

2014

# BioTechnology

*An Indian Journal*

FULL PAPER

BTAIJ, 10(20), 2014 [12063-12068]

## Assessment indicator system of talent aggregation in emerging industry based on structural equation method

Hui Li\*, Qun Wang, Ziyi Wei

Mailbox 490, Hohai University, No.8 of Focheng West Road, Jiangning District,

Nanjing City, Jiangsu Province

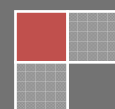
E-mail: Helenli1979@126.com

### ABSTRACT

In post-crisis era, many countries attach great importance to the development of emerging industry. Since the emerging industry is in initial stage, foreign and domestic research on form mode, risk, driving factor and etc is more, while the research on talents of emerging industry is less, and the talent aggregation, development and cultivation are important supporting role in the development of emerging industry. Firstly, this thesis preliminarily establishes the assessment indicator of talent aggregation effect in strategic emerging industry through semi-structured interview and exploratory factor analysis, and then applies measurement model of structural method to conduct the confirmatory factor analysis on established indicator system, thus reaches the degree of fitting of structure and relevant importance between factors, and finally forms the assessment indicator system of talent aggregation effect in emerging industry.

### KEYWORDS

Talent aggregation; Agglomeration effect; Assessment indicator system; Emerging industry.



## INTRODUCTION

Talent aggregation is a special action in the process of talent flow, and it means that talents flow to a specific region caused by some reasons<sup>[1-3]</sup>. The development of emerging industry should depend on talent aggregation, which not only can realize their value of talents in emerging industry, but also can produce the talent aggregation effect to make the gathering place of emerging to obtain the leading development opportunity, and promote sustainable growth of economics, thus accelerating the talent aggregation of the region, and forming the optimum cycle mechanism. Therefore, every country and region wants to be the commanding point of relevant talents while energetically develops the emerging industry, and vigorously promotes the talent aggregation engineering of emerging industry as well. The aggregation of talents in emerging industry is influenced by many factors, so this research applies the method of structural equation, and analyzes the main influencing factors of talent aggregation effect in emerging industry, thus proposing the assessment indicator system of talent aggregation effect in emerging industry.

## THEORETICAL ANALYSIS

Anderson N H (1971) put forward that the main factor of population migration is economic benefits, among it, the main content determining whether people migrate or not includes the labor demand, income, residence, environmental quality and education level<sup>[4]</sup>. Xingzhen Zhu (2010) thought that factors influencing the talent aggregation include environment factors, organizational factors and individual factors<sup>[3]</sup>. Wang, P(2009) analyzed the factors influencing the aggregation of regional technological innovation talents through the quantitative research, and proposed the assessment indicator on agglomeration force of regional technical innovation talents, including the economic environment, living environment, innovation input and innovation output<sup>[5]</sup>. Mao, G F, Hu, B (2009) etc, studied the influencing factor of talent flow in automobile industry cluster, including the characteristic of industry cluster, city environment, working environment, income and individual factors<sup>[6]</sup>. Qiang Zhang and Tiqin Zhang (2010) particularly subdivided the city's environment factors, though the main factors influencing the talent aggregation is city environment, which can be considered from the aspect of population, economic, life, physical geography and institutional environment<sup>[7]</sup>. Chunhai Zhang and Jian Sun (2011) studied the main factors influencing the aggregation of technical talents were economic development level, education level, science and technology input, income and living environment<sup>[8]</sup>. Jianqun Qiu (2011) analyzed the importance influences to talent aggregation from the United States Federal Government and Silicon Valley based on the retrospect of development history of economic belt along the Pacific in America, the United States Federal Government played the role of policy promoting, which two founders of Silicon Valley played the role of "bellwether", including the innovation spirit and attraction<sup>[9]</sup>. Naiwen Li and Huizhen Liu (2012) introduced the system dynamics to the talent aggregation system, analyzed the mechanism of action and degree of importance to talent aggregation from industrial economic environment, education environment and social culture environment<sup>[10]</sup>.

Combining the previous study, firstly, this study thinks that the influencing factors of talent aggregation effect can be divided into two parts: one part is the advantageous driving factors, and another part is the disadvantageous driving factors. The research shows that the advantageous factors influence the talent aggregation more, so this study will emphasize the advantageous factors of talent aggregation. Secondly, the environment influences the talent aggregation most, so the study will develop from the perspective of environment driving factors. Finally, the specific industrial characteristics influences the talent aggregation largely, therefore, this paper chooses the special industry-emerging industry and special talents as the studying object in order to provide the theory and practice exploration on influencing factors of talent aggregation.

## EMPIRICAL ANALYSIS

### Measurement scale

This research conducted the semi-structured depth interview to employees from an enterprise of Internet of Things in a city of China. Based on the induction and collection of interview result, 42 indicator items evaluating the talent aggregation effect in emerging industry were collected, delete and merge the repeated or similar content in primary selection, and adopt the form of Likert 5 graduation, from "1" to "5" means the degree of recognition on subject from interviewees, among them, "1" stands for "less important", "5" stands for "very important", and finally form assessment measurement TABLE on talent aggregation effect in emerging industry, including 4 dimensionalities (talent atmosphere, talent policy, infrastructure, enterprise development), and 18 items.

### Sample information

This study issued 200 questionnaires, collected 169, and 10 were invalid. The recovery rate of questionnaire is 84.5% and the effective recovery rate of questionnaire is 94.08%. Among them, there are more men, occupying 69.17% of total number; young people are more, and age under 35 occupies 67.5%; 90% people surveyed have bachelor degree or above, it can be seen that most of them have higher education level; from the position category, research staffs are most, and

the second place is production staffs, which means more talents are engaged in science and technology, and it is consistent with the industry characteristics of emerging industry; people surveyed mainly distribute in the emerging industries of software and service outsourcing, new generation information technology, energy conservation and environment protection, new material, high-end equipment manufacturing, new energy, culture creativity, etc.

**Data analysis**

This study applies SPSS20.0 to test the reliability and validity of questionnaire; uses the exploratory factor analysis to establish the assessment indicator system of talent aggregation effect in emerging industry, including the goal level, indicator level and each weight; and test the structure of exploratory factor by means of confirmatory factor analysis in structural equation.

(1)Reliability and validity test of questionnaire. In the aspect of reliability test of questionnaire, the whole Cronbach's  $\alpha$  coefficient of questionnaire is 0.817, most of subitem Cronbach's  $\alpha$ coefficient is above 0.7, which means the whole internal reliability and subitem's reliability of questionnaire are stronger.

In the aspect of validity test of questionnaire, the value of KMO is 0.801, so the data of questionnaire is suitable for factor analysis. The observed value on statistic of sphere Bartlett test is 1163.027, and the relevant probability P is 0, which means the hypothesis is refused, the matrix of relevant coefficient has the significant difference with the unit matrix, so the variable will be suitable for factor analysis.

(2)Exploratory factor analysis. The exploratory factor analysis is conducted by means of SPSS software, and the factor loading matrix after rotation is shown in TABLE 1.

**TABLE 1 : Loading matrix of factors after rotation**

	<b>Factor 1</b>	<b>Factor 2</b>	<b>Factor 3</b>	<b>Factor 4</b>
V1	0.817	-0.111	-0.076	-0.047
V13	0.803	-0.047	-0.057	0.053
V14	0.775	-0.130	-0.046	0.131
V15	0.684	-0.021	-0.098	-0.107
V16	0.671	-0.171	-0.052	0.094
V17	0.577	0.172	-0.044	-0.218
V18	0.485	0.173	-0.025	-0.174
V2	-0.072	0.746	0.038	0.043
V4	-0.020	0.703	0.033	0.086
V5	-0.045	0.685	0.188	0.119
V8	-0.017	0.519	0.377	0.217
V7	-0.237	0.147	0.793	0.126
V9	-0.148	0.254	0.727	0.181
V11	-0.246	-0.004	0.621	0.252
V12	0.197	-0.024	0.527	-0.256
V3	0.120	0.217	0.231	0.758
V6	-0.097	0.113	0.141	0.552
V10	-0.024	0.207	0.131	0.514

According to the content of each item, V1,V13,V14,V15,V16,V17,V18 is the talent aggregation degree, innovation atmosphere, respect for talent, talent quality, knowledge sharing, boss style, colleague relationship respectively, which reflects the atmosphere of talent aggregation in emerging industry, so it is named as talent atmosphere; V2,V4,V5,V8 is the entrepreneurship opportunity, living allowance, introduction measure, household registration respectively, which reflects the police and measure made by the government for talent aggregation, so it is named as talent policy; V7,V9,V11,V12 is the children's education, reeducation opportunity, convenient transportation, surrounding facilities (including the supermarket, hospital, bank, etc) respectively, which reflects the infrastructure construction condition of gathering place of talents, so it is named as infrastructure; and the last 3 items, V3,V6,V10 is the enterprise popularity, industry concentration level, prospect of enterprise respectively, which reflects the development of enterprise and industry in mid-scale view, so it is named as enterprise development.

From TABLE 2, it can be seen that the characteristic value of factor solution after rotation being greater than 1 has 4 factors, the contribution ratio to variance from factor 1, factor 2, factor 3 and factor 4 respectively is 31.452%, 19.479%, 10.446%, 8.382%, and the accumulated contribution ratio to variance from 4 factors is 69.758%, which has better explanation effect.

**TABLE 2 : Variance explained of factor analysis**

Factor	Characteristic value	Initial factor solution		Characteristic value	Factor solution after rotation	
		Contribution ratio to variance%	Accumulated contribution ratio to variance %		Contribution ratio to variance %	Accumulated contribution ratio to variance %
1	5.661	31.452	31.452	5.661	31.452	31.452
2	3.506	19.479	50.930	3.506	19.479	50.930
3	1.880	10.446	61.376	1.880	10.446	61.376
4	1.509	8.382	69.758	1.509	8.382	69.758

According to the result of factor analysis, the weight being relative to goal level is calculated by applying:

$$\alpha = \lambda_i / (\lambda_1 + \lambda_2 + \dots + \lambda_n)$$

For example, weight of talent policy:

$$\alpha_1 = \lambda_1 / (\lambda_1 + \lambda_2 + \lambda_3 + \lambda_4) = 0.26262 / (0.262 + 14.124 + 9.034) = 0.22$$

Weight of entrepreneurship opportunity:

$$\theta_1 = \alpha_1 \times v_2 / (v_2 + v_7 + v_8 + v_{13}) = 0.22 \times 0.147 / (0.147 + 0.303 + 0.358 + 0.343) = 0.028$$

Finally, the assessment indicator system of talent aggregation effect in emerging industry is shown in TABLE 3.

**TABLE 3 : Assessment indication system on talent aggregation effect of emerging industry**

Assessment objective	First grade assessment indicator	Weight	Second grade assessment indicator	Weight
Talent Aggregation Effect of Emerging Industry	Talent policy	0.22	Entrepreneurship opportunity	0.028
			Living allowance	0.058
			Introduction measure	0.068
			Household registration	0.066
			Talent aggregation degree	0.060
			Innovation atmosphere	0.063
			Respect for talent	0.062
	Talent atmosphere	0.41	Talent quality	0.051
			Knowledge sharing	0.062
			Boss style	0.051
			Colleague relationship	0.059
	Infrastructure	0.22	Children's education	0.028
			Reeducation opportunity	0.036
			Convenient transportation	0.030
			Surrounding facilities	0.032
			Enterprise popularity	0.039
	Enterprise's development	0.15	Industry concentration	0.051
Prospect of enterprise			0.041	

(3)Confirmatory factor analysis. The structure of confirmatory factor is tested by the means of confirmatory factor analysis in structural equation, and the following conditions are found to be the illegal estimation: firstly, the variance of error term exists; secondly, the standardized coefficient is close to 1 or larger than 1 (generally, 0.95 is the critical point); thirdly, the larger standard error exists (meaning up to standard), which means that the fitting testing can be conducted to the whole model<sup>[11]</sup>.

The detailed result of fitting testing for whole model in this study is shown in TABLE 4, TABLE 5. The result shows that there is no illegal estimation in the whole model, and it has better fitting degree.

**TABLE 4 : Non-standard regression of multi-factor oblique crossing model**

Variable relation	Estimate	S.E.	P
Talent atmosphere <--> Talent policy	.092	.071	***
Talent policy <--> Infrastructure	.203	.074	***
Infrastructure <--> Enterprise development	.036	.024	***
Talent atmosphere <--> Infrastructure	.219	.073	***
Talent policy <--> Enterprise development	.030	.021	***
Talent atmosphere <--> Enterprise development	.011	.013	***

**NOTE: \*\*\* means P<0.001**

**TABLE 5 : Fit index of multi-factor oblique crossing model**

$\chi^2 / df$	RMSEA	GFI	AGFI	NFI	TLI	CFI	IFI
1.921	0.095	0.943	0.937	0.922	0.977	0.946	0.948

**RESULT AND DISSCUSS**

The study conducts the theoretical analysis and empirical analysis on assessment indicator system of talent aggregation effect in emerging industry by means of literature reading, interview and questionnaire survey, etc, and three aspects of result are reached as follows:

(1) The talent aggregation effect in emerging industry is not caused by a particular factor, it si caused by the resultant force of many factors, such as talent policy, talent atmosphere, infrastructure, enterprise’s development, etc, and these factors drive the talent aggregation of emerging industry together.

(2) According to the degree of relative importance, The talent policy dimensions for talent aggregation of emerging industry is composed of 4 indicators, including introduction measures, household registration, living allowance and entrepreneurship opportunity; The talent atmosphere dimensions is composed of 7 indicators, including respect for talent, innovation atmosphere, knowledge sharing, talent quality, talent aggregation level, boss style, colleague relationship; The infrastructure dimensions is composed of 4 indicators, including the reeducation opportunity, children’s education, surrounding facilities and convenient transportation; and the enterprise development dimensions is composed of 3 indicators, including the industry concentration degree, prospect of enterprise, enterprise popularity.

(3) Assessment model of talent aggregation effect in emerging industry has got the better confirmatory factor analysis, and it can be the important base of policy making.

**CONCLUSIONS**

We can learn from the above analysis that indicators of respecting talents and innovation atmosphere are relatively important in talent atmosphere factors, therefore, the good talent atmosphere should be built, respect talents, and the innovation atmosphere and learning organization should be established in order to promote the knowledge sharing between talents.

In talent policy, the introduction measure is the relatively important evaluation indicator, while the most key factor of strengthening introduction measure is increasing the talent introduction force, improving means of talent motivation, and adopting various incentive methods to produce the talent aggregation effect.

The education environment construction for gathering places of emerging industry should be strengthened by means of establishing the diversified education investment structure, and the public service facility should be perfected by means of improving the planning of public traffic, building, promoting the covering rate of communication system and completing the communication network construction, improving medical and health facilities and perfecting the infrastructure of city, which are one of important means of producing talent aggregation effect.

In some ways, the talent aggregation of emerging industry relies on the emerging industry cluster. So the role and position of government is very important in widening the concentration scale of emerging industry.

Meanwhile, the development prospect of enterprises engaging in emerging industry is better, excellent talents are more willing to work together. Therefore, the enterprise should establish and perfect the human resource management system in order to provide the powerful support for the talent aggregation, cultivation and utilization.

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