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Study on the Innovation Incubation Ability Evaluation of High Technology Industry in China from the Perspective of Value-Chain

An Empirical Analysis based on 31 Provinces

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Abstract

This paper establishes the innovation incubation ability evaluation model by using optimal combination weight and analyzes the innovation incubation ability of high technology industry based on data from 31 provinces during the period of 2008-2012. The results show that from general perspective, the innovation incubation ability of high technology industry enters into the slow development phase in accord with “W” shape in China; From the regional perspective, Guangdong, Jiangsu and Beijing are in the lead; Tibet, Ningxia lag behind other regions; The rank of some regions is changeful; From sub-ability perspective, while resource investment ability and research and development ability overall show a downward trend, economic transformation ability shows an upward trend; Besides, research and development ability makes more important contribution to the innovation incubation ability of high technology industry.

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Keywords: Innovation incubation ability, resource investment ability, research and development ability, economic transformation ability;

1. Introduction

The total production value of high-tech industry is leapfrogging with an average annual growth rate of over 20% [1]. Meanwhile, some severe challenges such as the lack of industry chain, low-level product technology and added value and gradient patterns in regional development cannot be ignored [2]. To avoid regional shelling and rural hollowing, we should foster high-tech industries with core competence and long-term potentials. The concept of incubation innovation ability emerges as the goal of industrial incubation was put forward [3], and its social and economic returns spawned extensive attention.

Innovation incubation ability relies on innovation incubation network [4] which mainly regards parent organizations as core carriers, serves high-growth entrepreneurs and aims to incubate high-tech industries. During the transition from corporate incubation into industrial incubation, the mother body, along with other organizations, provide new ventures with initial service support, shared resource and some operating funds [5,6] in accordance with its expertise and resource network to improve new venture's innovation ability and achievement transformation level, as well as synthetic ability of high-tech potentials [7]. Innovation incubation ability is regarded as a reflection to rate optimization of regional technological innovation structure and function display to promote the sustainable development of high-tech industry in China. To evaluate this innovation incubation

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ability objectively and scientifically can foster the scientific positioning of a certain area and its feasible innovation incubation ability cultivation strategy, and it's important to improve the competitive edge of high-tech industry.

Currently scholars at home and abroad have carried out a series of related researches. To sum up, the existing researches mainly exhibits the following problems: firstly, scholars currently pay more attention to concept connotation and functional objective concerning the research on innovation incubation ability, but they seldom make quantitative assessment. Secondly, researches are now mostly based on microscopic levels, only in the scope of incubators to analyze how to improve the management level and operational mode of incubators or improve the innovation incubation ability [7], which ignore the influences that other carriers in the incubation network have on innovation incubation ability. Thirdly, when the majority of scholars evaluate the ability of innovation incubation, they rarely touched the industrial level, thus resulting in the lack of concerning industry incubator.

In light of the concerns above, on the basis of exploring the conjunction point of value chain and innovation incubation activities, this paper divides the process of high-tech industrial innovation incubation into three sub-phases based on the value-chain framework, which are upstream resource investment, research and development midstream and economic transformation downstream. This method will help separate three main factors, resource, technology and market, from the problem of influencing high-tech industrial innovation incubation ability system to create a set of sound innovation incubation ability evaluation index system among regional high-tech industries. Following process and the direction of value chain upgrading of the evaluation index system, innovation incubation ability and its sub-ability can be assessed macroscopically, which can reveal inefficient sections of innovation incubation ability and specifically upgrade the value-chain framework. Thus, high-tech industrial innovation incubation ability can be improved according to the whole value-chain framework.

This study is to analyze the development status of innovation incubation capability of provinces and cities in China on a basis of 31 provinces during the period of 2008-2012, this paper uses optimal combination weighting method and analyzes China's high-tech industrial innovation incubation ability. The optimal combination weighting method includes G1 method [8], G2 method [9], entropy method [10] and maximize deviation method [11], which can avoid shortages of subjective assessment and objective assessment. The G1 and G2 methods are subjective evaluation methods. Their data are derived from expert experience and subjective judgment. The entropy method and the maximization of variance are objective evaluation methods. Their data are derived from the objective data in China Statistical Yearbook. By combining the weighting method, it can also allocate the contribution that every index makes to innovation incubation ability appropriately, which is conducive to a more rational evaluation result.

2. Build an innovation incubation ability index system for high-tech industry

2.1. Principles

To build an innovation incubation ability index system for high-tech industry, it is important to select indexes scientifically and rationally. The indexes should follow these principles:

- (1) Scientific principle. The settings of index system should be in accord with innovation incubation ability's connotation.
- (2) Operative principle. The settings of indexes and index system should have definitions and limits and indexes should be available.
- (3) Advanced principle. Indexes selected must be able to reflect the condition of innovation incubation ability instantaneously.
- (4) Systematic principle. Indexes selected must reflect not only resource investment and efficiency condition of innovation incubation ability but also its sustainability and potentials. Stock, relative level and growth level should all be considered. To make a objective and rational evaluation, absolute index, relative index and potential index (growth rate), can be adopted to evaluate rational innovation incubation ability.

2.2. Evaluation index system

Scholars believe that innovation value chain focuses on enterprises, scientific research institutions, colleges and universities, government agencies, investment and financing institutions etc. The value chain model is a process which is about innovation resource investment, emergence of innovative technology and finally the realization of industrialization and marketization of the innovation. In the process, innovative knowledge and technology flow along the value chain in order to realize the innovation value and promote the upgrade of the value chain. The operational process of high-tech industry innovation incubation is with high growth startups as the core subject, taking market demand as the guidance, through the effective connection of related innovation subjects such as technical innovation, organizational innovation and management innovation incubator, to achieve the efficient allocation and integration of incubation resources within the innovation incubation network, so as to realize innovative knowledge supply, technology supply and products supply, finally to promote technology industrialization and marketization. Thus, the operational process of high-tech industry innovation incubation system is consistent with the thoughts of innovation value chain. Optimization of high-tech industry innovation incubation system essentially is the realization of the value chain

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