



Capital Allocation Efficiency Evaluation of Energy Conservation and Environmental Protection Enterprises in the Yangtze River Delta of China

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ABSTRACT

Various measures are implemented to promote the construction of China's ecology. These measures aim to accelerate the green transformation of the economy and promote the rapid development of energy conservation and environmental protection industry under the promotion of relevant policies. Consequently, the numbers of enterprises and the market scale have shown explosive growth. However, energy conservation and environmental protection enterprises are faced with lack of technological innovation, shortage of capital, and high cost. Effective measures must optimize the efficiency of capital allocation. To evaluate the capital allocation efficiency of energy conservation and environmental protection enterprises, 26 listed companies of energy conservation and environmental protection in the Yangtze River Delta of China were selected as samples. Monetary capital, accounts receivable, inventory, fixed assets, and construction in progress were used as input scalars. Net profit, undistributed profit, and surplus reserve were used as output variables. The Data Envelopment Analysis (DEA) model was used for analysis. Results show that capital allocation efficiency of 11 sample companies is DEA-effective. Power, heat, gas, water production, and supply industry rank first with the real estate industry divided by industry. Shanghai ranks first in the regional division. Specific improvement strategies are proposed for non-DEA effective sample enterprises.

INTRODUCTION

The energy conservation and environmental protection industry provide technical basis and equipment support for energy conservation, circular economic development, and environmental protection. Among the specific industries included are energy conservation, resource recycling, and environmental protection equipment, which are involved in conservation, energy-saving products and services (Wang 2017). The 13th Five-Year Plan for the development of energy conservation and environmental protection industry proposes to develop energy conservation and environmental protection industry and strengthen the prevention and control of air, water, soil, and other pollution. At the same time, by 2020, energy conservation and environmental protection industry will become a pillar of the national economy.

In 2018, China's environmental protection and energy conservation support reached 635.3 billion yuan, with a year-on-year increase of 13%. The proportion of financial expenditure of the environmental protection industry in the GDP has increased as well. In the same year, the proportion of financial expenditure of the environmental protection industry in GDP was 0.7%. In recent years, China's energy conservation and environmental protection industry has grown rapidly, with the total output value increasing from

approximately 3 trillion yuan in 2012 to 5.8 trillion yuan in 2017 and breaking through 7 trillion yuan in 2018. This growth was driven by the acceleration of ecological civilization construction, establishment and implementation of demonstration pilot projects in multiple circular economy fields, and improvement of public awareness of energy conservation and environmental protection. With the continuous increase of policies and regulations, such as environmental protection tax and emission permit system, the market space of China's energy conservation and environmental protection industry will continue to expand in the future (Peng et al. 2017, Bravo-Macias et al. 2019). Hence, the output value of energy conservation and environmental protection industry is expected to exceed 10 trillion yuan in 2020. However, the development of energy conservation and environmental protection industry depends on the forced promotion of policies (Xiong et al. 2010, Xiong et al. 2020). Driven by the policy, the potential demand for energy conservation and environmental protection will become a huge market space, which can attract the convergence of various capitals and enterprises and stimulate new employment demand. The development of energy conservation and environmental protection to a certain scale can realize the win-win of social and economic benefits.

From the perspective of industrial structure, the further expansion of industrial-scale can result in the large proportion for energy-saving and environmental protection equipment manufacturing industry. Furthermore, the proportion of the energy-saving and environmental protection service industry can further increase. With the acceleration of the market-oriented process, new modes and formats are rapidly emerging in the energy-saving and environmental protection industry. These trends continue the improvement of industrial scale and technology level. At the same time, the government continues to issue policies that promote enterprises to increase capital investment and subsequently form a diversified financing pattern (Sun 2018). However, problems such as unreasonable structure, irregular market, low industrial concentration, weak technological innovation ability (Yan et al. 2019), fund shortage and imperfect service system must be solved. The energy conservation and environmental protection industry is a heavy asset industry with large investment and long cycle. However, many small and medium-sized energy conservation and environmental protection enterprises in China lack financing capacity and serious capital shortage (Hao et al. 2018). According to the Development Research Center of the State Council, the corresponding investment demand for green development in China from 2015 to 2020 is approximately 2.9 trillion yuan per year. The proportion of government investment only accounts for 10%–15%, which is more than 80% of the funds needed to be solved by social capital. Thus, the financing demand for green development is in great shortage. Therefore, the efficiency of capital allocation of the energy conservation and environmental protection industry is worth exploring. The input is capital, whereas output comprises the indicators of operating results and equity. The source of capital includes equity capital and debt capital, and assets are the external form of expression. Assets come in various kinds. Different input combinations determine different output forms and output quantities. In the Yangtze River Delta region of China, economic development is fast. Environmental protection measures are increasing daily and environmental protection industrial policies are constantly issued. Studying the capital allocation efficiency of energy-saving and environmental protection enterprises in this region is significant.

The rest of this study is arranged as follows. Section 1 presents the design of research model, construction of the data envelopment analysis (DEA) model, selection of samples and indicators, and the extraction of data. Section 2 is the empirical analysis, which focuses on the DEA analysis results from the overall, industry, and regional situations, and puts forward the improvement strategy of capital allocation efficiency for energy-saving and environmental protection enterprises. Section 3 concludes this study.

METHODS

Modelling

In 1978, Charles and Cooper established an efficiency evaluation method known as the data envelopment analysis (DEA). DEA is a quantitative analysis method that aims to evaluate the effectiveness of comparable similar evaluation objects by using a linear programming method using multiple inputs and output indicators. The first DEA model proposed by Charles, Cooper, and Rhodes is the C2R model, which analyses and evaluates the effectiveness of decision-making units. The second DEA model is called the BC2 model, which was proposed by Banker, Charles, and Cooper in 1984. As an extension of the C2R model, the BC2 model measures the comprehensive efficiency of multiple inputs and output decision-making units under the assumption of variable returns to scale and distinguishes comprehensive efficiency into pure technical and scale efficiency. When choosing the BC2 model for efficiency evaluation, an input- or output-oriented model can be used (Yu et al. 2016). This study fully considers the limited input of energy-saving and environmental protection enterprise resources and tests the output of energy-saving and environmental protection enterprises under a given capital input. Hence, the output-oriented BC2 model is selected.

The basic principle of BC² model is that if given n DMUs, each DMU_j ($j = 1, 2, \dots, n$) uses p inputs, namely X_{ij} ($i = 1, 2, \dots, p$), and produces q outputs, namely Y_{kj} ($k = 1, 2, \dots, q$). The relative efficiency value of m DMUs can be obtained from the following models:

$$\left\{ \begin{array}{l} \text{Max } h_m = \frac{\sum_{k=1}^q u_k Y_{km} - U_0}{\sum_{i=1}^p v_i X_{im}} \\ \text{s.t. } \frac{\sum_{k=1}^q u_k Y_{kj}}{\sum_{i=1}^p v_i X_{ij}} \leq 1, j = 1, 2, \dots, n \end{array} \right. \quad \dots(1)$$

In formula (1), u_k and v_i are weight coefficients for measuring output input, with the relation $u_k, v_i \geq \varepsilon \geq 0$. Generally, the larger h_m is, the more output can be obtained when the input of the m decision unit is certain. Therefore, the maximum value of h_m can be examined by trying to change as many weight coefficients as possible, which can lead to judging whether the m^{th} decision-making unit is relatively optimal in the decision-making unit. According to the linear programming technique, we can obtain the optimal solution h_m^* of the equation. If the optimal solution $h_m^* = 1$, then the decision unit DMU_m is DEA-efficient.

Variables

According to the component stocks of “beautiful China,” we reduced the sample range and considered the following factors when screening. The first is selecting the samples from the Yangtze River Delta of China, which included listed companies in Zhejiang, Jiangsu, and Anhui Provinces, and Shanghai. The second is considering that the number of samples is equal to or exceeds the total number of input and output indicators twice, according to the requirements of the DEA model for samples and indicators. In this study, 26 listed companies of artificial intelligence in China are selected as samples, that is, the decision unit (DMU) in the model.

Referring to the research on capital input and output of the home appliance industry (Xu et al. 2017), we considered the characteristics of energy conservation and environmental protection industry. Thus, we selected monetary fund (X_1), account receivable (X_2), inventory (X_3), fixed assets (X_4), and construction in progress (X_5) as capital input variables of energy conservation and environmental protection enterprises. We selected net profit (Y_1), undistributed profit (Y_2), and surplus reserve (Y_3) as capital output variable of energy conservation and environmental protection enterprises, as shown in Table 1 below:

Data Source

Variable data comes from the Wind Database. Monetary capital, accounts receivable, inventory, fixed assets, and construction in progress are presented from the opening and closing balance of corresponding subjects of sample balance sheets in 2017 and 2018. Net profit, undistributed profit, and surplus reserve come from the opening and closing balance of corresponding subjects of sample balance sheets in 2017 and 2018. Table 2 presents variable data after calculation. We adjusted the variable from the negative value to 0 in the empirical analysis.

RESULTS

Capital Allocation Efficiency Analysis

The original data of input and output variables of 26 skilled environmental protection enterprises in the Yangtze River Delta of China were imported into the DEAP2.1 software, and the parameters of the guidance file were set. The decision-making unit was 26, time was 1 year, the number of output indicators was 3, the number of input indicators was 5, and output leading type was 1 = OUTPUT ORIENTATED, 1 = VRS, 0 = DEA (MULTI-STAGE).

Overall Results

Based on the BC² model, the operation results of the DEA of business efficiency of enterprises in the Yangtze River Delta are shown in Table 3. The average comprehensive efficiency of capital allocation and the pure technical and scale efficiency of 26 energy-saving and environmental protection enterprises in the Yangtze River Delta are 0.709, 0.739, and 0.95, respectively. At the same time, the results showed that the DEA of 11 sample enterprises is effective, having accounted for 42.308%.

In comprehensive efficiency, 11 enterprises, such as Weifu Group, Cec Environmental Protection, and Weiming Environmental Protection, are DEA-effective, with a value of 1. Comprehensive efficiency of *St Feida is only 0.096, and the comprehensive efficiency of 11 sample enterprises is lower than the average level, indicating that the capital allocation efficiency of energy-saving and environmental protection enterprises in the Yangtze River Delta is different.

In pure technical efficiency, 11 sample enterprises are below the average level, with a minimum value of 0.097 (*ST Feida). However, although Jiaao’s environmental protection has reached 1, its scale efficiency is insufficient, resulting in a comprehensive efficiency of less than 1.

Table 1: Capital input and output variables of energy conservation and environmental protection enterprises.

Variable type	Variable name	Computing method
Input variables	Monetary fund (X_1)	(Initial balance + Ending balance) / 2
	Account receivable (X_2)	
	Inventory (X_3)	
	Fixed assets (X_4)	
	Construction in progress (X_5)	
Output variables	Net profit (Y_1)	
	Undistributed profit (Y_2)	
	Surplus reserves (Y_3)	

In scale efficiency, only six sample enterprises are below the average level, with a minimum value of 0.639 (Anhui Construction Engineering Group). The scale efficiencies of Skyray Instrument, Chuangyuan Technology,

and Guozhen Environmental Protection Technology are 0.999, 0.997, and 0.994, respectively, which are close to 1. The pure technical efficiency indicates that comprehensive efficiency is not high.

Table 2: Original data of capital input and output of energy conservation and environmental protection enterprises in the Yangtze River Delta of China (Unit: 100 Million Yuan).

Serial number	Code	Securities abbreviation	Input variables					Output variables		
			X_1	X_2	X_3	X_4	X_5	Y_1	Y_2	Y_3
DMU1	000551	Chuangyuan Technology	8.364	5.410	9.534	8.249	0.968	1.455	5.828	1.514
DMU2	000581	Weifu Group	28.675	19.577	14.385	26.461	1.334	25.568	104.043	5.101
DMU3	000925	UniTTEC	8.950	14.096	4.271	3.389	1.759	0.744	-0.933	0.159
DMU4	002015	GCL Energy Technology	0.557	0.363	1.370	0.660	0.000	0.073	-11.268	0.180
DMU5	002479	Fuchunjiang Environmental Thermoelectric	5.897	2.529	1.307	29.265	1.310	2.921	9.381	1.556
DMU6	002499	*ST Kelin	1.224	6.424	0.057	2.018	0.018	-2.505	-0.938	0.247
DMU7	002645	Huahong Technology	3.845	1.850	5.916	3.927	0.111	1.415	4.136	0.445
DMU8	300090	Shengyun Environment Protection Group	8.194	11.888	9.092	6.892	5.523	-22.230	-14.956	1.066
DMU9	300165	Skyray Instrument	4.946	2.935	3.680	2.035	0.070	0.825	3.292	0.563
DMU10	300172	Cec Environmental Protection	1.157	4.343	1.882	1.185	3.741	1.248	5.576	0.632
DMU11	300190	Welle Environmental Group	10.631	9.833	11.798	4.973	2.335	1.956	5.528	0.501
DMU12	300203	Focused Photonics	10.814	17.030	12.833	4.819	0.889	5.850	18.294	1.681
DMU13	300262	Safbon Water Service	5.139	4.046	5.916	1.596	0.196	1.224	5.675	0.495
DMU14	300266	Xingyuan Environment Technology	6.209	14.155	43.119	3.890	0.138	-4.554	1.297	0.414
DMU15	300272	Canature Health Technology Group	1.258	1.501	1.375	4.630	2.527	1.801	2.582	0.676
DMU16	300385	Xuelang Environmental Technology	2.139	4.934	4.389	3.439	0.027	0.571	3.512	0.495
DMU17	300388	Guozhen Environment Protection Technology	9.317	8.623	5.824	2.233	7.376	2.593	8.093	0.618
DMU18	300495	Misho Ecology & Landscape	13.978	18.192	14.752	0.736	0.028	3.354	9.547	0.610
DMU19	600475	Huaguang Boiler	16.298	25.320	14.429	19.210	4.096	4.702	36.155	2.274
DMU20	600481	Shuangliang Eco-energy Systems	12.393	7.484	4.179	4.788	0.341	1.748	1.811	3.484
DMU21	600502	Anhui Construction Engineering Group	86.058	168.370	256.454	30.805	0.536	8.007	27.037	3.924
DMU22	600526	*ST Feida	9.004	12.557	24.798	9.993	2.429	-3.127	-1.536	0.353
DMU23	600649	Chengtou Holding	53.396	0.502	208.799	0.198	0.000	14.683	120.883	22.518
DMU24	601199	Jiangnan Water	9.926	1.798	0.353	19.691	5.019	2.191	11.353	1.664
DMU25	603568	Weiming Environment Protection	8.636	3.015	0.900	1.070	7.855	6.225	15.636	1.459
DMU26	603822	Jiaao Enprotech Stock	2.900	0.423	2.561	2.919	1.461	0.543	3.335	0.401
Average			12.689	14.123	25.538	7.657	1.926	2.203	14.360	2.040
Maximum			86.058	168.370	256.454	30.805	7.855	25.568	120.883	22.518
Minimum			0.557	0.363	0.057	0.198	0.000	-22.230	-14.956	0.159

Table 3: Overall results of capital allocation efficiency of energy conservation and environmental protection enterprises in the Yangtze River delta of China.

DMU	Comprehensive efficiency	Pure technical efficiency	Scale efficiency	Increase or decrease of returns to scale	DMU	Comprehensive efficiency	Pure technical efficiency	Scale efficiency	Increase or decrease of returns to scale
DMU1	0.586	0.588	0.997	irs	DMU14	0.156	0.159	0.982	irs
DMU2	1	1	1	-	DMU15	1	1	1	-
DMU3	0.157	0.170	0.922	irs	DMU16	0.821	0.892	0.921	irs
DMU4	1	1	1	-	DMU17	0.397	0.399	0.994	drs
DMU5	1	1	1	-	DMU18	1	1	1	-
DMU6	1	1	1	-	DMU19	0.620	0.642	0.967	drs
DMU7	0.571	0.614	0.930	irs	DMU20	1	1	1	-
DMU8	0.356	0.398	0.895	drs	DMU21	0.268	0.419	0.639	drs
DMU9	0.716	0.716	0.999	drs	DMU22	0.096	0.097	0.982	drs
DMU10	1	1	1	-	DMU23	1	1	1	-
DMU11	0.281	0.290	0.967	irs	DMU24	1	1	1	-
DMU12	0.943	0.983	0.959	irs	DMU25	1	1	1	-
DMU13	0.607	0.847	0.717	irs	DMU26	0.863	1	0.863	irs

According to the increase and decrease of returns to scale, 11 DEA-effective sample enterprises show the same returns to scale, nine sample enterprises show the same returns to scale. Hence, 76.923% of sample enterprises show the same returns to scale. Only six sample enterprises show decreasing returns to scale, accounting for 23.077% of the total sample enterprises. This result is closely related to the state-issued relevant policies that aim to strengthen environmental protection and encourage the development of environmental protection enterprises. Many energy-saving and environmental protection enterprises, under the incentive of preferential policies, increase capital investment, promote

the continuous growth of market scale, and seize market share with the rapid growth of enterprise scale.

Results by industry: Table 4 shows the average values of comprehensive, purely technical, and scale efficiencies of the capital allocation efficiency of enterprises in different industries: power, heat, gas, and water production and supply industry (1), real estate industry (1) > manufacturing industry (0.671) > water conservancy, environment, and public facilities management industry (0.634) > construction industry (0.268). Among the 13 manufacturing enterprises, five enterprises have increasing returns to scale, and three enterprises have unchanged returns to scale. Among the seven

Table 4: Results of capital allocation efficiency of energy conservation and environmental protection enterprises in the Yangtze River Delta of China by Industry.

Industry	Type	Comprehensive efficiency	Pure technical efficiency	Scale efficiency
Manufacturing industry	Average	0.671	0.700	0.957
	Minimum	0.096	0.097	0.863
Water conservancy, environment and public facilities management	Average	0.634	0.671	0.951
	Minimum	0.156	0.159	0.717
Power, heat, gas and water production and supply industry	Average	1	1	1
	Minimum	1	1	1
Real estate industry	Average	1	1	1
	Minimum	1	1	1
Construction industry	Average	0.268	0.419	0.639
	Minimum	0.268	0.419	0.639

Table 5: Results of capital allocation efficiency of energy conservation and environmental protection enterprises in the Yangtze River delta of China by region.

Region	Type	Comprehensive efficiency	Pure technical efficiency	Scale efficiency
Jiangsu	Average	0.815	0.826	0.983
	Minimum	0.281	0.290	0.921
Zhejiang	Average	0.602	0.630	0.958
	Minimum	0.096	0.097	0.863
Shanghai	Average	0.869	0.949	0.906
	Minimum	0.607	0.847	0.717
Anhui	Average	0.340	0.405	0.843
	Minimum	0.268	0.398	0.639

water conservancy, environment, and public facility management enterprises, three enterprises show increasing returns to scale, and only one enterprise indicates decreasing returns to scale. The capital allocation efficiency of power, heat, gas, and water production and supply enterprises is DEA-effective, and the returns to scale remain unchanged. Only one real estate enterprise and its capital allocation efficiency is DEA-efficient, and the returns to scale remain unchanged. The number of construction enterprises is 1, and the returns to scale decrease. Power, heat, gas, and water production and supply enterprises belong to government monopoly enterprises that have strong capital investment and stable market. However, the construction industry has high technical standards, increased requirements, slow technological innovation, and long capital return cycle. The manufacturing industry has many kinds, a large number of enterprises, and a variety of products. Several enterprises actively invest in capital, accelerate the research and development of energy conservation and environmental protection technology, and quickly seize the market. Other enterprises may maintain the status quo or change the original business scope, resulting in overall scale decline.

Results by region: According to Table 5, the average values of comprehensive, purely technical, and scale efficiencies of enterprise capital allocation in different regions are Shanghai (0.869) > Jiangsu (0.815) > Zhejiang (0.602) > Anhui (0.340). Among the 13 enterprises in Zhejiang Province, four enterprises are with increasing returns to scale, seven enterprises with unchanged returns to scale, and only two enterprises are with decreasing returns to scale. Among the seven enterprises in Zhejiang Province, four enterprises have increasing returns to scale, and only one enterprise with decreasing returns to scale. Among the three enterprises in Shanghai, two enterprises are with unchanged returns to scale, and one enterprise with increasing returns to scale. It shows that decreasing returns to scale of the three enterprises in Anhui Province. Shanghai has good location advantages and

financial and human resources. It has also issued a series of measures to encourage the development of energy-saving and environmental protection enterprises. However, due to the relatively poor geographical environment, lack of high-level talents, and technological innovation, the overall efficiency of the capital allocation of energy-saving and environmental protection enterprises is low. Jiangsu and Zhejiang Provinces are strong economic provinces and have strong capital, human resources, and technical support. Consequently, the energy-saving and environmental protection enterprises in those provinces have high capital allocation efficiency and show rapid growth.

Improvement Strategy of Capital Allocation Efficiency

Table 6 shows the many improvements in the input and output variables of non-DEA effective energy conservation and environmental protection enterprises in the Yangtze River Delta. Taking *ST Feida as an example, its capital allocation efficiency projection points on the production front are (0, 0, 3.591) and (9.004, 2.451, 24.798, 4.169, 1.862), whereas its initial input and output are (9.004, 12.557, 24.798, 9.993, 2.429) and (-3.127, -1.536, 0.353), respectively. As the negative output is adjusted to 0 in DEA analysis, *ST Feida should adjust its net profit by 3127 million RMB, the undistributed profit of 153.6 million RMB, and surplus reserve of 323.8 million RMB. When DEA is effective, *ST Feida can reduce the accounts receivable of 1.0106 billion RMB, fixed assets of 580.1 million RMB, and construction in progress of 56.7 million RMB. The many accounts receivable and fixed assets in *ST Feida lead to the high capital occupation. Poor performance leads to continuous losses of the enterprise. Thus, launching relevant preferential strategies, recovering accounts receivable, promoting inventory sales, and speeding up the turnover of fixed assets are necessary. For example, the investment of Anhui Construction Engineering Group is (86.058168, 370256.454, 30.805, 0.536). The first four inputs are the highest level in the industry, but the

Table 6: Improvement strategy for capital allocation efficiency of energy conservation and environmental protection enterprises in the Yangtze River Delta of China.

DMU	Comprehensive efficiency	Improvement strategy							
		Output variables			Input variables				
		Y ₁	Y ₂	Y ₃	X ₁	X ₂	X ₃	X ₄	X ₅
DMU1	0.586	2.798	9.914	2.568	8.360	4.108	9.530	8.250	0.970
DMU2	1	25.568	104.043	5.101	28.675	19.577	14.385	26.461	1.334
DMU3	0.157	4.351	0	1.000	6.770	5.091	4.270	3.390	1.760
DMU4	1	0.073	0	0.180	0.557	0.363	1.370	0.660	0
DMU5	1	2.921	9.381	1.556	5.897	2.529	1.307	29.265	1.310
DMU6	1	0	0	0.247	1.224	6.424	0.057	2.018	0.018
DMU7	0.571	2.296	10.119	0.943	3.643	1.850	5.920	2.646	0.110
DMU8	0.356	0	0	2.691	8.190	4.332	9.090	4.570	1.404
DMU9	0.716	1.145	4.677	0.782	2.884	2.584	3.680	2.030	0.070
DMU10	1	1.248	5.576	0.632	1.157	4.343	1.882	1.185	3.741
DMU11	0.281	6.750	26.295	2.119	10.630	6.276	11.800	4.970	2.340
DMU12	0.943	5.951	23.893	1.819	10.810	8.419	12.830	4.820	0.890
DMU13	0.607	1.773	6.692	0.654	4.418	4.050	5.920	1.600	0.200
DMU14	0.156	0	12.979	2.580	6.210	0.438	23.398	0.831	0.140
DMU15	1	1.801	2.582	0.676	1.258	1.501	1.375	4.630	2.527
DMU16	0.821	0.837	3.936	0.585	1.889	0.795	4.390	1.236	0.030
DMU17	0.397	6.522	20.264	1.922	9.320	3.918	5.820	2.230	6.782
DMU18	1	3.354	9.547	0.610	13.978	18.192	14.752	0.736	0.028
DMU19	0.62	13.351	56.325	3.537	16.300	11.614	14.430	13.373	2.376
DMU20	1	1.748	1.811	3.484	12.393	7.484	4.179	4.788	0.341
DMU21	0.268	19.102	114.043	15.447	43.363	8.247	129.867	10.862	0.536
DMU22	0.096	0	0	3.591	9.004	2.451	24.798	4.169	1.862
DMU23	1	14.683	120.883	22.518	53.396	0.502	208.799	0.198	0.000
DMU24	1	2.191	11.353	1.664	9.926	1.798	0.353	19.691	5.019
DMU25	1	6.225	15.636	1.459	8.636	3.015	0.900	1.070	7.855
DMU26	0.863	0.543	3.335	0.401	2.900	0.423	2.561	2.919	1.461

output is not high. According to the improvement strategy, the projection point of capital allocation efficiency on the production front is (19.102, 114.043, 15.447) and (43.363, 8.247, 129.867, 10.862, 0.536). The comprehensive efficiency of the salary cost allocation of Anhui construction is only 0.268, and the scale efficiency is the lowest (0.639) of the sample enterprises. These figures show that the returns on the scale are decreasing, that is, enterprises do not give full play to the scale effect, as many investments cause great waste and consume most of the profits. Therefore, enterprises should increase output and adjust net profit of 1.109 billion yuan, the undistributed profit of 9.106 billion yuan, and surplus reserve of 1.152 billion yuan. In addition, enterprises should consider

reducing diversified operation, centralizing advantages, and improving profit point. Besides, according to the results of Jiaao Enprotech Stock, although pure technical efficiency reaches 1, its scale efficiency is insufficient at only 0.863, which increases the scale reward. Hence, its scale must be expanded, and its scale advantage should be given full play.

CONCLUSION

Through the analysis of the capital allocation efficiency of energy-saving and environmental protection enterprises in the Yangtze River Delta of China, this study mainly draws the following conclusions. First, the comprehensive efficiency of

the capital allocation of energy-saving and environmental protection enterprises is high at an average value of 0.709. The scale efficiency is 0.951. Overall, 42.308% of sample enterprises realize DEA efficiency, which shows that the capital utilization efficiency and income of energy-saving and environmental protection enterprises are good. Second, the comprehensive efficiency of the capital allocation of energy-saving and environmental protection enterprises is different, as the highest is 1, and the minimum is 0.096. Hence, huge differences are observed at the development level and in the strength among enterprises, and the market competition is intense. Third, differences are found in the average value of comprehensive efficiency among different industries, including power, heat, gas, and water production and supply industry (1), real estate industry (1), manufacturing industry (0.671), water conservancy, environment and public facilities management industry (0.634), and construction industry (0.268); Fourth, differences are observed in comprehensive efficiency among different regions, such as Shanghai (0.869), Jiangsu (0.815), Zhejiang (0.602), and Anhui (0.340). Fifth, more than two-thirds of the sample enterprises show constant or increasing scale. Hence, capital is not only in the stage of increasing in energy-saving and environmental protection enterprises but also forms scale effect, realizes effective integration of resources, and improves comprehensive income. Sixth, from the perspective of monetary capital, accounts receivable, and fixed assets, the average values are 1268.9, 1413.3, and 765.7 million RMB, respectively. The fixed assets are at a low level, whereas accounts receivable are too many. Hence, attention should be paid to prevent the risk of bad debts of accounts receivable. In addition, the average value of inventory is 2553.8 million RMB, which is at a high level. Hence, a necessary program is to speed up inventory turnover and prevent inventory depreciation.

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