

The Research on Innovation-Driven Paths of High-tech Zone Under the New Normal in China

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Keywords: High-tech zone, Innovation-driven, Talent aggregation, Content analysis, Analytic hierarchy process.

Abstract. Talent aggregation of high level is good for high-tech zone of one country's economic pattern to achieve new dynamics of innovation-driven development, and then to push forward regional industrial restructure and economic transformation and upgrading. From that, how to recognize the driving force of talent aggregation and construct its assessment system scientifically plays an important role in high-tech zone for achieving innovation advantage successively. This kind of correlation effect is very prominent in high-tech zone development in China's costal area. Among that, talent aggregation, as the catalyst of economic-coordinated development, has drawn extensive attention from theoretical cycle and industrial field. Therefore, this study, according to the systematic constructing thought proposed by Complex Systematic, explores the index assessment frame of talent aggregation system of China's high-tech zone by content analysis; assesses the weight of different indexes by analytic hierarchy process; and finally, summarizes theoretical deduction and empirical analyzing results to put forward the paths and strategies for the innovation-driven development of high-tech zone based on talent aggregation system evaluation and optimization.

1. Introduction

Talents aggregation usually develops with regional development and industrial aggregation, which will generate great economic benefit and social effect. Scholars have explored the content^[1], forming factor[1], external environment[2] and after effect[3] about talent aggregation, and acquired some research results. In recent years, the prevailing Complex System Theory has a new recognition of complex cluster phenomenon in social economic area. That is, studying the driving mechanism of system cluster from the view point of traditional economics doesn't always reflect the law and the essence of cluster development, while based on the complex idea of Complex Theory, taking talent aggregation as complex system and explaining the forming mechanism of talent aggregation system from the view point of the system can solve the problems in attracting, managing and developing talent resource, and thus can promote regional innovation-driven development[4].

As a main force of innovation, talent aggregation plays an important role for high-tech zone in increasing research level and strengthening innovation energy as well as acquiring the commanding heights of development, and has become important reference to measuring the zone's competitive advantage[5]. Thus, how to effectively evaluate the driving energy of talent aggregation system is good for scrutinizing the effect of talent resource management for different levels of organizations in high-tech zone, and effectively solving a series problem of planning, allocation and development of talents. However, it's found by investigation that, in current evaluation on the formation of talents aggregation system of high-tech zone and on its driving force extent, the form of "a cut" judgment by sourcing certain content from statistical data or experts' consultation is used mainly. As a result, the driving factors can make actual key effect being always ignored. The reasons are that, talent aggregation needs a set of scientific and effective evaluation system for measurement. Although there have been some research results in regional talent aggregation system and scholars have basically agreed that system's gradual change is affected by internal and external driving forces[6], there has

been less research on the different extents of driving paths under the frame of coordinated internal and external driving factors and the key condition for realizing system development.

To promote regional industrial structure adjustment and economic transformation, various high-tech zones in China have actively adjusted industrial aggregation strategy. With the gradual acceleration of regional innovation and development under the new normal, for further promoting regional economic transformation and development strategy of innovative industrial aggregation, higher requirements on the coordinating effect of economic growth factors have been put forward, and thus the successive development and utilization of innovative system resource is urgent. However, part of high-tech zones are in late-developing areas and their innovative industrial chain is with developing pattern, thus regional industrial aggregation scale is imperfect, and their industrial aggregation effect should be strengthened. Due to the unique feature of high-tech zones' high innovativeness, talents are the main force for innovation, and the continuous improvement of its aggregation system effect provides an effective path for solving those problems from the endogenous view point of organizational system for talent management and development.

Thus, this study, based on Complex Systematic Theory, explores the theoretical frame of talent aggregation system evaluation for high-tech zone under the new normal, tries to describe the condition for realizing talent aggregation under the coordinated effect of driving forces, and then to provide theoretical reference and direction for how to acquire innovation-driven paths and suggestion of high-tech zone through talent aggregation system evaluation.

2. Theoretical basis

2.1 The recognition of the driving factors of regional talent aggregation system. According to internal and external difference of driving factors, study results of the driving factors of regional talent aggregation system can be concluded from three points of view: ①From the view point of environment. Industrial aggregation environment is a key factor affecting talent aggregation, and the driving factor playing leading role during different aggregation stages has high uncertainty[7]. ②From the view point of talent structure level. On regional level, the driving factors of regional talent aggregation include knowledge overflow effect, regional common resource supply, external scale economy, government policy, reward and benefit level^[8]. ③From the view point of talent expectation. Talent aggregation extent is decided by industrial aggregating attraction and talent migrating expectation, and the attraction of regional policy to talents and talent communication effect in the area are main factors affecting talent aggregation[8].

2.2 The constructing mode of the driving factor of regional talent aggregation system . According to System Science Theory, dynamic organizational system is mainly operated by three basic modes: ①Self-organization system relies on internal driving factor to cause interacting effect among main bodies, to spontaneously form the change law with relatively stable function and structure[9]. ②Other-organization system relies on the effect of external driving factor to display the law of functional and structural change in the dimension of space and time, and follows mandatory path from top to bottom[10]. ③Complex mode means the objective developing law formed under the combined effect of both internal and external driving factors. In general, regional talent aggregation system should continually take strategy to construct other-organization system that is subject to specific external environment[11]. And with the system growing gradually, self-organization's internal driving system should be used, and the coordinated evolution role of the driving factors from other-organization and self-organization shall be exerted, so as to promote the sustainable development of regional innovative driving mechanism.

3. The evaluation analysis of talent aggregation system

Based on System Theory, this study uses a kind of evaluation form for the system, which is to construct evaluation system in advance to conduct CITC analysis with low reliability index by

empirical study, and to form evaluation indexes by repeated iteration^[12]. This form uses contrastive demonstration in qualitative research together with quantitative analysis, and the quantitative research based on qualitative research is just the methodology trend of System Theory construction[12].

3.1 The construction of the evaluation index system of talent aggregation system. This study, by analyzing the contents of 738 relative articles on talent aggregation during 2005-2014, abstracted talent aggregation driving factors of 37 emerging economic and industrial parks of national scale. Following the logic of gradually breakdown from top to bottom and the lower level being the reflection of the upper level, this study concluded the first-grade indexes by analyzing their content feature. Among which, 31 driving factors reflecting the content feature of the first-grade indexes were extracted to be served as the second-grade indexes (as shown in Table 1).

3.2 The weight assessment of the evaluation indexes of talent aggregation system. This study assessed the evaluation indexes' weigh of talent aggregation system by surveying the *Questionnaire of Talent Aggregation System Evaluation* together with experts' marking.

3.2.1 The questionnaire survey of index weight

3.2.1.1 The objective of the survey. It's to acquire experts' marking of the *Questionnaire of Talent Aggregation System Evaluation* and to calculate the indexes' weight by analysis of survey data.

3.2.1.2 The object of the survey. This study specially chose doctoral tutors as the object for the survey, who are engaged in the study on technological economy and management, and in special, have profound understanding in the construction and development of economic development area and emerging industrial areas, etc. 13 questionnaires are sent out and collected actually.

3.2.1.3 The way of the survey. In order to increase efficiency, this study used email and WeChat to collect questionnaire, and introduced the survey's objective and the fill-out items, etc., by the combined form of telephone and email explanation. This study designed the questionnaire by referring to the Likerts 10 Scale's design principle, and designed 1~10 grades from low to high subject to the importance extent of the indexes reflected in the survey items.

3.2.2 The process of index weight assessment. According to the weight design flow of the evaluation index system of analytic hierarchy analysis, this study assessed the evaluation indexes' weight of talent aggregation system in three steps: ①Design the *Questionnaire of Talent Aggregation System Evaluation* centering the objective, content and path of the survey; ②Send out the questionnaire, explain the terms and fill-out items, etc., and invite experts for marking; ③Collect the questionnaire and assess the indexes' weight by data statistics and Yaahp V7.5 software calculation. Based on the structure module of talent aggregation system, this study input experts' marks into judgment matrix, and set items as 1~10 grades to evaluate the weight of different indexes.

3.2.3 The results of indexes weight evaluation. This study used judgment matrix for geometric mean calculation of experts' marks, and concluded the indexes' weight (as shown in Table 1).

3.2.4 Testing on the reliability and validity of the indexes' structure. Just as shown in Table 2, the composite reliability (CR) between the indexes of each level and the total indexes is below 0.1, showing that the reliability of judgment matrix is acceptable. This study further consulted experts about the content feature of all the indexes, who consented on the rationality of all indexes' construction, thus the content validity of the talent aggregation system is confirmed.

4. Conclusion

This study identified the evaluation index structure of internal and external talent aggregating system, and defined the talent aggregation evaluation system of high-tech zone. Scientific evaluation on

Table 1. The evaluating indexes and weigh of the talent aggregation system.

	First-grade indexes	First-grade indexes' weigh	Second-grade indexes	Second-grade indexes' weigh
External aggregating driving factors	Policy support	0.349	Preferential policy support	0.238
			System measure support	0.200
			Policy atmosphere support	0.150
			Normalization of evaluating policy	0.119
	Guarantee system	0.324	Working guarantee system	0.171
			Service guarantee system	0.112
			Fund guarantee system	0.199
			Working atmosphere guarantee system	0.234
			Life guarantee system	0.153
	Supporting resource	0.321	Regional supporting resource	0.325
			Enterprise's supporting resource	0.286
			Industrial supporting resource	0.132
Project's supporting resource			0.256	
Internal aggregating driving factors	Talent capital	0.607	Specialized technical talent capital	0.301
			General scientific talent capital	0.186
			Senior technical talent capital	0.140
			Leading talent capital	0.372
	Talent management and development	0.390	Validity of talent attraction	0.061
			Rationality of talent construct	0.202
			Normalization of talent management	0.133
			Validity of Talent cultivation	0.052
			Feasibility of talent flowing or migrating	0.031

Table 2. The reliability checking results of the evaluating index construct of the talent aggregation system.

First grade-indexes	Internal aggregating driving factors (0.0000)		External aggregating driving factors (0.0014)		
	Talent management and development	Talent capital	Guarantee system	Supporting resource	Policy support
	0.0013	0.0002	0.0004	0.0001	0.0003

regional talent aggregation system is good for the zone's setting up talents management proposal, and motivating the positive effect of talents aggregation, so as to provide decision-making basis on regional innovation-driven development. Accordingly, this study gives the following suggestions:

Improve the service's environment and quality. Firstly, governmental departments, together with talent intermediary organizations, should construct talent service system, whose function includes not only talents' employment service, but headhunting role; secondly, establishing talents agent service system connected with human resources market to explore the talents agent market and outsourcing service that can meet the need of regional industrial scale development; thirdly, developing talents quality evaluation system to provide guidance for talents recruitment, management and cultivation; finally, establishing the "internet+talent service" platform for core industries, to drive the function of talent bank reserving, using and development.

Innovate the talent's management, attraction, cultivation and reservation. Policies on attracting and cultivating innovative talents should be formulated. That means to further construct the innovative talent management system from the three view points of attracting, cultivating and motivating talents. Firstly, complete the policy of attracting high-level talents at home and abroad, attract excellent talents studying abroad to come back for pioneering work and provide favorable policies supporting incorporation and human resources; secondly, set up diversified talent motivating measures, mainly support scarce talents who have prominent contribution to emerging industry or industrial cluster construction, and form the motivation system with lasting effect; finally, aiming at main industries, set up specialized talents cultivation policy. With regional advantage of high-tech zone, construct industry-university-research platform together with universities and research organizations of its surrounding areas, and set up orientated talent cultivation system.

Acknowledgement

This research was financially supported by China Postdoctoral Science Foundation (Grant NO. 2015M571266), Humanities Social Science Research Project of Education Ministry of China (Grant NO. 16YJC630143), National Education Science Plan “Key Project of Education Ministry of China” (Grant NO. DIA150293), Humanities Social Sciences Research Project for Universities of Shandong Province (Grant NO. J15WB01), Plan of Supporting Outstanding Young Scholar in Humanities Social Science of QILU University of Technology (Grant NO. SKRC15-01), National Undergraduate Training Project for Innovation-Entrepreneurship of QILU University of Technology (Grant NO. 201610431054), Teaching Reform Research Project of QILU University of Technology (Grant NO. 201625), Key Project to Statistical Research of Shandong Province of China (Grant NO. KT16235).

References

- [1] J. Xue-Lin and F. Jin, Research on perfecting and reconstructing of enterprise’s organizational structure based on organization entropy and dissipative structure, *Enterprise Vitality*, vol. 6, pp. 81-86, 2011.
- [2] SUN Jian and YOU Wen, The interactive relationship research between talent aggregation and industrial aggregation, *Management World*, vol. 3, pp. 177-178, 2008 (In Chinese).
- [3] R. E. Lewis and R. J. Heckman, Talent management: A critical review, *Human Resource Management Review*, vol. 2, pp. 139-154, 2006.
- [4] B. L. Pence, H. K. Fathy, and J. L. Stein, Recursive maximum likelihood parameter estimation for state space systems using Polynomial Chaos Theory, *Automatica*, vol. 11, pp. 2420-2424, 2011.
- [5] HU Bei, ZHOU Junxu, and WENG Qingxiong, The effect of high-tech industry cluster on the attraction of talents: Based on the empirical study of industrial clusters in Guanggu of Wuhan, Zhongguancun of Beijing, *Research and Developing Management*, vol. 1, pp. 51-57, 2009 (In Chinese).
- [6] LU Caimei and LIANG Jiaye, Co-evolution model and case study of industrial cluster: Take the hardware cluster in Xiaolan town of Zhongshan as an example, *China Soft Science*, vol. 2, pp. 142-150, 2009 (In Chinese).
- [7] NIU Chongkui, GAO Zuyan, and WANG Juan, The research on evaluation and optimization of S. & T.-based talent aggregation environment, *Science and Science and Management S. & T.*, vol. 12, pp. 127-133, 2007 (In Chinese).
- [8] ZHOU Junxu and HU Bei, The analyses of effect and cause of industrial cluster talent attraction: Take Foshan as an example, *Management Review*, vol. 3, pp. 101-107, 2010 (In Chinese).
- [9] R. A. Watson, C. Buckley, and R. Mills, Optimization in “self-modeling” complex adaptive systems, *Complexity*, vol. 5, pp. 17-26, 2011.
- [10] A. Hall and N. Clark, What do complex adaptive systems look like and what are the implications for innovation policy, *Journal of International Development*, vol. 3, pp. 308-324, 2010.
- [11] B. Ellis and S. I. Herbert, Complex adaptive systems (Cas): An overview of key elements, characteristics and application to management theory, *Informatics in Primary Care*, vol. 1, pp. 33-37, 2011.
- [12] H. Qian, Talent, Creativity and regional economic performance: The case of China, *The Annals of Regional Science*, vol. 1, pp. 133-156, 2010.