

The Study on the Evaluation of Regional Brand's Innovation Capacity----Insights from Manufacturing Companies in Jiangmen of China

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Abstract

Drawing on transformation and upgrading of advanced equipment manufacturing industry, this paper proposed an approach of how to evaluate the performance of advanced equipment manufacturing companies. Factor Analysis is adopted to analyze the innovation of regional company. After analyzing the overall scores and ranks of the innovation capacity advanced equipment companies, we conclude that Transport Equipment Manufacturing industry has prominent advantages and potentials in contributing Jiangmen's development and the key of creating Jiangmen's regional brands lies in developing and maintaining advantages of Transport Equipment Manufacturing industry. The results provides important theoretical and empirical implications to Jiangmen's industry transformation and upgrading.

Keywords: Regional Brand; Industry's Innovation Capacity; advanced equipment and manufacture; Evaluation index system; Factor analysis; Jiangmen of China

1. Overview

Regional brand industry is the most important industry of the region. Regional

comprehensive strength to a large extent depends on regional industry brand ranking of the region core of the comprehensive competitiveness. Advanced equipment manufacturing industry is the pillar industry of our country economic development, the foundation of industrial development, a sign of the regional industrial level and the core of the regional brand competitive advantage. As a member of the "pearl river delta" region, Jiangmen in the plan for the twelfth five-year national economic and social development compendium in Jiangmen (herein after referred to as the "five-year plan"), which clearly put forward form the economic structure of taking advanced manufacturing industry as the core and modern service industry developing coordinatedly.

On the basis of advanced transformation and upgrading of equipment manufacture, this paper built the index system of the evaluation of advanced equipment manufacturing industry brand innovation capacity, carries to analyze to the advanced industry's brand of equipment manufacture of Jiangmen, and provided theoretical guidance and decision-making basis for creating the regional brand in Jiangmen.

2. Construction of evaluation index system on the innovation capacity of regional brand

In the line with principles of science, rationality, comprehensiveness, systemic and operability, this text has chosen the evaluation index system including 3 classes and 20 indexes from economic creativity, capacity of scientific and technological research and development, environmental protection of resources. Index A to reflect the economic capacity to create, including 7 indicators: total industrial output value, industrial added value, industrial added value rate, the contribution rate of total assets, total assets profit rate, labor productivity and cost profit rate. Index B to reflect the science

and technology R&D capacity, including 6 indicators: Per capita R&D funds, R&D fund industry accounted for the proportion of the total investment, investment funds, the annual R&D new product output value, output value of new products and investment in fixed assets. Index C to reflect the environment and resources protection capacity, including 7 indicators: Comprehensive energy consumption, million yuan output value of energy consumption, energy-saving rate, coal consumption, fuel consumption and power consumption. Specific indicators are shown in Table 1.

Table 1 evaluation index system of regional industry brand

First-level indicators	Secondary indexes	Secondary index code	Unit of secondary indicators
Economic creation capacity (A)	Gross value of industrial output	A1	Hundred million
	The added value of industrial	A2	Hundred million
	Industrial added value rate	A3	%
	Total assets contribution	A4	%
	Total assets profit margins	A5	%
	The overall Labour productivity	A6	Yuan per person each year
	The cost profit margins	A7	%
R&D capacity (B)	R&D spending per capita	B1	Yuan per person
	R&D expenditure intensity	B2	%
	The annual R&D spending	B3	Ten thousand
	New products output	B4	Hundred million
	New products output ratio	B5	%
	Fixed assets investment.	B6	Ten thousand
Environment and resources protection (C)	Comprehensive energy consumption	C1	Tce
	Ten thousand yuan output value of energy consumption	C2	Tce/ten thousand

Energy saving rate	C3	%
Raw coal consumption	C4	Ton
Fuel consumption	C5	Ton
The power consumption	C6	Million kilowatt hour

3. Empirical analysis of the key industry of city branding in Jiangmen

3.1. Data collection

For the classification of the advanced equipment manufacturing industry, adopt classification of GB/T4754-2002 which namely to divide 7 sub trades into equipment manufacture in this text, and make research on the regional brand innovation capacity of the equipment manufacturing industry. Regard 7 sub trades of advanced equipment manufacturer as the system frame of the evaluation index, collect the initial data of 7 sub trades of equipment manufacture of Jiangmen.

3.2. Factor Analysis

According to the initial data listed in Table 2, using statistical analysis software SPSS19.0, analysis Jiangmen the equipment manufacturing industry of regional brand innovation capacity for factor with seven

sample sizes, 19 variables.

3.2.1 Determine the number of common factor

Usually public factor is selected according to the principle of characteristic roots is greater than 1, in this paper we elected to four public factor, the cumulative variance contribution rate reached 93.91%, is said that this four common factor include the basic information of the 19 variables, that is to say, we can be through the four common factor to explain all the original variable contains all the information. The results are shown in Table 2.

Table 2 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.849	46.572	46.572	8.849	46.572	46.572
2	5.461	28.741	75.313	5.461	28.741	75.313
3	2.111	11.111	86.424	2.111	11.111	86.424
4	1.423	7.487	93.911	1.423	7.487	93.911
5	.736	3.874	97.785			
6	.421	2.215	100.000			
7	5.953E-16	3.133E-15	100.000			
8	4.354E-16	2.291E-15	100.000			
9	3.835E-16	2.018E-15	100.000			
10	2.365E-16	1.245E-15	100.000			
11	1.718E-16	9.043E-16	100.000			
12	8.239E-17	4.336E-16	100.000			
13	-2.370E-18	-1.247E-17	100.000			

14	-6.677E-17	-3.514E-16	100.000
15	-1.020E-16	-5.370E-16	100.000
16	-2.738E-16	-1.441E-15	100.000
17	-3.347E-16	-1.762E-15	100.000
18	-3.494E-16	-1.839E-15	100.000
19	-5.128E-16	-2.699E-15	100.000

3.2.2 The factor loading matrix and component score coefficient

Rotate the initial factor loading matrix, the component score coefficient, specific results are showed in table 3.

Table3 Component Score Coefficient Matrix

	Component			
	1	2	3	4
A1	.119	.008	.070	.035
A2	.125	-.002	.060	.031
A3	-.005	-.088	-.082	-.189
A4	.010	.029	.072	.427
A5	-.015	.093	.057	.283
A6	.018	.128	.025	.033
A7	-.075	.157	.024	.042
B1	-.058	.169	-.005	-.106
B2	-.099	.123	-.007	-.037
B3	-.016	.165	.073	-.145
B4	.106	.075	-.074	-.144
B5	.045	.116	-.129	-.118
B6	.115	-.069	.082	.220
C1	-.077	.030	.498	.116
C2	-.060	.008	-.297	.090
C3	.043	.103	.181	-.424
C4	.155	-.004	-.239	-.120
C5	.163	-.034	-.132	-.081
C6	.142	-.048	-.022	-.027

As known as the table 3 above, the final formula of factor score are as follows:

$$H1=0.119A1+0.125A2-0.005A3+0.010A4+...+0.163C5+0.142C6, (1)$$

$$H2=0.008A1-0.002A2-0.088A3+0.029A4+...-0.034C5-0.048C6, (2)$$

$$H3=0.070A1+0.060A2-0.082A3+0.072A4+...-0.132C5-0.022C6, (3)$$

$$H4=0.035A1+0.031A2-0.189A3+0.427A4+...-0.081C5-0.027C6 (4)$$

H1 is the first factor, on behalf of the

industrial added value of gross output A1, The

added value of industrial A2, New products output B4, fixed assets investment. B6, Raw coal consumption C4, fuel consumption C5 The power consumption C6, these indicators of H1 embodies the comprehensive index of production and energy of the equipment manufacturing industry, we called the comprehensive factor; H2 is the second factor,

represents the total assets profit margins A5, The overall Labor productivity A6, The cost profit margins A7, R&D spending per capita B1, R&D expenditure intensity B2, The annual R&D spending B3, New products output ratio B5, these indicators of H2 embodies the Economic profitability of the equipment manufacturing industry and R&D profitability indicators such as economy, we can called the profit factor; H3 said the third factor, better represents the Comprehensive energy consumption C1, so we can called energy consumption factor ; H4 said the fourth factor, better represents the total assets contribution A4, we can called assets contribution factor; The other three indicators: Industrial added value rate A3, Ten thousand yuan output value of energy consumption C2, Energy saving rate C3, Has been dropped

3.2.3 The regional brand innovation capacity assessment scores

According to table 3 after rotating each variance and contribution ratio of the common

factor to calculate for each common factor weight, calculating formula is

$$\alpha_i = \beta_i / \sum_1^4 \beta_i$$

α_i is i The weights of common factor, β_i is i The eigenvalues of the main factors. According to the weight of factor score coefficient function and common factor, can construct the evaluation model. Industrial upgrading assessment model as follows:

$$H = \alpha_1 H_1 + \alpha_2 H_2 + \alpha_3 H_3 + \alpha_4 H_4 \quad (5)$$

$$= 40.37 H_1 + 37.85 H_2 + 12.20 H_3 + 9.58 H_4$$

Which model of H1, H2, H3 and H4 are the factor score of each common factor. H is the composite scores. Using the above industrial upgrading assessment model, which can be further calculated the evaluation scores and comprehensive scores and rankings of the equipment manufacturing industry in Jiangmen. The results are shown in table 4.

Table 4 evaluation factor scores and ranking

Industry	Common factor score				Composite scores		centesimal system			
	H1	H2	H3	H4	Ranking	Ranking	score	Ranking		
Metal product industry	2.0308	-0.62905	-0.52434	-0.14882	6	6	4	50.35	78.45	2
General equipment manufacturing	-0.56777	-0.13169	-1.53966	1.3897	3	7	1	-33.38	26.06	5

industry											
Special equipment manufacturing	-0.91026	7	0.1447	2	0.1044	2	0.0450	3	-29.57	28.45	4
Transportation equipment manufacturing	0.26626	2	2.1231	1	-0.10172	5	-0.52776	5	84.81	100	1
industry											
Electrical machinery and equipment manufacturing	0.1926	3	-0.14174	4	1.78298	1	1.2907	2	36.53	69.8	3
Communication equipment, computers and other equipment manufacturing	-0.27665	4	-0.45176	5	0.3795	3	-1.05102	7	-33.71	25.86	6
Instrumentation and cultural, office machinery manufacturing	-0.73504	6	-0.91349	7	-0.10116	4	-0.99779	6	-75.04	0	7

4.The results of brand innovation capacity of industry in Jiangmen

According to the score of each public factor that the industry brand creativity of the advanced equipment manufacture of Jiangmen appraises,it can be concluded that:First, the metal products industry has significant strength in the comprehensive factors (production,energy);Second,the manufacturing industry of the facilities for transport and communication has absolute advantages in the profit-making respect (profit, R&D,etc.) of the economy;Third, the manufacturing industry of the electric machinery and equipment does very well in energy consumption (the volume of consumption of comprehensive energy); Fourth, general equipment manufacturing industry , electric machinery and equipment manufacturing industry in a leading position in the capital contribution (contribution rate of total assets);Fifth, manufacturing industry of the dedicated device and communication equipment, computer and other apparatuses

manufacturing industry do not have any advantage in Jiangmen; Sixth, general equipment manufacturing industry and special equipment manufacturing industry which are the most capable of representing equipment manufacturing industry level still much room for development in Jiangmen.

Meanwhile, according to the comprehensive evaluation scores and rankings on the advanced industrial upgrading of equipment manufacture in Jiangmen, we can conclude that manufacturing industry of facilities for transport and communication is the advantage industry in the equipment manufacturing industry in Jiangmen. Metal products industry,electric machinery and equipment manufacturing industry are developing. Special equipment manufacturing industry, general equipment manufacturing industry, communications equipment, computers and other equipment manufacturing industry are in the initial stage of development. Instrumentation and culture, office machinery manufacturing is inferior sub-sectors.

Therefore, we can conclude that creating a breakthrough of the regional brand of Jiangmen is transportation equipment manufacturing. Transportation equipment manufacturing industry in Jiangmen has a potential for development. Therefore, the key to creating industry brand in Jiangmen City is the priority of the development of the transportation industry.

Transportation equipment manufacturing industry in Jiangmen city has a larger scale, such as motorcycle production accounted for 15% of the national container, auto parts, ship manufacturing have higher visibility. 2010, CSR project bring new opportunities for Jiangmen transportation equipment manufacturing industry, in order to grasp the opportunity, wuyi university has established rail transit comprehensive laboratory, the development support the industry-university-research cooperation in Jiangmen city, makes the transportation equipment manufacturing into Jiangmen city brand, and promoting the development of transportation equipment manufacturing industry in Jiangmen city.

In the process of creating the regional brand, a unified planning is needed, Firstly, by the government. Government to make up the solution transportation equipment manufacturing industry, promoting its rapid development, and use the government's influence, promoting transportation equipment manufacturing industry on this "business card". Secondly, relying on schools to train professional talents. Industrial development cannot leave the talents, therefore, the development of Jiangmen transportation equipment manufacturing has to rely on colleges, to train professional talents to support the industry development. Thirdly, the establishment of research and development platform, provide technology support. Jiangmen also needs to increase investment in research and development platform, provide

technology support for the transportation equipment manufacturing industry.

By priority to the development of the transportation equipment manufacturing, build strong transportation equipment manufacturing, make it become Jiangmen regional brand which is well-known in domestic and foreign. And the development of a regional brand, also can drive the industry's further development, promote economic and social prosperity. This also is the result we want.

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