises, such as Economic Factor, Social Factor, Ecological Factor and Technical Factor, which are the most important factors. Each factor evaluates sustainable development capacity from different perspectives, with a certain degree of representativeness and completeness. There are 8 major industries composed of the measure layer. Then it affects the target layer by criteria layer. These 8 major industries of Shandong Energy Group further affect evaluation of sustainable development through Economic Factor, Social Factor, Ecological Factor and Technical Factor.

According to characteristics of Shandong Energy Group and principles of AHP, we can establish the evaluation index system of capability of the enterprise, as shown in Fig. (1).
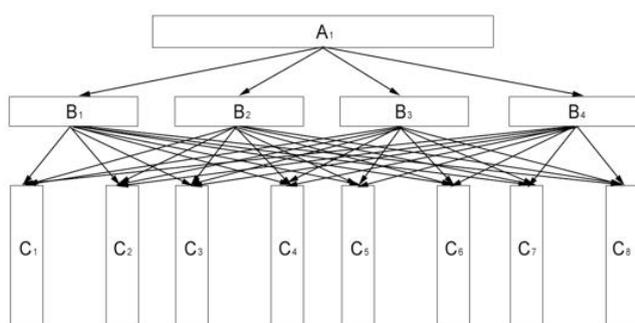

Figure 1. Evaluation Index Sustainable Development Capability of Shandong Energy Group

Note: C_5 is a representative for the traditional and non-coal energy industry, which contains the traditional and non-coal energy, such as oil shale.

Now specify meaning of various indexes:

A_1 sustainable development capacity of Shandong Energy Group: the target layer of the hierarchical structure, which is evaluation of sustainable development to the enterprise and draw industries priorities and overall development evaluation.

B_1, B_2, B_3 and B_4 are criteria levels of the hierar-

chical structure. They are evaluation standard. Of which:

B_1 Economic Factor: each industry brings economic benefits to the enterprise, such as Coal Industry impact on higher interests, thereby affecting evaluation of sustainable development.

B_2 Social Factor: each industry brings social impact on the enterprise, relating people government to it recognition and support, such as Modern Logistics and Medical Device to the deeper level, and then affects evaluation of sustainable development.

B_3 Ecological Factor: each industry brings ecological impact on the enterprise, such as people very concerned on development of Power Industry and new energy, and then affects evaluation of sustainable development.

B_4 Technical Factor: each industry brings technical impact on the enterprise, such as equipment manufacturing, new energy and other industries increasing demand for technology, it needs R&D continuously, and then affects evaluation of sustainable development.

C_1, C_2, C_3, C_4, C_5, C_6, C_7, C_8, which are 8 major industries, belong to measure levels of the hierarchical structure. We realize evaluation of sustainable development of the enterprise by analyzing importance of various industries at final.

1.1.2. Choice of Evaluation Index Method

Shandong Energy Group is a large one to develop coal as the main industry, with Coal, Chemical, Equipment Manufacturing, Modern Logistics, Power, New Energy, Medical Device and Health and Others 8 major industries[5]. Each industry has its own characteristics. How many industries belonging to the group does not represent corporate sustainability. Due to limited resources, the enterprise need develop key industries preferentially according to own characteristics to drive other industries, and slowly eliminate the industry of small prospect. There is of great reality significance to the enterprise development by identifying importance and evaluating development prospect of each industry. To achieve sustainable development evaluation of the 8 major industries has certain difficulties. But AHP for multi-objective and multi-criteria complex problems provides a convenient method of decision making, and take advantage of less quantitative information for digital and systematic decisions. Therefore, AHP has a great advantage in evaluation of sustainable development of Shandong Energy Group.

AHP is analysis method that Professor T. L. Saaty, an expert in Operation Research of United States, University of Pittsburgh, proposed in the early 1970 of the 20th century. The problem in decision making

of complex and multi-objective as a system, it calculates level sorting (weight) and total sorting by method of fuzzy quantifying of qualitative index, as optimization decision of the target (indexes) and multi-scheme.

2. Weight Analysis and Inspection of Evaluation Index

2.1. Weight Analysis of Evaluation Index

The judgment matrix is for 1-to-1 comparison by index importance of each layer. The result will be written in matrix form. Filling out the matrix approach is: questions repeated to persons completed (experts), according to criteria of judgment matrix and importance for 1-9 assignment. Importance of scaled values is shown in Table 1.

Table 1. Implication Table of Importance Scaling

Importance Scaling	Implication
1	X_1 and X_2 are equally important
5	X_1 is more important than X_2
9	X_1 is extremely vital than X_2
2, 4, 6, 8	Represent the middle value above judgment
Reciprocal	If ratio of the importance between the element i and the element j is a_{ij}, ratio of the importance between element j and element i is $a_{ji}=1/a_{ij}$

Calculate the maximum characteristic root (λmax) and the corresponding characteristic vector of the judgment matrix.

Firstly, calculate the product of each element of each row in judgment matrix A:

$$M_i = \prod_{j=1}^{n} a_{ij}, i = 1, 2, \cdots, n \quad (1)$$

Secondly, calculate n Times Square:

$$\overline{W_i} = \sqrt[n]{M_i} \quad (2)$$

Thirdly, calculate the normalization to vector: $\overline{w} = (\overline{w_1}, \overline{w_2}, \cdots, \overline{w_n})$:

$$w_i = \frac{\overline{w_i}}{\sum_{k=1}^{n} \overline{w_k}} \quad (3)$$

Among them, vector $w = (w_1, w_2, \cdots, w_n)$ is characteristic vector, also called single weight.

Under this approach and by using MATLAB, the constructing judgment matrix of level index of sustainable development capacity goal of Shandong Energy Group is shown in Table 2.

Table 2. Judgment Matrixes of the Level Index and Calculation of Weights

A_1	B_1	B_2	B_3	B_4
B_1	1	6	8	4
B_2	1/6	1	1/2	1/3
B_3	1/8	2	1	1/2
B_4	1/4	3	2	1
Single Weight	0.6383	0.0700	0.1020	0.1898
λ_{max} = 4.0963; CI = 0.0321; RI = 0.9; CR = 0.0357				

Judgment matrixes of the secondary index and calculation of weights are shown in Table 3 to Table 6.

Table 3. Judgment Matrix and Calculation of Weight of B_1

B_1	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
C_1	1	1/4	1/3	1	1/3	1/4	1/2	1/3
C_2	4	1	1	3	2	1/2	2	1
C_3	3	1	1	2	2	1/4	2	2
C_4	1	1/3	1/2	1	1/3	1/3	1/2	1/2
C_5	3	1/2	1/2	3	1	1/3	1/2	1/2
C_6	4	2	4	3	3	1	3	2
C_7	2	1/2	1/2	2	2	1/3	1	1/2
C_8	3	1	1/2	2	2	1/2	2	1
SW	0.4325	0.1826	0.1340	0.0735	0.0831	0.0262	0.0395	0.0286
λ_{max} = 8.4278; CI = 0.0611; RI = 1.41; CR = 0.0433								

Notes:

SW - Single Weight.

Table 4. Judgment Matrix and Calculation of Weight of B_2

B_2	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
C_1	1	1/2	1/2	1/3	1/3	1/5	1/4	1/2
C_2	2	1	1/2	1/3	1/3	1/5	1/4	1
C_3	2	2	1	1/2	1	1/4	1/3	2
C_4	3	3	2	1	1.5	1/3	1/3	1
C_5	3	3	1	0.67	1	1/2	1/2	2
C_6	5	5	4	3	2	1	1	2
C_7	4	4	3	3	2	1	1	2
C_8	2	1	1/2	1	1/2	1/2	1/2	1
SW	0.0424	0.055	0.0917	0.1207	0.1207	0.2553	0.2329	0.0812
λ_{max} = 8.3214; CI = 0.0459; RI = 1.41; CR = 0.0326								

Notes:

SW - Single Weight.

Table 5. Judgment Matrix and Calculation of Weight of B_3

B_3	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
C_1	1	1/2	1/2	1/3	1/2	1/3	1/3	1/3
C_2	2	1	1/2	1/3	1/2	1/3	1/3	1/3
C_3	2	2	1	1/2	1/2	1/2	1/2	1/2
C_4	3	3	2	1	1	1/2	1/2	1/2
C_5	2	2	2	1	1	1	1	1
C_6	3	3	2	2	1	1	1	1
C_7	3	3	2	2	1	1	1	1
C_8	3	3	2	2	1	1	1	1
SW	0.0503	0.0599	0.0872	0.1251	0.1466	0.1770	0.1770	0.1770
λ_{max} = 8.1830; CI = 0.0261; RI = 1.41; CR = 0.0185								

Notes:

SW - Single Weight.

Table 6. Judgment Matrix and Calculation of Weight of B_4

B_4	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
C_1	1	1/2	1/2	1/3	1/3	1/5	1/4	1/2
C_2	2	1	1/2	1/3	1/3	1/5	1/4	1
C_3	2	2	1	1/2	1	1/4	1/3	2
C_4	3	3	2	1	1.5	1/3	1/3	1
C_5	3	3	1	0.67	1	1/2	1/2	2
C_6	5	5	4	3	2	1	1	2
C_7	4	4	3	3	2	1	1	2

C$_8$	2	1	1/2	1	1/2	1/2	1/2	1
SW	0.0464	0.1606	0.1472	0.0551	0.0876	0.2741	0.0941	0.1350
λ_{max} = 8.3773; CI = 0.0539; RI = 1.41; CR = 0.0382								

Notes:

SW - Single Weight.

2.2. Check of Evaluation Index

In the reality, there requires consistency of the judgment matrix in general. Hence, it needs for consistency check that the judgment matrix has the following relationship clearly:

$$b_{ij} = \frac{b_{ik}}{b_{jk}} \ (i, j = 1, 2, \cdots, n) \tag{4}$$

Based on matrix theory, a known judgment matrix P can be calculated the characteristic vector W that satisfies the condition.

$$PW = nW \tag{5}$$

In the real decision-making, given the judgment matrix is $\acute{P}$. For now, new issues can be classified into:

$$\acute{P}\acute{W} = \lambda_{max}\acute{W} \tag{6}$$

$$\lambda_{max} = \frac{1}{n}\sum_{i=1}^{n}\frac{(AW)_i}{w_i} \ (i = 1, 2, \cdots, n) \tag{7}$$

$$CI = \frac{\lambda_{max}-n}{n-1} \ \ CR = \frac{CI}{RI} \tag{8}$$

where,

λ_{max} - the maximum characteristic root (the maximum value);

W - the characteristic vector.

$AW = \lambda_{max}W$, A is used as a judgment matrix and n is the order number.

The check result of evaluation index of Shandong Energy Group is shown in Table **7**.

Table 7. Check List of Evaluation Index

	Judgment Index				
	λ_{max}	CI	RI	CR	Pass the test?
Level index A$_1$	4.0963	0.0321	0.9	0.0357	Yes
Secondary index B$_1$	8.4278	0.0611	1.41	0.0433	Yes

Secondary index B$_2$	8.3214	0.0459	1.41	0.0326	Yes
Secondary index B$_3$	8.1830	0.0261	1.41	0.0185	Yes
Secondary index B$_4$	8.3773	0.0539	1.41	0.0382	Yes

3. Result Analysis of Evaluation Index

3.1. Analysis of Evaluation Result of a Single Sort

All results by Table 7, we conclude that the judgment matrixes have passed the test in the table, ensure the objectivity and truth of experts' evaluation, thereby ensuring the credibility of sustainable development evaluation of the enterprise.

Table 8. Sorting of Level Index

	Level Index			
	B$_1$	B$_2$	B$_3$	B$_4$
Single weight	0.6383	0.0700	0.1020	0.1898
Sorting	1	4	3	2

We can see that Economic Factor is the most important factor as a whole from Table 8. As a social enterprise, profit-making is its mission. The enterprise does not rely on constant profitability until maintain sustainable development; does not fulfill profitability until expand production and put into fund for R&D in new technology. Advanced technology not only reduces dependence on the resource, but also reduces damage to the environment, and protection of the living environment. Meanwhile, expansion of the group due to the profit can also promote local economic development, and provide more jobs for the community. Therefore, Economic Factor sorted the first, not only suit for the objective of sustainable development of the enterprise, but also with the objective reality. It is explained objectivity and relevance of AHP from the side.

Table 9. Sorting of Secondary Index

	C$_1$	C$_2$	C$_3$	C$_4$	C$_5$	C$_6$	C$_7$	C$_8$
IF	B$_1$							
SW	0.4325	0.1826	0.1340	0.0735	0.0831	0.0262	0.0395	0.0286
S	1	2	3	5	4	8	6	7
IF	B$_2$							
SW	0.0424	0.055	0.0917	0.1207	0.1207	0.2553	0.2329	0.0812

S	8	7	5	3	3	1	2	6
IF	B_3							
SW	0.0503	0.0599	0.0872	0.1251	0.1466	0.1770	0.1770	0.1770
S	8	7	6	5	4	1	1	1
IF	B_4							
SW	0.0464	0.1606	0.1472	0.0551	0.0876	0.2741	0.0941	0.1350
S	8	2	3	7	6	1	5	4

Notes:
IF - Influence Factor;
SW - Single Weight;
S - Sorting.

We can see from Table 9 that Coal Industry still plays an important role in economic factors, and far more than any other industries. The cultivation products of New Energy Industries and other industries belonging to the group, it still could not bring considerable cash flow. But its social factors, ecological factors and technical factors ahead of the others, so the group should pay attention to this industry and develop new energy sources.

Table 10. Total order weight

	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
FW	0.293	0.157	0.1288	0.0786	0.093	0.1046	0.0774	0.0676
CR	1	2	3	6	5	4	7	8

Notes:
FW - Final Weight;
CR - Comprehensive Ranking.

Coal Industry, Chemical Industry and Equipment Manufacturing Industry are still supporting industries energy of Shandong Energy Group seen by Table 10. While less proportion across the entire enterprise for new energy business, but due to environmental protection and pollution-free, it belongs to renewable energy and lead to ecological and social factors score higher, widening the whole weight, making new energy business a star[6]. The enterprise can contribute to it in future development. Followed by Electrical Power Industry and Modern Logistics Industry, they belong to focus on development objects of the enterprise later. Due to the market uncertainty, Medical Device Industry and Other Industries belong to the wait-and-see maintenance status. If the market turns for the better, and will foster and develop the business; otherwise giving up, to find new business.

4. FCE of Sustainable Development Capacity of The Enterprise

4.1. Result of FCE

(1) Determination of index set and weight of Fuzzy

3.2. Calculation of Total Order Weight

Sorting refers to the relative weight by each factor of the judgment matrix for the target layer (the top layer). By a top down approach, the calculation is synthesized layer-by-layer. Let P (k) = (P_1 (k), P_2 (k), ..., P_n (k)), the total weight about the k layer element for the overall goal is sorted as follows:

$$w(k) = (w_1(k), w_2(k), \cdots, w_n(k))T = p(k)w(k-1) \quad (9)$$

$$W_i^{(k)} = \sum_{j=1}^{m} P_{ij}^{(k)} W_j^{(k-1)} \quad (i = 1, 2, \cdots, n) \quad (10)$$

By calculation, we can result in a total order weight, as shown in Table 10.

Comprehensive Evaluation (FCE)

The paper sets evaluation index set for k of sustainable development capability of Shandong Energy Group. By above of analysis known the set k for 2 layers factors, the first layer factor contains for K_1 = (A_1, B_1, B_2, B_3, B_4) = (Economic Factor, Social factor, Ecological Factor, Technology Factor); corresponding to the second layer factor K_2 is reflected decomposition index of the first factor K_1, K_2 = (C_1 Coal Industry, C_2 Chemical Industry, C_3 Equipment Manufacturing Industry, C_4 Modern Logistics Industry, C_5 Electrical Power Industry, C_6 New Energy Industry, C_7 Medical Device Industry, C_8 Other Industries).

In this paper, using AHP to determine factor weight M of FCE of sustainable development of Shandong Energy Group, M = (M_1, M_2, ..., M_n), the calculated results as shown in table 10, M = (M_1, M_2, ..., M_n) =(0.293, 0.157, 0.1288, 0.0786, 0.093, 0.1046, 0.0774, 0.0676).

(2) Determination of evaluation set and weight

Combined with Experts' rating, the evaluation of sustainable development capacity of Shandong Energy Group is divided into the following 5 to determine the evaluation set, T = (T_1, T_2, T_3, T_4, T_5) = (Excellent, Good, Fair, Poor, Bad). For evaluation grade we can

respectively assign value, obtain the evaluation grade, $\mu = (2, 4, 6, 8, 10)$. $(0, 2]$ is of bad development state, $(2, 4]$ for poor development state interval, $(4, 6]$ for fair development state interval, $(6, 8]$ for good development state interval, $(8, 10]$ for excellent development state interval.

(3) Determination of membership matrix

Index membership matrix is marked by the expert group, then combined with field research data and taking into account, and by fuzzy evaluation of qualitative indexes to determine the index membership. The membership matrix is made up of experts from Shandong Energy Group as well as Beijing Coal Institute of Energy Economy of China University of Mining & Technology (20 people) to fill out questionnaires and evaluate scoring. The score for comments summary is shown in Table 11.

Table 11. Fuzzy Evaluation Form of Subjective Index

Score	Bad	Poor	Fair	Good	Excellent
Index	0-2	2-4	4-6	6-8	8-10
C_1	0/20 = 0	4/20 = 0.2	2/20 = 0.1	8/20 = 0.4	6/20 = 0.3
C_2	2/20 = 0.1	2/20 = 0.1	4/20 = 0.2	6/20 = 0.3	6/20 = 0.3
C_3	6/20 = 0.3	2/20 = 0.1	4/20 = 0.2	4/20 = 0.2	4/20 = 0.2
C_4	0/20 = 0	0/20 = 0	2/20 = 0.1	8/20 = 0.4	10/20 = 0.5
C_5	6/20 = 0.3	4/20 = 0.2	0/20 = 0	2/20 = 0.1	8/20 = 0.4
C_6	0/20 = 0	0/20 = 0	2/20=0.1	8/20 = 0.4	10/20 = 0.5
C_7	6/20 = 0.3	4/20 = 0.2	4/20 = 0.2	4/20 = 0.2	2/20 = 0.1
C_8	6/20 = 0.3	6/20 = 0.3	6/20 = 0.3	2/20 = 0.1	0/20 = 0

To integrate member matrix $G = M \times T =$

$$G = \begin{bmatrix} 0 & 0.2 & 0.1 & 0.4 & 0.3 \\ 0.1 & 0.1 & 0.2 & 0.3 & 0.3 \\ 0.3 & 0.1 & 0.2 & 0.2 & 0.2 \\ 0 & 0 & 0.1 & 0.4 & 0.5 \\ 0.3 & 0.2 & 0 & 0.1 & 0.4 \\ 0 & 0 & 0.1 & 0.4 & 0.5 \\ 0.3 & 0.2 & 0.2 & 0.2 & 0.1 \\ 0.3 & 0.3 & 0.3 & 0.1 & 0 \end{bmatrix} \times \begin{bmatrix} 2 \\ 4 \\ 6 \\ 8 \\ 10 \end{bmatrix} = \begin{bmatrix} 7.6 \\ 7.2 \\ 5.8 \\ 8.8 \\ 6.2 \\ 8.8 \\ 5.2 \\ 4.4 \end{bmatrix}$$

(4) Calculation score of evaluation index

The paper sets evaluation index set for k of the enterprise sustainable development capability when FCE index set and weight are assured by Shandong Energy Group, and determines index weight M of FCE of sustainable development, M = (0.293, 0.157, 0.1288, 0.0786, 0.093, 0.1046, 0.0774, 0.0676).

The final score of FCE of Shandong Energy Group:

$$Q = M \times G = 69,9293$$

The evaluation results above are shown in Table 12 and Table 13.

Table 12. Integrated Evaluation Results

Single Evaluation					Total Evaluation
Sub-index	B_1	B_2	B_3	B_4	
Score	0.7102	0.6875	0.6585	0.6886	0.6992
Risk rating	Good	Good	Good	Good	Good
Index weight	0.6383	0.07	0.102	0.1898	1
Score	0.7102	0.6875	0.6585	0.6886	0.6992

Table 13. Evaluation Results of Index

Assessment Elements	Assessment Score	Status Grade	Weight
C_1	0.76	Good	0.293
C_2	0.72	Good	0.157
C_3	0.58	General	0.1288
C_4	0.88	Excellent	0.0786
C_5	0.62	Good	0.093
C_6	0.88	Excellent	0.1046
C_7	0.52	General	0.0774
C_8	0.44	General	0.0676

4.2. Analysis of Results on FCE

Actually index size is calculated to the industry's prospects for sustainable development, higher the evaluation results, better the growth prospects. Conversely, lower the evaluation results, smaller the growth prospects. We will sort in accordance with the sustainable development prospects of these industries, the result as follows: $C_6 = C_4 > C_1 > C_2 > C_5 > C_3 > C_7 > C_8$. Then for drawing by scores of these index factors and discrimination cases of importance weights, with bubble size for weight and ordinate for index evaluation scoring metrics, the result is shown in Fig. (2).
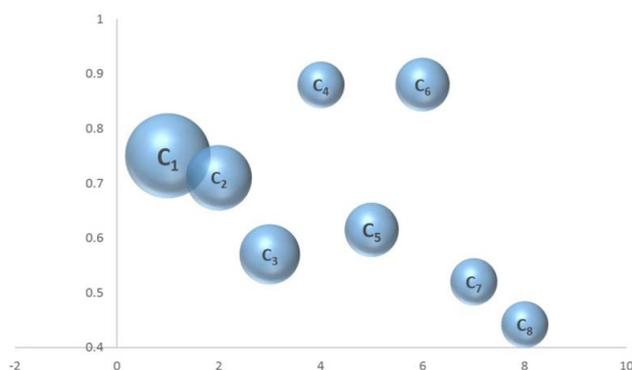
Figure 2. Evaluation index on sustainable development in Shandong Energy Group

Single factor analysis of risk assessment results are as follows:

C_1 Coal Industry: as a basis of Shandong Energy Group, the sustainable development prospects of 0.76 points belong to the normal state. Although pollution from coal, mine disaster and other issues affecting the sustainable development evaluation, and taking into account the irreplaceable position in coal in China's economic development and the proportion of industry, the coal industry is still the supporting industry of the enterprise.

C_2 Chemical Industry: Chemical Industry of 0.72 points, closely followed by Coal Industry, which belongs to the good prospects. Chemical Industry and Coal Industry have a lot of tightness, with planned projects of Yili (in Xinjiang Province) coal-to-gas project under construction and coal-to-olefins and ethylene glycol. The representation of a new kind of coal-chemical industry is on the rise. This is a portal opening to the Western and one of the key areas of development of China in 21st century. Meanwhile in oil shale mining, the enterprise has independent intellectual property rights, as the first one implementing fully mechanized mining and anti-mining technology in the country, achieve an annual production capacity of 3 million tons. The enterprise ensures sustainable development of Chemical Industry with the guidance concept of circular economy and ecological industry.

C_3 Equipment Manufacturing Industry: Equipment Manufacturing Industry of 0.58 points, the prospects of a general. At present, China's Equipment Manufacturing Industry tends to be saturated, and does not have the special status of coal, ranking 6th are normal. The remanufacturing technology and capacity of mining equipment is leading currently. For Shandong Energy Group, Equipment Manufacturing Industry basically meets the use of production and external output. Overall, due to service in the Coal Industry and some of the leading technology, the industry has the potential for sustainable development.

C_4 Modern Logistics Industry: 0.88 points of Modern Logistics Industry, New Energy Industry and tied for the first place. Modern Logistics Industry as a service industry, improving the enterprise balance of region materials and energy by mode of transportation, is one of the important industries to increase scale. Shandong Energy Group rely on inter-provincial railways, roads and ports and other critical infrastructure, overall planning, rational distribution, system integration of materials flow, trade flow, funds flow and information flow, implement and improve supply chain management. In an increasingly competitive case of coal, logistics cost and speed will determine the coal sales. Modern Logistics Industry has good prospects of sustainable development.

C_5 Electrical Power Industry: Electric Power Industry of 0.62 points, it is well below the state. Shandong Energy Group is to focus on the development of upstream and downstream industry chain for a solid foundation. Electric power Industry is one of the most important industries to increase value. The enterprise is constructing of low calorific value fuel, comprehensive utilization power plants, and new energy power generation projects by the way of large power enterprises to develop and create coal-electricity integration industry chain.

C_6 New Energy Industry: New Energy Industry of 0.88 points, tied for the first place with Modern Logistics Industry. Due to new energy with clean sources, environmental protection and safety features, New Energy Industry are expected prospects for sustainable development by experts. But relatively late for entering, the enterprise does not have a competitive advantage, so Energy Group should lean toward the industry and develop new energy.

C_7 Medical Device and Health Industry, C_8 Others: Medical Device Industry and Other Industries ranked in the 7th and 8th respectively, sustainable development in General. Shandong Power Group is to promote medical device technology and market development, implement leap-forward development of "medical service-pharmaceutical-medical and health". The enterprise has a number of other industries, such as producer services, to other coal business in geological prospecting, mining support activities, professional and technical services and other forms of industry. The sustainable development capability of Medical Device Industry and Other Industries is less than other industries.

Overall, the evaluation of sustainable development of Shandong Energy Group Co., Ltd. total 0.699 point, in good condition, but not yet achieved Elite status. It should be a cause of leaping-forward deve-

lopment in the transformation process of high priority of the enterprise[7].

5. Conclusions

By the qualitative and quantitative analysis on the basis of the production system, there receives the significance of establishing the index system of the energy enterprise in sustainable development. At first, to assign a value through sustainable development indicators by using the Delphi method survey data; secondly, combined with AHP to analyze and test the evaluation index weight; finally, in order to effectively evaluate the overall by using FCE to describe the results[8].

Conflict of Interest

The author confirms that this article content has no conflict of interest.

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