EVALUATION OF TECHNOLOGY INNOVATION IN HUBEI PROVINCE

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ARTICLE DETAILS

ABSTRACT

Innovation is the soul of a nation's progress and the inexhaustible motive force of a country's prosperity. This paper analyzes the status of technological innovation in Hubei province by constructing the evaluation index system of technological innovation and combining factor analysis. The result shows that the technological innovation of Hubei Province has improved significantly in recent years, but there is a gap between Hubei Province and economically developed provinces such as Guangdong, Jiangsu. The marketization of innovation achievements of Hubei Province is still in a relatively weak position. Therefore, the government should formulate and implement relevant policies to promote the introduction of technological innovation achievements and accelerate the transformation of technological innovation achievements.

KEYWORDS

1. INTRODUCTION

The nineteen report of the communist party of China puts forward the six tasks of building a modern economic system. It is one of the six tasks to speed up the construction of an innovative country. Innovation is the soul of a nation's progress and the inexhaustible motive force of a country's prosperity. Since China reforms and opens up, the economic strength of Hubei province has been significantly enhanced. The productivity level of Hubei province has also been greatly improved, and science and technology has been made great progress. However, we should also see that, the independent innovation capability of Hubei province still has a great room for improvement if we compare Hubei province with the advanced innovation provinces. Therefore, it is the main purpose of this study to choose the appropriate method to evaluate the technological innovation in Hubei province.

Scholars in various countries have studied technological innovation in a region. A group researchers use DEA model to analyze regional technological innovation [1-3]. Another researchers use wavelet analysis and improved grey entropy TOPSIS method to evaluate the provincial technological innovation capability [4]. In other study, they has use the structural equation model to evaluate the provincial technological innovation capability [5]. Irina uses analytic hierarchy process to evaluate regional technological innovation in Russia [6]. In the above study, European and American scholars mainly aimed at the evaluation of technological innovation of European and American countries. There is no special research on the evaluation of technological innovation in China. Furthermore, Most Chinese scholars use provincial units as the research area, and there is no special analysis of the situation of technological innovation in Hubei province. Different from the above research, this paper will evaluate the technological innovation of Hubei Province on the basis of a large number of statistical data.

2. CONSTRUCTION OF EVALUATION INDEX SYSTEM OF TECHNOLOGICAL INNOVATION CAPABILITY

According to the principle of the structure about technological innovation capability and design abut index system, we build the evaluation index system of Hubei province from the investment ability of technological innovation, allocation ability of technological innovation, the utput capacity of technological innovation and the environment of technological innovation. We form hierarchical structure of evaluation regarding technological innovation capability in Hubei province on the basis of the relevant literature.

2.1 Investment ability of technology innovation resources

Input capability of technological innovation resources is the basic ability of technological innovation capability. We select number of R&D personnel (person-year), number of R&D personnel in medium-size industrial enterprises, internal expenditure of R&D funds, internal expenditure of R&D in medium-size industrial enterprises to measure the input capacity of regional technological innovation resources.

2.2 Configuration ability of the main body concerning technological innovation

Configuration ability of the main body concerning technological innovation is the ability that technological innovation behavior organization, such as enterprises, universities, scientific research institutions, etc., realizes research, development and technology transformation through knowledge exchange. We choose number of R&D institutions (unit), number of higher education (unit), number of high-tech enterprise (unit), investment of high-tech industry (100 million yuan), export contract of the technology market (item), export contract amount of the technology market (million yuan), import contract of the technology market (item), import contract amount of the technology market (million yuan), import contract of foreign technology (item), import contract amount of foreign technology (million yuan) to measure the ability of technology innovation subject configuration.

2.3 Output capability of technological innovation

Output capability of technological innovation reflects the strength of technological innovation and the result about investment of technological innovation resources. We select the number of authorized patents, the number of papers retrieved by SCI, the number of new product development projects in high-tech industry, the sales revenue of new high-tech products (10000 yuan) and the total profit of high-tech industry (100 million yuan) to measure the output capacity of technological innovation.

2.4 Ability to support the environment of technological innovation

Ability to support the environment of technological innovation is the basic condition of the technological innovation. We use R&D expenditure of government (10000 yuan), science full-time popularization (person), raising amount of popular science fund (10000 yuan), and the educational population per one hundred thousand person to measure the ability to support the environment of technological innovation.

3. TECHNICAL INNOVATION EVALUATION

3.1 Evaluation method

Here, we use the factor analysis method to analyze the technological innovation ability of Hubei Province in order to provide decision support for policy making.

3.2 Data acquisition

Data are collected from related yearbooks, such as Statistical Yearbook of China Science and technology, China High Tech Industry Statistical Yearbook, China Statistical Yearbook.

3.3 Evaluation process of ability about technological innovation

We put the data in 2013, 2014, and 2015 into SPSS for factor analysis at the same time, so as to make it easier to compare the technical innovation ability.

3.3.1 KMO and Bartlett test

The KMO statistics are 0.828, more than 0.7. The overlap of information between variables meets the requirements. The Bartlett test shows that the independence of the variables is rejected, that is, there is a strong correlation between the variables. In general, the original variables are suitable for factor analysis model.

Table1: Test of KMO and Bartlett

Kaiser-Meyer-Olkin measure of sufficient sampling		0.828
Approximate chi square		5069.49
The sphericity test of Bartlett	df	231
	Saliency	0.000

3.3.2 Factor selection

22 indexes are selected to obtain the characteristic value and the variance contribution rate of the common factor. After rotation, the eigenvalue of the first factor is 9.357, and the variance contribution rate is 42.534%. The eigenvalue of the second factor is 7.670, and the variance contribution rate is 34.865%. The third factor's characteristic value is 2.355, and the variance contribution rate is 10.706%. The total cumulative variance contribution of the 3 factors is 88.105%, which can reflect all the information in the model more comprehensively.

3.3.3 Factor rotation

The maximum variance rotation is used to get the load matrix of rotated factor, which makes the factor load volume differentiate into two extremes. This method can highlight the role of the leading variables and better explain the factors.

3.3.4 Comprehensive evaluation

According to the proportion of the variance contribution rate corresponding to the public factors, the comprehensive score of the technical innovation is calculated by the number of provinces and cities. The calculation formula is as follows:

$$\text{Comprehensive score} = 42.534/88.105 \ast F1 + 34.865//88.105 \ast F2 + 10.706//88.105 \ast F3$$

4. RESULTS OF EVALUATION OF TECHNOLOGICAL INNOVATION ABILITY

From 2013 to 2015, the score of technical innovation in Hubei increased year by year, and the comprehensive scores were 0.0048, 0.1059 and 0.2211 respectively. Horizontal comparison, Hubei province technical innovation score ranks eighth, seventh, seventh in China. The F1 score of Hubei province ranks twenty-first, nineteenth and fourteenth in China.

The F2 score of Hubei province ranks seventh, fourth and fourth in China. The F3 score of Hubei province ranks second, sixth and fifth in China. Overall, the capability of technological innovation in Hubei has been steadily improving in recent years, but there is still much room for improvement in the transformation of achievements. There is still a gap of the comprehensive innovation capability between Hubei and the developed provinces and cities such as Jiangsu, Guangdong, Beijing, Shanghai, Zhejiang and Shandong. Hubei province needs to increase the introduction of technological innovation results and accelerate the transformation of technological innovation results.

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