

Research on Comprehensive Evaluation of High-quality Development of China's Regional Manufacturing Industry

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Abstract. Promoting the high-quality development of the manufacturing industry is an inevitable choice under the background of the development of my country's new era. The article focuses on the connotation of the high-quality development of the manufacturing industry and builds an evaluation index system for the high-quality development of the manufacturing industry from four dimensions: high-end, innovative, service-oriented, and green. , using the vertical and horizontal scale method to evaluate and analyze the high-quality development level of the manufacturing industry in 30 provinces and cities from 2010 to 2020. The results show that the high-quality development of the manufacturing industry in my country is unbalanced among regions, showing a trend of strength in the east and weakness in the west. Based on the empirical results, corresponding policy recommendations are put forward for different regions.

Keywords: Manufacturing; high-quality development; vertical and horizontal separation of grades; regional comparison.

1. Introduction

The report of the 19th National Congress of the Communist Party of China pointed out that my country's economy has entered a stage of high-quality development, and it is necessary to focus on building a modern economic system, and the focus of development has shifted from scale and speed to quality and efficiency. As an important pillar of the national economy, manufacturing is the focus of supply-side structural reform and the main field of modern economic system construction. General Secretary Xi Jinping pointed out that the high-quality development of manufacturing is the top priority of high-quality economic development in my country. It is essential for a modern power. At the Central Economic Work Conference held in 2018, the high-quality development of the manufacturing industry was listed as one of the key tasks in 2019. It can be seen that the high-quality development of the manufacturing industry is an important part and the key to the high-quality development of my country's economy. Accordingly, discussing the connotation of high-quality development of manufacturing, building an evaluation system for high-quality development of manufacturing, and analyzing the current situation of high-quality development of manufacturing in my country's regions are of great significance to promoting high-quality development of manufacturing and realizing high-quality economic development in my country.

2. Construction of high-quality development index system of manufacturing industry Section Headings

2.1 The choice of index system

The high-quality development of the manufacturing industry cannot be evaluated only by a single indicator, but should be comprehensively analyzed in combination with the actual situation of the manufacturing industry to determine the "desirability" of the high-quality development of the manufacturing industry [16]. Based on the literature review of the high-quality development evaluation system of the manufacturing industry, combined with the national "14th Five-Year Plan" and the manufacturing development goals put forward by the 2035 vision, this paper defines the high-quality development of the manufacturing industry as high-end, innovative, and high-end

development. A service-oriented and green new manufacturing system, so the high-quality development level of the manufacturing industry is evaluated from the four dimensions of high-end, innovation, service, and green. Among them, high-end is an important manifestation of the high-quality development of the manufacturing industry. The high-quality development of the manufacturing industry requires in-depth implementation of quality improvement actions to promote the "quality improvement" of manufacturing products. Output value growth" indicator to measure the level of high-end development of the manufacturing industry. Innovation is the core driving force for the development and upgrading of the manufacturing industry. To build a strong manufacturing country and promote the high-quality development of the manufacturing industry, innovation must be placed in the first place. The number of invention patents per unit of industrial added value", "the total number of R&D personnel at that time", and "the proportion of technology market turnover in industrial added value" to reflect the level of innovation in the manufacturing industry. The servitization of the manufacturing industry is to better meet the market demand, transform from providing products to providing products and series services, and enhance the differentiated advantages of manufacturing enterprises. In-depth integration with the modern service industry and the development of a new model of service manufacturing, the level of service-oriented development of the manufacturing industry can be reflected in the "proportion of input service elements" and "the complete consumption coefficient of the manufacturing industry to the service industry". Greening is a link that cannot be ignored when the manufacturing industry enters the stage of high-quality development. It is an important way for the manufacturing industry to achieve sustainable development and optimize economic and environmental benefits. Reflecting that, this paper selects four indicators of "energy consumption per unit of industrial added value", "sulfur dioxide emission intensity", "comprehensive utilization rate of industrial solid waste", and "investment measurement of industrial pollution control" to measure the level of green development of the manufacturing industry.

2.2 Analysis of the results of the measurement of high-quality development of the manufacturing industry

Following the systematic, scientific, representative and comparable principles of index construction, we selected continuously released statistical data in the time dimension, and selected indicators commonly used by provinces and cities in the spatial dimension, and obtained 4 first-level indicators and 12 second-level indicators. The level indicators constitute the evaluation index system of the high-quality development level of the manufacturing industry in this paper. Relevant data comes from the China Economic Net database, "China Statistical Yearbook", "China Science and Technology Statistical Yearbook", "China Industrial Statistical Yearbook" and "China Environmental Statistical Yearbook" of the corresponding year, world input-output data (WIOD), provincial and inter-provincial data. The time span is from 2011 to 2020, and the space span is 30 provinces and cities in my country. The index is shown in Table1 by calculating the panel data of 30 provinces and cities from 2011 to 2020 using the vertical and horizontal pull-up method.

Table 1. Calculation results of high-quality development level of regional manufacturing industry

area	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	0.4113	0.4242	0.4326	0.4391	0.4428	0.4515	0.4693	0.4785	0.4974	0.5298	0.4113
2	0.2712	0.2758	0.2934	0.2969	0.3001	0.3215	0.3365	0.3521	0.3749	0.4152	0.2712
3	0.2689	0.2711	0.2754	0.2856	0.2905	0.2992	0.3175	0.3354	0.3586	0.3714	0.2689
4	0.4299	0.4465	0.4511	0.4569	0.4637	0.4754	0.4923	0.5116	0.5213	0.5451	0.4299
5	0.5782	0.6165	0.6359	0.6549	0.6799	0.6891	0.6972	0.7058	0.7087	0.7158	0.5782
6	0.4121	0.4218	0.4517	0.4568	0.4683	0.4758	0.4905	0.4932	0.4951	0.5231	0.4121
7	0.3683	0.3795	0.3887	0.3961	0.3984	0.4381	0.4491	0.4582	0.4627	0.4811	0.3683
8	0.3863	0.4095	0.4248	0.4267	0.4483	0.4579	0.4699	0.4849	0.4905	0.5031	0.3863
9	0.6841	0.6983	0.7012	0.7131	0.7382	0.7438	0.7568	0.7831	0.7953	0.8115	0.6841
10	0.2021	0.2158	0.2214	0.2413	0.2649	0.2731	0.2879	0.2916	0.3097	0.3121	0.2021

11	0.2496	0.2573	0.2625	0.2875	0.3012	0.3075	0.3115	0.3296	0.3447	0.3616	0.2496
12	0.2116	0.2382	0.2412	0.2457	0.2772	0.2894	0.2917	0.3056	0.3105	0.3126	0.2116
13	0.2346	0.2414	0.2593	0.2645	0.3096	0.3113	0.3238	0.3419	0.3492	0.3635	0.2346
14	0.1951	0.2039	0.2076	0.2112	0.2195	0.2251	0.2339	0.2547	0.2635	0.2736	0.1951
15	0.2951	0.2992	0.3065	0.3285	0.3416	0.3483	0.3556	0.3682	0.3787	0.4073	0.2951
16	0.2958	0.3081	0.3143	0.3256	0.3395	0.3449	0.3543	0.3596	0.3861	0.3948	0.2958
17	0.3616	0.3885	0.3931	0.4005	0.4086	0.4152	0.4228	0.4316	0.4407	0.4612	0.3616
18	0.3195	0.3265	0.3364	0.3556	0.3581	0.3714	0.3798	0.3975	0.4119	0.4364	0.3195
20	0.3125	0.3214	0.3296	0.3527	0.3701	0.3757	0.3821	0.3912	0.4051	0.4198	0.3125
21	0.1889	0.1952	0.2019	0.2081	0.2118	0.2174	0.2293	0.2468	0.2795	0.3207	0.1889
22	0.2283	0.2465	0.2574	0.2716	0.2770	0.2852	0.2935	0.2981	0.3152	0.3266	0.2283
23	0.2563	0.2616	0.2786	0.2819	0.2834	0.2983	0.3256	0.3412	0.3647	0.3806	0.2563
24	0.3214	0.3381	0.3463	0.3502	0.3585	0.3691	0.3809	0.4115	0.4376	0.4407	0.3214
25	0.2259	0.2378	0.2431	0.2514	0.2615	0.2696	0.2757	0.2951	0.3187	0.3375	0.2259
26	0.2078	0.2134	0.2235	0.2315	0.2376	0.2454	0.2614	0.2775	0.2897	0.3015	0.2078
27	0.2795	0.2869	0.3156	0.3379	0.3451	0.3512	0.3587	0.3618	0.3854	0.3935	0.2795
28	0.1783	0.1857	0.1916	0.2039	0.2154	0.2254	0.2335	0.2390	0.2782	0.2519	0.1783
29	0.1307	0.1386	0.1452	0.1562	0.1671	0.1758	0.1914	0.1986	0.2138	0.2294	0.1307
30	0.1639	0.1712	0.1851	0.1985	0.2126	0.2192	0.2215	0.2263	0.2371	0.2469	0.1639

2.2.1 Spatial distribution characteristics

According to the difference between the high-quality development level of the regional manufacturing industry and the national average level, the high-quality development level of the inter-provincial manufacturing industry in China is classified into the following four categories. Regions and underdeveloped regions are the regions below the horizontal line. As can be seen from Table 4, Guangdong, Jiangsu, Shanghai, Zhejiang, and Beijing are the first echelon of high-quality development of the manufacturing industry, leading the high-quality development of my country's manufacturing industry, while the western and northeastern regions are the gathering places for the third and fourth echelons. There is a huge difference in the index between highly developed regions and underdeveloped regions, reflecting the significant regional heterogeneity in the high-quality development level of the inter-provincial manufacturing industry in my country, and there is an obvious imbalance in regional development.

2.2.2 Timing distribution characteristics

From 2011 to 2020, the average trend of the high-quality development level of the manufacturing industry in the country and the four major regions is shown in Figure 1. It can be seen that the overall high-quality development level of my country's manufacturing industry is on the rise, rising from 0.2973 in 2011 to 0.4041 in 2020. , with an average annual growth rate of 3.47%. Among them, the high-quality development level of manufacturing in the eastern region has always been above the national average level, and there is a growing trend of the gap with the national average level. From 2011 to 2016, the development level of the central region was basically the same as the national development level. After 2016, it was slightly lower than the national level. The trend of manufacturing development level in the western and northeastern regions was always below the national average level. It is relatively close to the western region, but the growth rate increased from 2015 to 2017, which further widened the distance with the western region. In general, the high-quality development level of my country's manufacturing industry is on the rise and the growth rate is accelerating, which shows that my country has achieved certain results in promoting the high-quality development of the manufacturing industry.

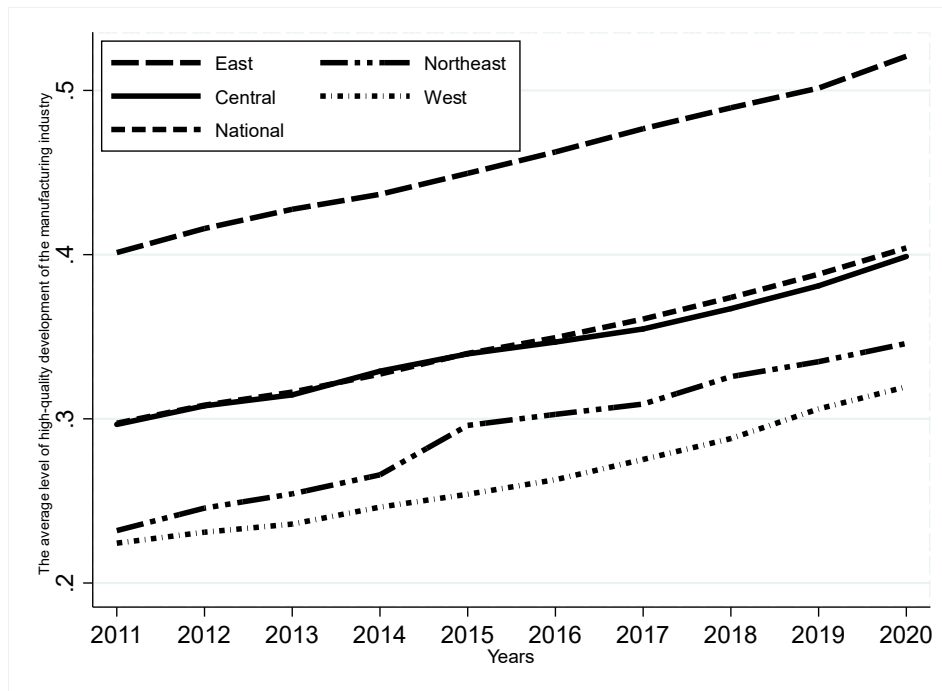


Fig. 1 2011-2020 High-quality development level and changing trend of manufacturing industry

3. Conclusions and Policy Recommendations

This paper constructs an evaluation system for the high-quality development of my country's manufacturing industry from the four dimensions of high-end, innovation, service, and greening, and uses the vertical and horizontal scale method to assess the high-quality level of manufacturing in 30 provinces and cities in my country from 2011 to 2020. A comprehensive evaluation analysis was carried out. The results show that in terms of spatial distribution, the overall level of high-quality development of the manufacturing industry among the four regions is unbalanced, showing a situation where the east is strong and the west is weak, and there are large differences in the development levels of high-end, innovation, service, and green development; In terms of distribution, the overall level of high-quality development of my country's manufacturing industry is on the rise and the growth rate is accelerating; in different dimensions, there are large differences in the level of high-quality development of manufacturing between regions, and each region has different advantages and shortcomings. Based on the above empirical results, in order to further improve the high-quality development of my country's manufacturing industry, this paper puts forward the following suggestions:

First, strengthen basic research on high-quality development of the manufacturing industry. Enrich the research on the evaluation of high-quality development of the manufacturing industry, build a more complete statistical system of high-quality development indicators of the manufacturing industry, and continue to promote the evaluation and assessment of the high-quality development of the manufacturing industry. Increase investment in basic research projects, encourage cutting-edge basic research in the manufacturing industry, strengthen key technology research, promote my country's manufacturing industry to move towards the mid-to-high end of the value chain, continuously promote the "four modernizations" development capabilities of manufacturing, and achieve high-quality development of my country's manufacturing industry .

Second, Strengthen the coordinated development of manufacturing between regions. Each region formulates different high-quality development plans for the manufacturing industry based on the strengths and weaknesses of the manufacturing industry in the region, giving full play to its advantages and making up for its shortcomings. Promote the establishment of cooperative relations between regions with complementary advantages, carry out innovation exchanges and cooperation,

optimize and integrate the manufacturing industry chain, and form inter-regional industry chain complementarity. Appropriately incline policies to underdeveloped regions with high-quality manufacturing development, promote the free flow of human resources, technology, capital, data and other elements and resources between regions, and drive underdeveloped regions from developed regions to narrow the gap in the level of high-quality manufacturing development between regions.

Third, Clarify the focus of high-quality development of manufacturing in each region. According to the advantages and disadvantages of each region, each place focuses on promoting the high-quality development of the manufacturing industry in the four major regions: the eastern region should continue to play a leading role, drive the overall development of my country's manufacturing industry, further strengthen the innovation capability of the manufacturing industry, and accelerate the cultivation of leading enterprises with international competitiveness. , carry out policy pilot demonstrations, and conduct pilot projects in emerging fields such as intelligent manufacturing, large-scale personalized customization, and networked collaborative manufacturing. The central region should pay attention to the green development of the manufacturing industry, strengthen the research and development of green manufacturing technology, and improve the utilization rate of resources; cultivate green emerging industries, drive the transformation and upgrading of traditional manufacturing enterprises, and form a green manufacturing industry system. The Northeast region should strengthen the service-oriented development of the manufacturing industry, introduce more producer services and the integration of the manufacturing industry, increase the input of service elements, extend the industrial value chain, learn from domestic and foreign excellent cases, expand the enterprise service business, and increase the added value of products. The development foundation of the manufacturing industry in the western region is relatively weak. It is necessary to further increase the investment in research and development to improve the independent innovation capability of the region, concentrate advantageous resources, strengthen and refine the advantageous industries, and enhance the industrial agglomeration and radiation capabilities, so as to activate the high-quality development momentum of the manufacturing industry in the western region.

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