

# Analysis on the Demand of Top Talent Introduction in Big Data and Cloud Computing Field in China Based on 3-F Method

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**Abstract**—Big data and cloud computing, which can help China to implement innovation-driven development strategy and promote industrial transformation and upgrading, is a new and emerging industrial field in China. Educated, productive and healthy workforces are necessary factor to develop big data and cloud computing industry, especially top talents are essential. Therefore, a three-step method named 3-F has been introduced to help describing the distribution of top talents globally and making decision whether they are needed in China. The 3-F method relies on calculating the brain gain index to analysis the top talent introduction demand of a country. Firstly, Focus on the high-frequency keywords of a specific field by retrieving the highly cited papers. Secondly, using those keywords to Find out the top talents of this specific field in the Web of Science. Finally, Figure out the brain gain index to estimate whether a country need to introduce top talents of a specific field abroad. The result showed that the brain gain index value of China's big data and cloud computing field was 2.61, which means China need to introduce top talents abroad. Besides P. R. China, those top talents mainly distributed in the United States, the United Kingdom, Germany, Netherlands and France.

## I. INTRODUCTION

Big data and cloud computing is a new and emerging industrial field[1], and increasing widely used in China[2-4]. Talents' experience is a source of technological mastery[5], essentially for developing and using big data technologies. Most European states consider the immigration of foreign workers as an important factor to decelerate the decline of national workforces[6]. Lots of universities and research institutes have set up undergraduate and/or postgraduate courses on data analytics for cultivating talents[7]. EMC corporation think that vision, talent, and technology are necessary elements to providing solutions to big data management and analysis, insuring the big data success[8].

Bibliometrics research has appeared as early as 1917[9], and has been proved an effective method for assessing or identifying talents. Based on analyses of publication volume, journals and their impact factors, most cited articles and authors, preferred methods, and represented countries, Gallardo-Gallardo et. al[10] assess whether talent management should be approached as an embryonic, growth, or mature phenomenon.

In this paper, we intend to analysis whether China need to introduce top talents in the field of big data and cloud computing by using bibliometrics. In section 2, the 3-F method

for top talent introduction demand analysis will be discussed. In section 3, we will analysis the demand of top talent introduction in big data and cloud computing field in China.

## II. METHOD

In general, metering indicators contain the most productive authors, journals, institutions, and countries, and the collaboration networks between authors and institutions[11, 12]. Based on the commonly used bibliometrics method, 3-F method for top talent introduction demand analysis is proposed. 3-F method has three steps:

Firstly, searching the literature database and forming a high-impact literature collection in a specific field. Focusing on the high-frequency keywords in the high-impact literature collection by using the text analysis method as the research hotspots. Just to be clear, the high-impact literature refers to the journal literature whose number of cited papers ranked in the top 1% in the same discipline and in the same year.

Secondly, retrieving those keywords in the Web of Science to find out where those top talents of this specific field are. Find the top talents by collected the information about talents' country distribution, the institutions distribution and so on through the high-impact literature collection. Among them, the top talent refers to the first author or the communication author of the high-impact literatures.

Finally, Figure out the brain gain index to determine the top talents introduction demand of a certain country. The brain gain index is calculated as following formulas:

$$I_{ik} = (T_{wk} / T_{ik}) / (P_w / P_i) \quad (1)$$

Among them,  $I_{ik}$  means the brain gain index value of country (i) in the field (k),  $T_{wk}$  means the number of world's top talents in the field (k),  $T_{ik}$  means the number of country's (i) top talents in the field (k),  $P_w$  means the world population,  $P_i$  means the country's (i) population. If  $I_{ik}$  was more than 1, that means the country (i) has less top talents in the field (k), therefore the talent introduction demand will be relatively strong. In contrast, if  $I_{ik}$  was less than 1, that means the country's (i) has greater top talents in the field (k) than the world average, and the talent introduction demand will not be so strong.

Additionally, the literature information mainly from the ISI Web of Science (SCI, CPCI-S), and the the data analysis and visualization tools are TDA and Tableau.



From table 2 and 3 we can see that China was in the second place worldwide. However, China's top talent is much less than the United States. In addition, the overall strength of Chinese research institutions is not strong. So, whether China should introduce top talents from other countries is need to be discussed.

According to the formula of the brain gain index, and using the world population data as well as the Chinese mainland population data released by the World Bank, the value of the Chinese brain gain index of big data and cloud computing was 2.61. In comparison, the brain gain index value of the United States was 0.11. That means China need to introduce top talent in the field of big data and cloud computing.

#### IV. CONCLUSION

In the knowledge economy era, the international flow of top talent has become convenient and frequent. Facing the world's top talent shortage, China and the world's major countries have developed overseas top talent introduction programs. Until 2007, almost all European countries had introduced some skillselective migration policies in order to attract the top talents. To make the overseas top talent introduction programs more effective and targeted is helpful for occupying the strategic high ground in the global top talent competition.

This paper improved the traditional talent evaluation function of bibliometric method, and presented the 3-F analysis method, which was applied to analyze the demand of top talents. The 3F method could help the government official to make decision whether need to introduce top talents to develop a new industry field and lock these top talents geographic location.

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