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# An empirical study on talent attraction evaluation of China western region

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**ABSTRACT**

*Introducing and keeping talents have been a difficult problem in China western region. Based on this reality, this paper focus on seeking the influence factors of talent attraction in twelve provinces of China western region referring to the talent attraction theory and the talent flow theory. In order to determine the main influence factors, we asked the expert by Delphi method to build talent attraction evaluation index system for the western region. To evaluate talent attraction quantitatively in western 12 provinces and obtain its overall talent attraction situation. Next, to carry out comparative analysis of 12 provinces' overall talent attraction situation and also comparative analysis of each province's internal talent attraction indexes. The results show that Sichuan, Shaanxi and Chongqing were routed to the top three talent attraction in the western 12 provinces, and the other nine provinces' talent attraction was fairly basic level of significantly lower; Technology innovation and entrepreneurship condition, career condition and education development condition are advantage factors affected talent attraction of Sichuan, Shaanxi and Chongqing. These three factors are also weak short board of other nine provinces. This study can provide basis and reference for policy makers and other talent work in the western region.*

**Key words:** evaluation index system; talent attraction; AHP; Delphi method; China western region

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## INTRODUCTION

China western region's economic development has become the highlight of China's economic development currently. It relates not only the balance of China's domestic economic development, but to improve the international competitiveness in the world economic development. China began to implement the western development strategy in 2000. It has now lasted 14 years. Over the past 14 years China western region has made great achievements, but there are still many problems. One of the most critical questions is difficult to introduce and retain talent. How to attract talent from eastern and central China to the west and how to retain them in the west has become the problem restricting the development of western economy. To solve this problem, the key point is to improve the attraction of western talent. The study on talent attraction in western China currently is quite lacking, so this paper studies the issue of talent attraction in China's western region.

Study on talent attraction, foreign countries mainly concentrated in two aspects of talent flow and talent attraction. Talent flow study mainly composed of talent flow factors and talent flow model; Talent attraction study mainly focused on theories and empirical studies of industrial clusters [1-5]. Domestic study on the flow of talent from around 1990 to the present, there are about 20 years. Part of the study focuses on the flow of talent to the enterprise, and the other part focuses on the flow of talent between regions. These studies basically were focused on analyzing the causes of talent flow and control countermeasure of the brain drain etc. Studies of talent attraction, there is a small part of the main attraction of urban talent evaluation [6-9]. Among them, the evaluation index system varies, but most of them were lack of empirical study. Therefore, this paper carries out the evaluation of talent attraction empirical study on China western region. This paper firstly analyzes the factors affecting the western talent attraction, and then establishes talent attractive talent evaluation system, and lastly carries out evaluation and analysis of talent in the western region. The purpose of this paper is to study the present state of talent attraction in western China, on the other hand is intended to find out the advantage contributing factors and disadvantage

constrains factors about the western region's talent attraction. This study may help to provide some scientific basis for the western local government to formulate talent policy and implement talent work.

## 2. WESTERN REGION OVERVIEW

The western region, usually referring to west of connected line between the Qinling Mountains and YellowRiver, includes 12 provinces and municipalities. They are Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Guangxi in southwest China and Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Inner Mongolia in northwest China. The land area of western region is 6.81 million kilometers, accounting for 71% of the total area, and population of about 350 million, accounting for 28% of the total population. Western region has vast territory, rich natural resources, and diversity ethnic and cultural. But Western regions' economic development lags behind; there are still many poor people who have not yet realized subsistence. In order to accelerate the development of the western region, Chinese government began implementing the western development strategy in 2000.Up to now, fourteen years has flied, the western economy has made tremendous development, but still long way to go. The key of the economic development is talent, and the lack of talent is an important issue in current western' economic development. Especially not leading into talents and retaining talent become a big constrain which restrict the development of the west. Although the Central and western provinces develop and implement a series of policies to attract talent, which has relatively made some achievements, but they still cannot introduce and retain talent smoothly. Especially the excellent local talent outflows, young brain drain, key positions brain drain, excellent external talent hard to introduce and so on. So, how to promote western region to attract talent, retain talent and improve the talent attraction has become an important part of western region economic development.

## 3. THE CONSTRUCTION OF EVALUATION INDEX SYSTEM

Scholars study talent attraction evaluation index system mainly from the perspective of the regional development, industrial cluster environment and enterprise environment. They set the talent attraction evaluation index system from several dimensions of the economic environment, social environment, cultural environment, legal environment and so on. The study of the talent attraction includes both quantitative and qualitative study. Based on these literature studies [6-9], we take the expert advice by Delphi method to select and determine index system following the index set principles of independence, accessibility, quantifiable, comparable, understandable, and also combining with the characteristics of the western region itself.

**Tab 1: The talent attraction evaluation index system and index weight of western region**

| Primary Index | Secondary Index | Explanation of Secondary Index | Secondary Index Code | Weight | Rank |
|---|---|---|---|---|---|
| Economic Condition $X_1$ (0.048) | Economic Level | GDP Per Capita/yuan | $X_{11}$ | 0.012 | 11 |
| | Economic Growth | GDP Growth Rate/% | $X_{12}$ | 0.031 | 8 |
| | Economic Structure | Tertiary Industry Proportion in GDP/% | $X_{13}$ | 0.005 | 13 |
| Life livable Condition $X_2$ (0.073) | Standard of Living | Average Disposable Wage of the Urban Units/yuan | $X_{21}$ | 0.020 | 10 |
| | House Price | Average Price of Commercial house/ yuan/$m^2$ | $X_{22}$ | 0.035 | 7 |
| | Transport | City Road area per Capita/ $m^2$ | $X_{23}$ | 0.003 | 14 |
| | Medical | Health technical persons(10000 person) | $X_{24}$ | 0.005 | 13 |
| | Culture and Entertainment | Cultural Expense Per Capita/yuan | $X_{25}$ | 0.010 | 12 |
| Career Development Condition $X_3$ (0.253) | Employment Structure | Third Industry Employment proportion/% | $X_{31}$ | 0.063 | 5 |
| | Employment Level | Urban Registered Unemployment Rate/% | $X_{32}$ | 0.190 | 2 |
| Education Condition $X_4$ (0.115) | High Education Development | Colleges and Universities Numbers | $X_{41}$ | 0.029 | 9 |
| | High Education Universal | Students in Colleges and Universities per 10000 person | $X_{42}$ | 0.086 | 4 |
| Technology Innovation and Entrepreneurship Condition $X_5$ (0.511) | Scientific and Technological Level | R&D Investment Intensity Proportion/% | $X_{51}$ | 0.132 | 3 |
| | Innovation Level | Total Patents Granted | $X_{52}$ | 0.325 | 1 |
| | Entrepreneurial Environment | Fixed-asset Investment Per Capita (10000 Yuan) | $X_{53}$ | 0.054 | 6 |

Selecting index primarily based on western talent attraction factors. There are three steps to carry out this process. Firstly, to select talent attraction factors based on talent attraction and talent flow literature. Secondly, to invite 15 talent experts to trade off these factors by Delphi method. Ultimately, we got 15 talent attraction factors, which were set as the secondary index of the talent attraction evaluation index system (Tab.1 secondary index).Then, these 15 secondary indexes were classified as 5 dimensions which were designed as primary indexes (Tab.1 primary

index).Thirdly, to set quantitative index based on secondary indexes (Tab.1 explanation index of secondary).This process was also drawed on talent experts advice. So through these three steps, we constructed talent attraction evaluation index system by 5 primary indexes, 15 secondary indexes and 15 quantitative indexes of secondary indexes.

In the process of index system construction, we gave three instructions. Firstly, eight talent experts of all 15 experts come from western region, and other seven experts come from central and eastern china. These 15 experts also took the next step to rate the relative importance of talent attraction evaluation index. Secondly, we judged and selected talent evaluation factors both considering the city and the individual career choice factors especially young talent, technology professionals [10-11].Thirdly, we set life livable condition index referring to the national livable city standards [12].

## 4. THE TALENT ATTRACTION EVALUATION IN WESTERN BY AHP

### *4.1 AHP*

AHP is a hierarchical decision analysis method, which was proposed by Saaty, American Operations Study Professor at the University of Pittsburgh in early 1970s. It is a combination of qualitative and quantitative multi-criteria decision analysis method with the features 0f flexible and simple [13]. In a nutshell, this approach breaks down complex problems into multiple constituent elements, and arranges these elements in accordance with the target layer, criteria layer, index layer to form hierarchical structure, and then pairwise comparisons these indexes to determine the relative importance of various indexes. Actually, the characteristic of this method lies in the "pairwise comparison" and distinguishing the relative importance of the factors, and ultimately re-establish the weight of individual element.

The specific steps of AHP are as follows: First, create a system of hierarchical structure. Second, using Saaty's 1-9 scale method to reflect the relative importance of the indexes, and constructing pairwise comparison judgment matrix. Third, calculate the relative weight of each factor, and consistency checking them. The calculation process is as follows.

①Calculating the product of elements in each line of the matrix:

$$M_i = \prod_{j=1}^{n} a_{ij} \quad (i=1,2,\ldots,n) \tag{1}$$

②Calculating $\overline{w_i}$ :

$$\overline{w_i} = \sqrt[n]{m_i} \quad (i=1,2,\ldots,n) \tag{2}$$

③Standardizing $\overline{w_i}$ :

$$w_i = \frac{\overline{w_i}}{\sum_{i=1}^{n} \overline{w_i}} \quad (i=1,2,\ldots,n) \tag{3}$$

④Calculating the maximum eigenvalue :

$$\lambda_{\max} = \frac{1}{n} \sum_{i=1}^{n} \frac{\sum_{j=1}^{n} a_{ij} \times w_i}{w_i} \tag{4}$$

⑤Consistency test:

First calculating the consistency index:

$$CI = \frac{\lambda_{\max} - n}{n-1} \tag{5}$$

Then testing the consistency index:

$$CR = \frac{CI}{RI} \tag{6}$$

When $CR$ <0.1, the degree of inconsistency in the matrix is acceptable. It indicated that the indexes have passed consistency test and the matrix has a satisfactory consistency.

### *4.2 Evaluation process and results by AHP*

Combined with AHP theory, using the Delphi method, we invited 15 talent experts (experts mentioned in the second part of this paper, not repeat them here) to value the relative weight of each index. After two rounds of expert scoring, and ultimately got the relative weight of each index. According consistency test, $CR$ values of six

judgment matrix are less than 0.1, and the consistency error is within the acceptable range. The judgments weight matrix of the 5 primary indexes and 15 secondary indexes, $\lambda$value, $CI$ value and the $CR$ value were as shown in Tab 2.

**Tab 2: Pairwise comparison matrix, weight and consistency values**

| The Middle Layer | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | Weight | $\lambda$ | $CI$ | $RI$ | $CR$ |
|---|---|---|---|---|---|---|---|---|---|---|
| $X_1$ | 1 | 1/2 | 1/5 | 1/3 | 1/7 | 0.048 | 5.135 | 0.0348 | 1.12 | 0.030 |
| $X_2$ | 2 | 1 | 1/4 | 1/2 | 1/6 | 0.073 | | | | |
| $X_3$ | 5 | 4 | 1 | 3 | 1/3 | 0.253 | | | | |
| $X_4$ | 3 | 2 | 1/3 | 1 | 1/5 | 0.115 | | | | |
| $X_5$ | 7 | 6 | 3 | 5 | 1 | 0.510 | | | | |
| Economic Condition $X_1$ | $X_{11}$ | $X_{12}$ | $X_{13}$ | | | Weight | 3.039 | 0.0193 | 0.58 | 0.033 |
| $X_{11}$ | 1 | 1/3 | 3 | | | 0.258 | | | | |
| $X_{12}$ | 3 | 1 | 5 | | | 0.637 | | | | |
| $X_{13}$ | 1/3 | 1/5 | 1 | | | 0.105 | | | | |
| Life Livable Condition $X_2$ | $X_{21}$ | $X_{22}$ | $X_{23}$ | $X_{24}$ | $X_{25}$ | Weight | 5.25 | 0.0625 | 1.12 | 0.059 |
| $X_{21}$ | 1 | 1/3 | 7 | 5 | 3 | 0.273 | | | | |
| $X_{22}$ | 3 | 1 | 8 | 6 | 4 | 0.485 | | | | |
| $X_{23}$ | 1/7 | 1/8 | 1 | 1/3 | 1/5 | 0.035 | | | | |
| $X_{24}$ | 1/5 | 1/6 | 3 | 1 | 1/3 | 0.068 | | | | |
| $X_{25}$ | 1/3 | 1/4 | 5 | 3 | 1 | 0.139 | | | | |
| Career Development Condition $X_3$ | $X_{31}$ | $X_{32}$ | | | | Weight | 2 | 0 | 0 | 0 |
| $X_{31}$ | 1 | 1/3 | | | | 0.250 | | | | |
| $X_{32}$ | 3 | 1 | | | | 0.750 | | | | |
| Education Condition $X_4$ | $X_{41}$ | $X_{42}$ | | | | weight | 2 | 0 | 0 | 0 |
| $X_{41}$ | 1 | 1/3 | | | | 0.250 | | | | |
| $X_{42}$ | 3 | 1 | | | | 0.750 | | | | |
| Technology Innovation and Entrepreneurship Condition $X_5$ | $X_{51}$ | $X_{52}$ | $X_{53}$ | | | Weight | 3.039 | 0.0193 | 0.58 | 0.033 |
| $X_{51}$ | 1 | 1/3 | 3 | | | 0.258 | | | | |
| $X_{52}$ | 3 | 1 | 5 | | | 0.637 | | | | |
| $X_{53}$ | 1/3 | 1/5 | 1 | | | 0.105 | | | | |

*4.3 Comprehensive talent attractiveness evaluation in the western region*

(1)Data sources and data standardization

Raw data were collected from western 12 provinces in 2008-2012.We collected these data from《China Statistical Yearbook》,《China Technology Statistical Yearbook》,《China Labor Statistical Yearbook》,《China Population and Employment Statistics Yearbook》,《China's Tertiary Industry Statistics Yearbook》,China economic information network statistics database and related provincial statistical yearbook .

This paper took a linear standardized method to normalize the raw data. For positive effect index, standardizing them by linear method. Setting $\overline{X_{ij}}$ to be standardized index, the standardized approach is as formula (7).

$$\overline{X_{ij}} = X_{ij} / \sum_{i=1}^{n} X_{ij} \qquad (i=1,2,\ldots,n;\quad j=1,2,\ldots,n) \qquad (7)$$

For negative effect index, taking the reciprocal of indexes' original data firstly, and then standardized them by formula (7). All normalized values were distributed between 0-1.

(2) The calculation of evaluation index value and results

First, calculating the final score of each evaluation index. Each index's standardized value multiplied corresponding weight, and the product is the final score of each index. All of these scores were distributed between 0-1. The score which is closer to 1 indicates that the score is higher. It means that corresponding index contributes to a larger extent to the talent attraction. In other words, this index is the most important benefit factor to the area's talent attraction.

Second, calculating the final score of every provincial talent attraction. According to the final score of each index, adding all the evaluation index values of each province together will get the total score of each provincial talent attraction evaluation value. The results are shown in tab. 3. To display them more intuitive in the form of fig.1. The bigger of the talent attraction evaluation score indicating that the degree of talent attraction is stronger, and vice Versace, it is the weaker.

Third, calculating the total score of each evaluation index from 2008 to 2012.First, Summing and averaging the 15 secondary indexes evaluation value from 2008 to 2012, and to get the average value of every secondary index evaluation value in 5 years shown in fig. 2. Accordingly, the relative contribution of each index to the western region talent attraction can be analyzed. Specific analysis will be shown in the evaluation of the results of the analysis

section below.

**Tab3: The annual talent attraction evaluation value and the total 5 years average value in 2008-2012**

| | 2008 | Rank | 2009 | Rank | 2010 | Rank | 2011 | Rank | 2012 | Rank | Average | Average Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inner Mongolia | 0.0709 | 5 | 0.0682 | 4 | 0.0676 | 5 | 0.0646 | 7 | 0.0657 | 7 | 0.0674 | 6 |
| Guangxi | 0.0717 | 4 | 0.0681 | 5 | 0.0684 | 4 | 0.0690 | 4 | 0.0694 | 5 | 0.0693 | 4 |
| Chongqing | 0.1126 | 3 | 0.1152 | 3 | 0.1202 | 3 | 0.1131 | 3 | 0.1297 | 2 | 0.1182 | 3 |
| Sichuan | 0.1936 | 1 | 0.2013 | 1 | 0.2089 | 1 | 0.2045 | 1 | 0.1910 | 1 | 0.1999 | 1 |
| Guizhou | 0.0638 | 9 | 0.0611 | 8 | 0.0621 | 9 | 0.0610 | 8 | 0.0686 | 6 | 0.0633 | 8 |
| Yunnan | 0.0675 | 7 | 0.0650 | 7 | 0.0636 | 8 | 0.0667 | 5 | 0.0651 | 8 | 0.0656 | 7 |
| Tibet | 0.0478 | 12 | 0.0469 | 12 | 0.0441 | 12 | 0.0528 | 11 | 0.0491 | 12 | 0.0481 | 12 |
| Shaanxi | 0.1269 | 2 | 0.1229 | 2 | 0.1254 | 2 | 0.1243 | 2 | 0.1246 | 3 | 0.1248 | 2 |
| Gansu | 0.0702 | 6 | 0.0654 | 6 | 0.0667 | 6 | 0.0658 | 6 | 0.0709 | 4 | 0.0678 | 5 |
| Qinghai | 0.0504 | 11 | 0.0503 | 11 | 0.0522 | 11 | 0.0576 | 9 | 0.0516 | 11 | 0.0524 | 11 |
| Ningxia | 0.0596 | 10 | 0.0587 | 10 | 0.0572 | 10 | 0.0453 | 12 | 0.0532 | 10 | 0.0548 | 10 |
| Xinjiang | 0.0649 | 8 | 0.0592 | 9 | 0.0640 | 7 | 0.0552 | 10 | 0.0601 | 9 | 0.0607 | 9 |

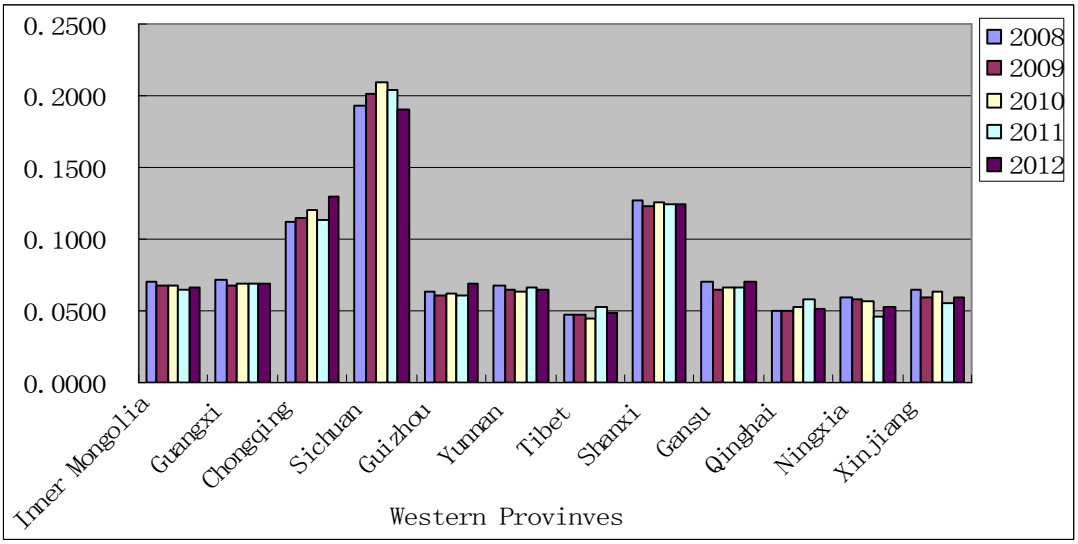


**Fig. 1: Western talent attraction evaluation value in 2008-2012**

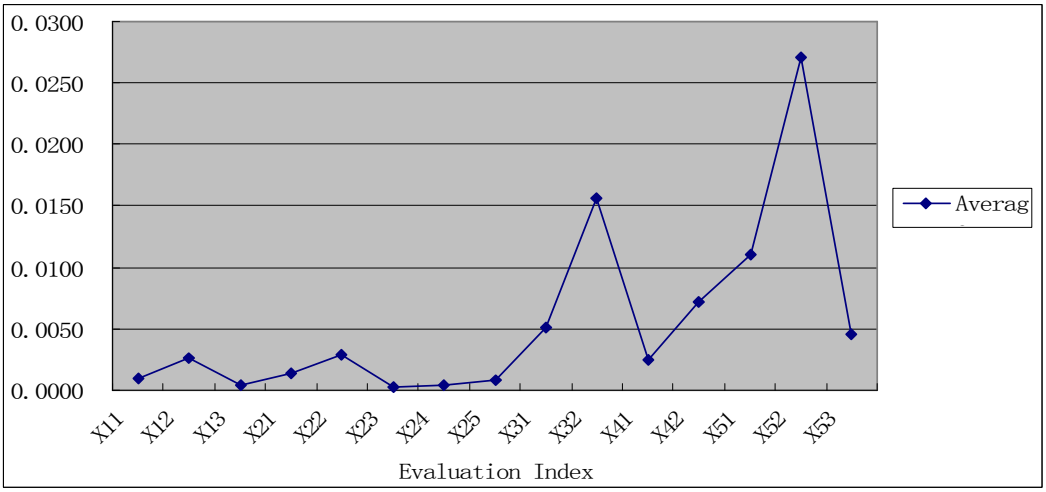


**Fig. 2: Western talent attraction evaluation index average in 2008-2012**

## RESULTS

*5.1 The overall analysis of the talent attraction evaluation value*

The tab.3 and fig.1 show that Sichuan's talent attraction evaluation value ranks first in twelve provinces in western

region. Shaanxi ranks secondly and Chongqing ranks thirdly. Both of them are relatively moderate degree of the talent attraction among 12 provinces in western region. Other nine provinces including Guangxi, Gansu, Inner Mongolia, Yunnan, Guizhou, Xinjiang, Ningxia, Qinghai and Tibet have similar degree of the talent attraction which is the lowest level of the talent attraction among 12 provinces in western region.

In addition, Sichuan's talent attraction maintains first place for 5 consecutive years, while its talent attraction score is much higher than the rest of the provinces. Tab.3 shows that Sichuan's talent attraction average is 0.1999 in 2008-2012.Shaanxi and Chongqing evaluation values roughly equal to 0.1248 and 0.1182 respectively. The gap of the value between these two provinces and Sichuan is 0.0751 and 0.0817 respectively. It means that Shaanxi, Chongqing and Sichuan have a large gap in the talent attraction. The rest of the nine province's talent attraction evaluation value difference is not too big. But the value has a large gap between Shaanxi and Chongqing. As shown in fig.3, the value differs double nearly and relatively far from Sichuan.

The above analysis shows that the gap about attracting and retaining talent in the western region is great considerably. Sichuan, Chongqing and Shaanxi are relatively able to attract and retain talent, and the rest of nine provinces are in a relatively backward state. Why Sichuan's talent attraction is higher than Chongqing and Shaanxi by about 1/3? Why other nine provinces have quite low level of talent attraction? The causes of this phenomenon, to some extent, lies in that Sichuan, Shaanxi and Chongqing have higher economic level, relatively advantageous geographical location, and rich natural resources. But these causes are not the most important reason. In order to seek the most important reason, we analyzed the internal structure of the evaluation index.

*5.2 The internal structure analysis of the talent attraction evaluation value*

First, overall analysis of talent attraction evaluation value of internal structure of the western region.

We compared average evaluation value of 15 secondary indexes in 2008-2012, and concluded the results shown in fig.2. To analysis of these values from two aspects: First, the average of $X_{52}$ ,$X_{32}$ ,$X_{51}$,$X_{42}$ ,$X_{31}$ and $X_{53}$ is definitely too high. The primary index corresponding to these six indexes are technology innovation and entrepreneurship condition, career condition and education condition. It means that technology innovation and entrepreneurship condition, career condition and education condition play the important role of talent attraction in western region. It also means that talents are more concerned with these three indexes when they enter or retain in western region. Second, that 15 indexes value from $X_{11}$ to $X_{25}$ relatively low indicating that these indexes contribute less attraction for talent. Combined weight of these indexes, we can see some indexes which experts believe that relatively important evaluation points are relatively low. Such as $X_{12}$ (GDP Growth Rate) and $X_{22}$ (Average Price of Commercial House), both of them have greater relative weight, but relatively low evaluation values of talent attraction in the western region. While it states that they are important factors in western talent attraction, but cannot bring a greater contribution to the talent attraction and retention in western region. So, these factors need to be strengthened in talent work in the western region.

Second, provincial analysis of talent attraction evaluation value of internal structure of the western region.

Sichuan talent attraction keeps the first place for 5 consecutive years, at the same time; its evaluation value is relatively far higher than that of Shaanxi and Chongqing. Why Sichuan has relatively high talent attraction? Through analysis of the data, we found that innovation level index value reached 0.1303 in Sichuan which is the main factor pull Sichuan's talent attraction. Secondly indexes of R＆D investment intensity proportion, urban registered unemployment rate, Third industry employment proportion, students in colleges and universities (10000 person) have higher value, and these indexes corresponding to secondary indexes of technology innovation and entrepreneurship condition ,education condition and career development condition. It shows that key reason of attract and retain talent in Sichuan is its technology innovation and entrepreneurship condition, education condition and career development condition.

Shaanxi and Chongqing have similar evaluation value but a different internal evaluation structure. Combined index evaluation value we found Shaanxi has higher evaluation value in education, science and technology than Chongqing. While Chongqing has a comparative advantage mainly in the level of innovation and employment. We can say that Shaanxi's talent attraction advantage is mainly in education and technology, and Chongqing in innovation and career development condition.

The other nine provinces' talent attraction level is comparable, which is relatively backward in the western region. Through the analysis of internal structure, the difference between the talent attraction evaluations of these nine provinces is mainly reflected in the level of innovation and the employment condition. It further illustrates that innovation and career development condition have tremendous contribution to the talent attraction.

## CONCLUSION

Under difficult realities background of attracting and retaining talent in western region, this paper conducts talent attraction evaluation study on the western region. The paper establishes talent attraction evaluation index system by Delphi method for western region including 5 primary indexes and 15 secondary indexes on the basis of the talent attraction theory. We invited talent expert to assign weight to each index by AHP. Combined with official statistics raw data on 12 provinces of western region in 2008-2012, we carried out talent attraction evaluation studies and got three conclusions: First, building talent attraction evaluation index system for the western region and determining index weight. Second, finding contributing factors which have relatively large contribution to the talent attraction in western region as technology innovation and entrepreneurship condition, career condition and education development condition, and also finding small contribution factors restricting the western talent attraction as economic condition and life livable condition. Third, analyzing internal structure of the talent attraction evaluation for 12 provinces in western region, and to find the advantage factors and disadvantages of the provincial talent attraction factor. There is basically no national evaluation and comparison study for talent attraction of the western 12 provinces. This evaluation and comparative study of the western region can provide basis and reference for policy makers and other talent work in the western region.

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