

The Evaluation of High Technology Industry Policy in Shaanxi

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Keywords: Policy evaluation; high technology industry; Shaanxi Province

Abstract: Based on the input-output principle, this paper establishes the policy input and policy output system of Shaanxi high-tech industry by selecting 10 indicators. This paper evaluates the policy efficiency of high-tech industry in Shaanxi Province from 2005 to 2013 by using the method of data envelopment analysis. From 2005 to 2013, the high-tech industries in Shaanxi Province were in the effective state of DEA in 2006, 2007, 2009, 2010, 2012, 2013; it was DEA in 2005 and 2011. It was not valid during the study period. The pure technical efficiency of the high-tech industry in Shaanxi Province reaches the DEA optimal. In 2005, the scale of the high-tech industry in Shaanxi Province increased; the scale of remuneration remained unchanged in 2008 and 2011; The rest of the year is a diminishing return on scale.

1 Introduction

With the rapid development of science and technology and the integration of the world economy globalization, rising worldwide countries, the competition between regions is becoming the production of knowledge, the competition in the field of high technology industry, high technology industry accounted for the proportion in the national economy growing, high technology and its industry has become an important driving force the economic development in the future. In terms of a region of the world economy, it follows the trend of technology development, learning from the successful experience of the developed countries or regions, and actively adjusting the industrial structure, implementation strategy, vigorously develop high-tech industry, is undoubtedly the next period of time to achieve rapid economic and healthy development of the strategic choice. "12th Five-Year" period, the country put forward to strengthen the independent innovation support system construction, high technology industry from large to strong changes in national policy refers to. As a result, all provinces and cities are vigorously developing high-tech industries.

As a major economic province, Shaanxi Province has been trying to find the way of rapid development of high-tech industry. In recent years, a series of preferential policies and measures have been introduced. At the end of 2013, the contribution rate of Shaanxi high-tech industry to GDP is 16.34%, which is more than 6.62% in 2005. The average annual growth rate is 0.74, and the high-tech industry is growing rapidly.

The paper adopts provincial time series data in 2005-2013 in Shaanxi Province. The research is on high tech industry policy in Shaanxi Province, the development level and the quality of the high technology industry of Shaanxi Province, has a positive practical significance to realize the sustainable development of economy and society, but also has a certain reference value for other areas within the scope of the high technology China industrial development and regional industrial policy.

2 Research Method and Index Selection

2.1 Research Method

2.1.1 Data Envelopment Analysis

Data envelopment analysis is the operational research experts and other scholars on the basis of "relative efficiency", according to the unit to multiple input and output index of the same type (Department) a new method of system analysis of the relative effectiveness or efficiency evaluation. Its relative efficiency of applied mathematics the planning model calculated between the decision making units, to make the evaluation of the evaluation object. In the evaluation of the effectiveness of the treatment of multiple input multiple output, DEA has an absolute advantage.

This paper uses the DEA method to evaluate the DEA in weight decision making units each input and output variables, evaluate the benefit from the perspective of decision making unit, so as to avoid the weight of each index is determined in the sense of priority; assume that each input is related to one or more input and output, there are indeed some the relationship between output, using the DEA method is not need to determine the explicit expression of this relationship. It is put on the social and economic system and multi output relative efficiency evaluation. So this thesis chooses the unique advantages of the method of data envelopment analysis to the evaluation of high-tech industrial policy in Shaanxi Province.

2.1.1.1 Basic Idea

The basic idea of data envelopment analysis method: by keeping the input or output DMUs constant is determined by the DMUs form effective production frontier evaluation groups using the method of mathematical programming, according to the distance function to define the DMU to the production frontier distance, so as to judge whether the DMU DEA effectively

2.1.1.2 Mathematical model

The DEA model is divided into input-oriented and output-oriented. According to the specific purpose of the analysis, different orientations can be selected. Generally speaking, most of the literature is used in the three-stage DEA model. For any decision making unit, the dual form of the input oriented BCC model can be expressed as:

$$\min \theta - \varepsilon(e^T S^- + e^T S^+) \quad \text{The formula (1)}$$

The formula (1) needs to satisfy the following constraints:

$$\text{s. t. } \begin{cases} \sum_{j=1}^n X_j \lambda_j + S^- = \theta X_0 \\ \sum_{j=1}^n Y_j \lambda_j - S^+ = Y_0 \\ \lambda_j \geq 0, S^-, S^+ \geq 0 \end{cases}$$

Among them, $j=1,2,\dots, N$ indicates that the decision unit, X, Y are input respectively, and the output vector. DEA model is essentially a linear programming problem.

If $\theta=1, S^+=S^-=0$, then the decision unit DEA is valid;

If $\theta=1, S^+ \neq 0$, or $S^- \neq 0$, then the decision unit is weak DEA effective

If $\theta < 1$, the decision unit is not DEA valid.

The calculated efficiency values of the BCC model for the comprehensive technical efficiency (TE), can be further decomposed into scale efficiency and pure technical efficiency (SE), $TE = SE^*$

(PTE) PTE. specific calculation steps are as follows: 1. CCR returns to scale model to extract the invariant under the condition of DEA efficiency and technical efficiency (TE); the result of the BBC model is the variable returns to scale under the condition of DEA efficiency and pure technical efficiency (PTE); the obtained scale efficiency (SE), $SE=TE/PTE$.

In this paper, we evaluate the high-tech industry policy from the perspective of input output, which is divided into 10 indicators of policy input and policy output. Among them, the policy input index includes the local financial technology appropriation, the high-tech industry R.

2.3 Data Resource

The data used in this paper are derived from the Statistical Yearbook of China and the Statistical Yearbook of Shaanxi Province from 2006 to 2015.

3 Empirical Analysis

3.1 Calculation of DEA efficiency

The DEA efficiency value of high technology industry in Shaanxi province in 2005-2013 years can be obtained by using MaxDEA software. See table 1.

Tab.1 DEA efficiency value of high tech industry in Shaanxi Province during 2005-2013

DMU	Comprehensive		Scale efficiency	Return of scale
	technical efficiency	Pure technical efficiency		
2005	0.96706	1	0.96706	irs
2006	1	1	1	—
2007	1	1	1	—
2008	0.971267	1	0.971267	drs
2009	1	1	1	—
2010	1	1	1	—
2011	0.962554	1	0.962554	drs
2012	1	1	1	—
2013	1	1	1	—

Note: the scale reward of IRS is increasing, the scale reward of the table is unchanged, and the scale return of DRS is decreasing.

Table 1 shows the comprehensive technical efficiency of high tech industry in Shaanxi province in the last 2005-2013 years basically is at or near DEA state, which in 2006, 2007, 2009, 2010, 2012 and the high technology industry in Shaanxi Province in 2013 reached DEA. During the study, pure technical efficiency value was 1, reached DEA effective efficiency, pure technical efficiency are all effective; non DEA efficiency is mainly the scale inefficiency caused. Scale efficiency in 2006, 2007, 2009, 2010, 2012 and 2013 to achieve the optimal DEA, other years did not reach the DEA. 2005 years of increasing returns to scale; the 2008 and 2011 constant returns to scale; decreasing returns to scale the rest of the year.

3.2 The relaxation and residual variables of a non DEA effective decision unit

In the 2005-2013 years of this study, Shaanxi was in an invalid state of DEA in 2005, 2008 and 2011. To observe its slack variables and residual variables, we can see that in Shaanxi 2005, the high tech industry in Henan Province has redundant investment in local financial technology, and R

in high-tech industry. In 2011, the high technology industry of Shaanxi province has the redundancy of local financial science and technology appropriation, high technology industry R.

In a comprehensive view, the target of redundancy is mainly local financial science and technology appropriation, high technology industry.

3.3 Analysis of reasons for invalid DEA in individual years

Overall, the comprehensive technology efficiency of Shaanxi's high-tech industry is basically at or close to the effective state of DEA in the past 2005-2013 years, and the local financial technology appropriation in Shaanxi Province, R of high-tech industry in 2005-2013.

In 2006, 2007, 2009, 2010, 2012 and 2013, the efficiency of Shaanxi's high-tech industry has reached DEA effectiveness, and its DEA is invalid in the two countries. This paper focuses on the reasons why the DEA is invalid.

From the point of view of investment, there is a local financial science and technology appropriation, high technology industry R. From the output point of view, the high technology industry's main business income, the high technology industry profit tax and the patent license output are insufficient.

4 Conclusion

The high technology industry in Shaanxi province in 2006, 2007, 2009, 2010, 2012 and 2013 year in DEA state; at the same time in 2005-2008 and 2011 for DEA is invalid. During the study period, the pure technical efficiency of high tech industry in Shaanxi province reached DEA in Shaanxi province. The optimal high technology industry in 2005 for increasing returns to scale; in 2008 and 2011 for the constant returns to scale; the rest of the year are decreasing returns to scale. From the point of view of investment, there is a local financial science and technology appropriation, high technology industry R

References

- [1] Chen Jin-mei. Research on the efficiency of China's Industrial Policy. [D] .Shenyang: Liaoning University, 2007: 10-20.
- [2] Du Dong, Pang Qing Hua, Wu Yan. Modern Comprehensive Evaluation method and Case Selection. [M] .Beijing: Tsinghua University Press, 2012: 62-67.
- [3] Li Xiaomei , an empirical research on the economic efficiency of high - tech industry in China from the perspective of technical system . Shenyang : Liaoning University , 2012 : 1 - 181 .
- [4] Xu Kangning , An Empirical Research on the Efficiency of R & D in China ' s High - tech Industry . China ' s Industrial Economy , 2006 (11) : 38 - 45 .
- [5] LiuZhiying, Yezhen. An empirical analysis of the technical efficiency of various industries in high - tech industries in China - -Malmquist index method based on non - parameters . Science and technology management , 2006 (9) : 22 - 27 .
- [6] Tian Yuan. A study on the effect of regional high - tech industrial policy - -Jiangsu Province as an example . Nanjing : Nanjing University of Technology , 2008 : 1 - 66 .