

Research on Independent Innovation Capability Evaluation of High-Tech Industries in the Yangtze River Economic Belt

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Abstract. In recent years, there are "bottlenecks" in the transformation and application of innovative scientific and technological achievements in China, and some core technologies are "stuck". The lack of independent innovation ability seriously restricts the transformation of economy from high growth to high quality development. The Yangtze River economic belt plays an extremely important strategic position in China's economic and social development. It is of great significance to evaluate the independent innovation capability of high-tech industries in 11 provinces and cities along the belt reasonably, compare regional differences, and put forward relevant policy suggestions to promote China's innovative development and economic transformation and upgrading. This article makes an analysis of the high technology industry independent innovation ability by using the factor analysis method from the innovation environment supporting capacity, innovation input, innovation ability and innovation output capacity of the Yangtze river economic belt, and found that there exists relatively significant regional differences of high technology industry's capacity for independent innovation, in the Yangtze River economic belt. Capacity for independent innovation of provinces along the Yangtze River upstream is far above the level of the provinces and cities along the Yangtze river shelter-forest, and this paper put forward some suggestions accordingly.

Keywords: High-tech industry; Independent innovation ability; Factor analysis.

1. Introduction

Since entering the era of knowledge economy, innovation has become the commanding height of global competition and an important means for countries to enhance their international economic status. At present, international competition is mainly reflected in economic competition, and the development of economy is more and more inclined to innovation economy. In recent years, great achievements have been made in the development of science and technology in China, and the innovation capacity of science and technology has been significantly improved. At the second meeting of the central committee of finance and economics, general secretary Jinping Xi stressed that "key and core technologies are the country's most important instruments". The emergence of trade frictions between China and the United States is also a wake-up call to China, China must enter a new stage, on the one hand to further reform, on the other hand, to enter the stage of independent innovation in science and technology, high-tech things must have their own development.

As the strategic leading industry of the national economy, high-tech industry is characterized by knowledge-intensive, advanced technology, high added value of products and strong industrial correlation effect. It is the commanding height of the comprehensive national strength competition of all countries in the world and an important symbol to measure the economic development level of a country or region. Independent innovation is the main source of scientific and technological innovation and the fundamental way for high-tech industries to gain competitive advantages in the process of development. Intellectual property rights or patents formed by independent innovation have a high market rate of return, which can enable high-tech industries to occupy a monopoly position in the competition, so as to obtain high profits and huge profits. Since China's accession to the WTO, the high-tech industry is facing rare opportunities for development, but there are serious challenges. In the complex competitive environment, the improvement of independent innovation ability of high-tech industry becomes an important means for its long-term development and the key to enhance its competitive strength.

The Yangtze river economic belt features stretch across three big area in our country, covering 11 provinces and cities, accounts for about 1/5 of the land area, population and GDP are more than 40%

of the country. It is most densely populated and the industrial scale is biggest, has the most developed economic level, the most complete city system in the region. What's more, it promotes the rise of China, realizing the great rejuvenation of the Chinese nation's history. In recent years, the strategic emerging industries proposed by the state have shown double-digit growth in all provinces of the Yangtze River delta economic belt, especially in electronic information and high-end equipment manufacturing. Driven by the new industry guidelines, the Yangtze River economic belt is expected to become the new growth pole of China in the future. In March 2016, the national development and reform commission, ministry of science and technology, ministry of industry and information technology jointly issued "the Yangtze river economic belt innovation drive industrial transformation and upgrading plan, proposed in 2030 completed the Yangtze river economic belt innovation-driven industrial system goal, driven by innovation to promote industrial upgrading is the main task of the transformation of growth development of the Yangtze river economic zone. High technology industry development in our country at present stage work is one of the important link of strengthening the construction of innovation ability, innovation ability and evaluation is the important foundation of innovation ability construction, scientific evaluation on the independent innovation ability of high technology industry, high technology industry independent innovation ability of the Yangtze river economic belt has a macro clear understanding, to realize the innovation in the Yangtze river economic belt drive provide reference for industry transformation and upgrading, for the government to develop high technology industry development policy, the national innovation policy, the rational allocation of resources of science and technology has important practical significance.

2. Evaluation Indicators and Evaluation Results

Independent innovation refers to the original and creative activities in which enterprises mainly rely on their own efforts to overcome technical difficulties and form development and research results of practical significance and value, and on this basis further promote the follow-up links of innovation, and finally realize the commercialization of technological achievements to obtain commercial benefits. The independent innovation ability of high-tech industry is one of the hot topics in the academic circle and has formed a mature evaluation index system. For example, Ji XF et al. (2018) constructed an evaluation index system of independent innovation capacity of high-tech industry from input capacity, output capacity, transformation capacity and basic capacity, and used principal component analysis method to evaluate independent innovation capacity of high-tech industry in six provinces in central China [1]. Zhang ZD and Gan WP (2014) constructed a comprehensive evaluation index system of independent innovation ability of high-tech industry from four dimensions of innovation foundation, innovation input, innovation transformation and innovation output, and conducted comprehensive evaluation and analysis of independent innovation ability of high-tech industry in various regions of China by using factor analysis method and cluster analysis method [2]. Zhang JS, Hu XZ (2012), Zhao YL and Cheng ping (2013) constructed an evaluation index system from three aspects of innovation input, innovation output and supporting environment [3-4]. According to the existing literature, the evaluation index system of independent innovation ability of high-tech industry is relatively perfect, but the comparative research on independent innovation ability of high-tech industry in the Yangtze River economic belt is relatively lacking. Based on the existing literature, this paper constructs the evaluation index system from the four dimensions of innovation basic capacity, innovation input capacity, innovation transformation capacity and innovation output capacity, and makes some improvements to the existing evaluation indexes, so as to evaluate the independent innovation capacity of high-tech industries in the Yangtze river economic belt more comprehensively.

This paper chooses factor analysis as the research method, constructs the factor analysis comprehensive evaluation model, and carries on the comprehensive comparison analysis to each region high technology industry independent innovation ability.

Table 1. Independent innovation capacity of national high-tech industries

	City	F1	F2	F3	Composite scores
The lower reaches of the Yangtze river economic belt	Shanghai	-0.2393	1.1378	0.5966	0.1644
	Jiangsu	0.7309	-0.1666	4.1159	1.1291
	Zhejiang	0.2863	-0.0994	0.9624	0.3195
	Anhui	-0.1867	-0.4333	0.3652	-0.1144
	Mean	0.1478	0.1096	1.5100	0.3747
Middle reaches of Yangtze river economic belt	Jiangxi	-0.2302	-0.2156	-0.2305	-0.2093
	Hubei	-0.0402	0.1818	-0.1678	-0.0222
	Hunan	-0.2185	-0.6355	0.4769	-0.1468
	Mean	-0.1630	-0.2231	0.0262	-0.1261
The upper reaches of the Yangtze river economic belt	Chongqing	-0.2083	0.1750	-0.3384	-0.1499
	Sichuan	0.0065	-0.3793	0.0517	-0.0515
	Guizhou	-0.3055	-0.3152	-0.3623	-0.2929
	Yunnan	-0.3404	-0.5032	-0.3442	-0.3416
	Mean	-0.2119	-0.2557	-0.2483	-0.2090
Total	Mean	-0.0678	-0.1140	0.4660	0.0259
Non-yangtze river economic belt	Beijing	-0.0695	4.2846	-1.0050	0.5079
	Tianjin	-0.3357	1.7558	-0.1431	0.0814
	Hebei	-0.2762	-0.7280	-0.0009	-0.2814
	Shanxi	-0.3038	-0.4527	-0.5234	-0.3443
	Inner Mongolia	-0.3882	-0.1070	-0.3747	-0.3069
	Liaoning	-0.2705	-0.1516	-0.2900	-0.2321
	Jilin	-0.3547	-0.0263	-0.3933	-0.2775
	Heilongjiang	-0.2844	-0.5586	-0.3822	-0.3259
	Fujian	-0.3463	-0.2469	1.5763	0.0444
	Shandong	0.3350	-0.1925	0.9009	0.3204
	Hainan	-0.0548	-0.6552	-0.1031	-0.1612
	Guangdong	5.2398	-0.0918	-0.8733	2.8139
	Guangxi	-0.2941	-0.5873	-0.4435	-0.3473
	Hainan	-0.3350	-0.1526	-0.5765	-0.3207
	Shanxi	-0.1885	0.5363	-0.3042	-0.0710
	Gansu	-0.2855	-0.5680	-0.6140	-0.3698
	Qinghai	-0.3160	-0.3684	-0.6015	-0.3510
	Ningxia	-0.3508	-0.1987	-0.5347	-0.3300
	Sinkiang	-0.3290	-0.4306	-0.5469	-0.3592
Mean	0.0417	0.0558	-0.2754	-0.0163	
National mean		0.0015	-0.0064	-0.0036	-0.0009

From the table we can see that:

(1) In terms of comprehensive scores, the development of independent innovation capability of high-tech industries in various regions of the Yangtze river economic belt is differentiated. The comprehensive scores of the downstream provinces and cities (Shanghai, Jiangsu and Zhejiang) are far ahead, followed by Sichuan and Hubei. Compared with the national provinces and cities, upstream of the Yangtze river economic belt province high technology industry's capacity for independent innovation (0.3747) higher than the national average (0.0009), middle (0.1261) and (0.2090) is lower than the national average level of average (0.0009), while the Yangtze river economic belt (0.0259) is higher than the overall average of the Yangtze river economic belt provinces and cities average (0.0163) and the national provinces and cities average (0.0009). This indicates that the independent innovation capacity of high-tech industries in the Yangtze River economic belt is in good condition,

but the development of the middle and lower reaches of the Yangtze river is unbalanced. Studies have suggested that the Yangtze River economic belt of high-tech industrial innovation elements unbalanced distribution, Shanghai, Jiangsu, Zhejiang, Sichuan, Hubei province innovation elements concentration level is higher, and the upstream provinces is low [5], this led directly to the Yangtze river economic belt high technology industry's capacity for independent innovation present a downstream > middle > upper situation.

(2) From the point of each principal component factor score, innovation input and output factor F1 and F scores ranking difference is bigger, Jiangsu and Zhejiang two provinces is always on top, in Shanghai, the opposite is Sichuan, Hubei, Anhui and other provinces and cities in recent years, with the continuous development of regional economy and the importance of high technology industry, the independent innovation input and output level is high, ranking the front. In terms of F2, Shanghai, Hubei, Chongqing and other regions have great advantages. These regions have relatively developed economy, education, and science and technology, which provide good basic conditions for high-tech industry innovation. In terms of innovation transformation factor F3, it is basically consistent with the comprehensive score ranking, and Jiangsu, Shanghai and Zhejiang are far ahead. This is mainly because the economically developed eastern coastal areas have abundant financial and material resources and have great advantages, while the backward areas in the central and western regions show weak overall capacity under the constraints of human resources, capital, environment and other factors, leading to the weak capacity of independent innovation transformation. Compared with other provinces and cities in China, the innovation input and output factor score (0.1478), innovation environment factor score (0.1096) and innovation transformation factor score (1.5100) of the upstream provinces and cities in the Yangtze river economic belt are all higher than the average level of the Yangtze river economic belt and the national level, but the average level of the Yangtze river economic belt is lower than the national level.

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