Review of Regional Innovation Capability Evaluation

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Abstract. Regional innovation research is a hot topic in the field of science, technology and economy at present, because it relates to the status and role of regional economy in the world economy today and in the future .Through a brief review of the relevant literature at home and abroad, in order to provide useful help for further research. The research results show that China's regional innovation ability is rich in research results, most of the research results on the index system of regional innovation ability and the influencing factors, and the research on the mechanism of action is not enough.

Keywords: Regional innovation capability; indicator system; influencing factors; mechanism of action.

1. Introduction

The report to the 19th CPC national congress further clarified the important role of innovation in leading economic and social development. In the new era, innovation will play an increasingly prominent strategic supporting role. However, China has a vast territory and unbalanced regional economic development. The research on regional innovation ability is of great significance to deeply understand the causes of unbalanced regional economic development and strengthen the coordinated development of regional economy. In recent years, research on regional innovation ability has made rapid development.

2. Foreign Research on Regional Innovation Ability

Foreign scholars are relatively early to systematically study regional innovation ability. The earliest scholar to deeply study regional innovation is professor Cooke from Cardiff university, who first proposed regional innovation in the article regional innovation system: competition rules of new Europe published in 1992. Cooke believes that enterprises continue to learn and reform through interaction in social and economic life, so as to form a benign development track. Regional innovation enables such interaction to go beyond enterprises themselves and involve governments, financial institutions, research institutes, universities and other organizations, thus forming a regional innovation system. The global innovation index consists of five "innovation input indexes" and two "innovation output indexes", which are respectively: system, human capital and research, infrastructure, market maturity, business maturity, knowledge and technology output, and innovation output.

2.1 Analysis of Influencing Factors of Regional Innovation Ability

The authoritative theoretical system about the influencing factors of regional innovation ability is the conceptual framework of national innovation ability established by Furman et al. In this theoretical framework, Furman et al.(2002) argued that national innovation capacity depends on innovation infrastructure, more specific innovation environment in industrial clusters and the connection between them[1]. Jarle Aarstad etal. (2016) found that international and regional cooperation can effectively promote product innovation, and the larger the enterprise size, the greater the benefits brought by regional innovation cooperation[2].

2.2 Formation Mechanism Analysis of Regional Innovation Ability

In terms of the characteristics of the formation of regional innovation ability: Schumpeter believes that the industrial expansion at different stages makes the innovation achievements obtained to

different degrees, and the delayed diffusion of innovation ability makes the acquisition of innovation achievements greatly lag behind the industrial expansion stage on which the innovation achievements are generated. Quatraro pointed out that regional innovation capability emerged with the increase of innovation activities within the system, compared with the expansion process of regional propelling industries, the diffusion of regional innovation capability also has a certain time lag[3]. In recent years, foreign scholars' research on the evolution of regional innovation capability has developed to the empirical stage.

3. Research on Regional Innovation Ability in China

3.1 Regional Innovation Ability Evaluation Index System

Index system of Chinese scholars on the research achievements of rich, have certain similarity index selection, selection of the index system of the main indicators of knowledge innovation, technology innovation, system innovation, the innovation input, innovation output capacity, and ability of knowledge acquisition and innovation performance, configuration capability, innovation environment, innovation foundation, support capacity, industry cluster environment and organization operation ability, etc. For example, Xiong Xi et al. (2016) constructed an evaluation system with factor input, structural level and functional performance as first-level indicators, and evaluated the innovation ability of each demonstration area[4].Wang Yushuai et al. (2018) constructed an evaluation system with knowledge capital, research and development input, economic conditions and performance results as first-level indicators, and conducted static and dynamic evaluation of 9 provinces in the pan-pearl river delta[5].

In general, Chinese scholars have some similarities in the selection of regional innovation ability index system, but there are also differences. There are three main reasons for the difference: first, there is no unified understanding of the meaning of regional innovation ability; Secondly, there are different classification standards when selecting indexes;Third, it may come from the great differences in the natural, historical, cultural and economic development of different regions in China.

3.2 Distribution and Evaluation of Regional Innovation Ability

There are two kinds of research on the distribution and evaluation of China's regional innovation ability. The other is to study the spatial distribution and characteristics of China's regional innovation ability. Qi Yawei (2015) found through research that the spatial distribution of China's regional innovation ability presented unbalanced and spatial positive correlation[6].Ni Yanting and Wu Jun (2019) used TOPSIS analysis method of entropy weight to measure and evaluate the innovation ability of metropolitan area[7] .Through sorting out relevant literatures, it is found that the spatial distribution of regional innovation ability in China is unbalanced and positively correlated with space. Although there are abundant research results on the distribution and evaluation of China's regional innovation ability, with the increase of studies on the spatial distribution and spatial correlation of China's regional innovation ability, the spatial effect of evaluation indexes is not obvious, and there is no evaluation index that can clearly express the synergies between regions. At the same time, the exploration of the reasons for the spatial correlation and its significance in narrowing the gap of regional innovation ability in China is still lacking.

3.3 The Influencing Factors of Regional Innovation Ability

Through reading literatures, it is found that the factors affecting regional innovation ability include personnel, capital input, FDI, regional innovation efficiency, material capital agglomeration, innovation environment, human capital agglomeration, material capital agglomeration, proportion of output value of high-tech industry, transportation infrastructure, industrial cluster, etc.

It can be seen that there are abundant researches on the influence of personnel and capital input and innovation environment on regional innovation ability, and the research conclusions are basically confirmed. Literature on the impact of FDI on regional innovation ability is also abundant, but there is no consistent conclusion about the impact of FDI on regional innovation ability. For the reasons of

the inconsistency, scholars mainly explain it from the perspective of threshold effect[8]. There are many factors influencing regional innovation ability. Although scholars have different research methods and different focuses, there is still some consensus on some indicators.

3.4 The Mechanism of Regional Innovation Ability

Chen Wu ,Chang Yan (2011) built a mechanism model of the influence of intellectual capital on regional innovation ability, and analyzed and studied the influence mechanism of intellectual capital on regional innovation ability respectively from three aspects of intellectual capital -- human capital, relational capital and structural capital[9]. He Xiaoqing (2017) investigated the impact mechanism of innovation network on regional innovation from the perspective of high-tech industry and medium and low technology industry[10].

There are relatively few theoretical researches on the formation of regional innovation ability, and no unified theoretical method has been formed. Existing researches also have great differences. Firstly, the methods adopted by scholars are various. Domestic scholars still focus on the theoretical description of the formation mechanism of innovation ability, but lack of systematic research on the mechanism of many important factors, such as FDI and industrial cluster. And the research abroad has made substantial progress in the empirical aspect.Nevertheless, scholars have reached a consensus in the following aspects: the formation of regional innovation capacity is a complex process. The interaction among various factors is changing dynamically, which plays an important role in the formation of regional innovation ability.

4.   Conclusion and Prospect

4.1 Conclusion

From the above analysis and summary, it can be seen that scholars at home and abroad have conducted extensive and in-depth discussions on the evaluation of regional innovation ability, and their understanding of the evaluation of regional innovation ability is deepening .To the following main conclusions: China is rich in regional innovation ability the related research results, the main content of the research focused on the index system of regional innovation capacity, regional innovation ability distribution and evaluation, regional innovation ability influence factors and mechanism of action, on the regional innovation ability index system and factors influencing the most research results, research on mechanism of inadequate.

4.2 Prospect

Scholars have made substantial progress in the definition, index construction, influencing factors and mechanism of regional innovation ability.Through systematic review of existing research results, relevant researches can be further deepened in the following aspects:

First, it is urgent to strengthen the connotation research of regional innovation ability and establish a set of highly operational conceptual model. Second, further improve China's regional innovation capacity evaluation index system. The construction of the evaluation index system of regional innovation capability in China is quite random and there is no unified standard. Third, strengthen the research on the mechanism of regional innovation ability.

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