

# Beijing-Tianjin-Hebei Talents Flow and Its Influence Factors

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**Keywords:** Beijing-Tianjin-Hebei, Scientific And Technological Talents, Flow, Influence Factors.

**Abstract.** The synergy development of Beijing-Tianjin-Hebei synergy is a major national strategy of China. In the time of science and technology, scientific and technological talents is very important to promote economic development. Currently there is no study on the factor analysis of Beijing-Tianjin-Hebei Science and technology talent flow. We consider the short of paper and analysis scientific and technological talents flow in Beijing-Tianjin-Hebei, propose policy recommendations concerned talents, to advance the collaborative development of Beijing, Tianjin and Hebei.

## Introduction

Beijing, Tianjin and Hebei's integration rose to national strategy of China at 2014, since then it has been a hot topic in the community. In 2015 China brought a plan for the Beijing-Tianjin-Hebei collaborative development, as the core is orderly relocate non-capital function of Beijing, to promote the Beijing-Tianjin-Hebei's industrial upgrading transfer. The CPC Central Committee notice issued at April 2017, to establish Xiongan new area of Hebei province, promoting the Beijing-Tianjin-Hebei collaborative development. Sci-tech talent is the central of industrial upgrading and the driving force of innovation of science and technology. In order to promote industrial upgrading and Beijing-Tianjin-Hebei regional economic integration can't do without flows of scientific and technological talents and a rational distribution.

Scientific and technological talent is the core of economic agglomeration. In 1919 Marshall proposed that only talent agglomeration and industry agglomeration combined together to produce economic agglomeration effect. Paul Krugman argued talent flow produced talent agglomeration and prompted industry agglomeration. Key of industry constantly development is attracting talent and keep them inside through high wage and income level. Thus industry agglomeration and talent agglomeration is mutual promote and mutual effect. Jian Sun and You Wen agreed that there were interactions between talents and industry agglomeration, as main form is that scientific and technological talents prompted the industry to improve industrial quality and innovation, industrial clusters by providing a variety of opportunities to attract talents, thereby expanding the scale and effect of the talent.

Beijing-Tianjin-Hebei region is rich in human resources, such as academicians of the two academies accounts for half of those in China. But for a long time Beijing has a talent siphon that makes the talent resources distribute uneven. In the context of integration of Beijing, Tianjin and Hebei, industrial division need a reasonable allocation of manpower support, so a rational flow of sci-tech talents should be promoted.

Mirandamartel found the country's research and innovation investment as well as the level of economic growth are the main reason of international talents flow, while the main barriers is science and technology policy; Zhang Yingchan pointed out that national policies have an impact on sci-tech talents relocation; Mbarushimana Nelson's research shows that University talent loss is because low base salary, poor administrative management, political instability and insufficient learning opportunities; Wang Yi, and Jian Sun found economic development level, education investment, research funding investment, number of technology enterprise are major factors that affect

technology talent development in a certain area; Su Jinjin found housing, traffic, children education, spouse work, placed problem, medical guarantees, and Social security are high demand by talents; Liao Zhongju follow up and encourage free flow of talents in universities, scientific research institutes and enterprises; After researching on overseas-back talent Gao Ziping found education level, overseas grades, degree of connection with the domestic are important factors affecting the return of overseas talent.

There are many factors that affect the flow of technological talent, such as economy, culture, education, health, science, technology and revenues. In the process of collaborative development of Beijing, Tianjin and Hebei, each of them has relative industrial advantages and geographical advantages, and they have different attractions. There is no literature yet that analysis the factor of Beijing-Tianjin-Hebei's sci-tech talents attraction. Currently Beijing-Tianjin-Hebei area has a big gap of economic level, studying the factor of talent flow of Beijing, Tianjin and Heber helps making reasonable talent policy, optimizing sci-tech talent resources, improving using efficiency of talent. This paper analysis factors of talents attraction of the three places, gives suggestions about talent policy, with a view to improve the talent structure and stimulate talent innovative activity.

## Background

**Sci-tech Talents in Beijing-Tianjin-Hebei.** Beijing, Tianjin and Hebei's integration has been through a progress, much more talents cooperation agreements have been made. However, many problems still exist in the allocation of scientific and technological talents. In 2015, the number of people who have graduate degree has reached 1.45 million that account for 6.69 per cent in Beijing; Tianjin has 0.18 million people who have graduate degree accounting for 1.2 per cent; Hebei, however, has 0.21 million graduate degree people only accounting for 0.29 per cent. Beijing's high-educated people is 7.83 times as much as Tianjin, 6.75 times of Hebei. In the case of insufficient flow of talents in these three places, will be an increasingly larger gap of high-educated population.

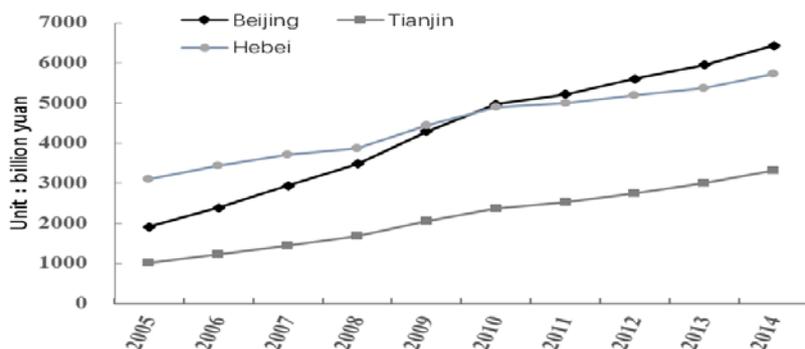


Fig. 1 The total of human capital in Beijing-Tianjin-Hebei

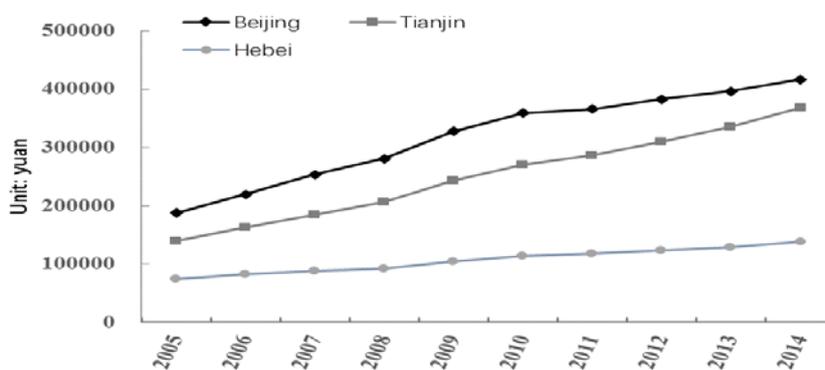


Fig. 2 The average of human capital in Beijing-Tianjin-Hebei

From National Bureau of Statistics, Beijing had 156,312 patents and 35,308 invention patents while Tianjin and Hebei had patents respectively for 79,963 pieces and 44,060 pieces. And invention patent counted more less (4,624 pieces and 3,840 pieces respectively), which add up to only one-tenth of Beijing. We can claim that Beijing has the largest number of sci-tech talents because inventions come from the talents. Talent distributes inhomogeneous must led to different labor human capital level. According to China human capital index project (2016), (as Figure 1, Figure 2). In general, Beijing is in the top of total human capital and average human capital in three places and grows fastest, which means Beijing has a large talent agglomeration; Tianjin has the minimum total human capital although a faster growth; Hebei has a mid-between total human capital but its average human capital is still low-level.

Moreover, the number of scientific researchers and their salaries differs obviously in Beijing-Tianjin-Hebei (table 1). Beijing has nearly 600,000 scientific researchers that is about 6 times and 4 times respectively of Tianjin and Hebei. Not only the number of researchers differ, salary also has a large gap. Average salary of Beijing researchers and Tianjin is 132,339 yuan and 123,312 yuan respectively, but Hebei is nearly a half of these two places (69774 yuan). So sci-tech talents find more appropriate jobs in Beijing and Tianjin with higher salaries and better career prospects. That's why the trend of sci-tech talents flow to Beijing and the outward flow of them in Beijing is very difficult.

Tab1 The number and average wage of urban employees in Beijing-Tianjin-Hebei in 2015

Unit: ten thousand (yuan)	Beijing	Tianjin	Hebei
Town employees	777.34(111390)	294.78(80090)	643.65(50921)
The first industry	3.89(50797)	0.53(68883)	4.17(19685)
The second industry	154.93(388895)	151.87(357722)	272.73(217074)
The third industry	622.4(155651)	142.91(1220934)	370.92(722913)
Scientific research and technical services jobs	59.35(132339)	11.32(123312)	14.81(69744)

**Sci-tech talents' policies.** Beijing-Tianjin-Hebei differs in comparative advantage industries and formulates talents' policy should base on the industrial layout of three places. According to the capital of medium and long-term talent plan, capital industrial transfer should use a model of 'talent plus industry' talent keep up with the industrial transfer and the flow of talent drives industry development. The intertwining of comparative advantage industry of Beijing, Tianjin and Hebei shown in table 2, especially in the secondary industry, functions overlap results regional less competitive.

Tab2 The comparative advantage industries of Beijing-Tianjin-Hebei

District	The comparative advantage industries
Beijing	High new technology industry including cell phones and software, finance and insurance, electronic and communication equipment manufacturing, Special equipment manufacturing; electricity and heat production, supply chain; non-metallic mineral
Tianjin	New energy and environmental protection, Computer, communication and other electronic equipment manufacturing, Transportation equipment manufacturing, Special equipment manufacturing, automobile manufacturing, metal products industry, black metal smelting and rolling processing industry
Hebei	Eco-tourism industry, electricity and heat production, supply chain, sector pharmaceutical manufacturing, food processing and manufacturing

Now Beijing has formed an industry structure that hi-tech and service industry are leading causes, which collects rich technology resources and the fast industry expansion brings pressure on traffic, environment and water; Tianjin has a few of strong industry (energy and aerospace) playing a leading role; Hebei still use first and second industries as the main driver of economic growth, undertake the resource-intensive industries of Beijing.

## The Model

**Data Sources.** This paper selects data of Beijing, Tianjin and Hebei for eight years' period from 2008 to 2015. Sources of data are selected from the Chinese population and employment Yearbook,

the Statistical Yearbook of China, the Beijing Statistical Yearbook, the Tianjin Statistical Yearbook, the Hebei economic Yearbook. And some indicators calculated according to the Yearbooks.

**Empirical Model.** From existing literature, external factors such as policy, culture, medical care and economy will have an impact on the flow of sci-tech talents. Therefore, analyzing factors of talents flow is regression analysis of talents and related factors. For sci-tech talents, there is no visual data can be represented, but the academic qualifications of the population density data are relatively easy to obtain, so this paper choose number of graduate student as explained variables, GDP per capita, the ratio between teachers and students in colleges and universities, the number of beds in health care institutions, books per capita, wages per capita, R&D as explanatory variables to building a model:

$$\text{LnY}=\beta_0+\beta_1 \text{LnRJGDP}+\beta_2 \text{LnGDSSB}+\beta_3 \text{LnCW}+\beta_4 \text{LnRJCS}+\beta_5 \text{LnRJGZ}+\beta_6 \text{LnRND}+\varepsilon$$

Where y measures the density of talents, RJGDP measures gross national product per capita, GDSSB measures college student-teacher ratio, CW measures the number of beds in medical institutions, RJCS measures books per capita, RJGZ measures wages per capita, RND measures R&D expenditure,  $\varepsilon$  measures the error term,  $\beta$  measures coefficient. When the coefficient is positive ( $\beta>0$ ) indicate the factors which promotes attracting the talents, while the coefficient is negative ( $\beta<0$ ) indicates that the element has not been used to attract talents. Consider the possible correlation between variables, the empirical analysis steps are as follows: (1) selected four basic explanatory variables for analysis, obtain the corresponding results; (2) on basis of (1) the other two variables are added to analysis and obtain corresponding results; (3) selected all of explanatory variables for analyzing and obtain results; (4) compare and analysis four models.

**Regression Result.** Beijing's regression results are as follows, four model fit well and all pass the significant test. In model 1, coefficients of CW and RND are positive, RJGDP and GDSSB are negative, which means economy and education are not factors for attracting talents, medical care and science-technology are the main factors. The conclusions of the other three models are basically the same. Coefficient of RJCS is very small, but RJGZ is significantly positive, which means RJCS is not very important but RJGZ have a strong influence on talents' attraction.

Tianjin's regression results are as follows, four model fit well and all pass the significant test. In model 1, coefficients of RJGDP, GDSSB and CW are positive, RND is negative, which means the four factors are used to attract talents expect science-technology. The conclusions of the other three models are basically the same. Coefficient of RJCS is very small that means culture is not a positive factor. But RJGZ is significantly positive, which means RJGZ has a strong influence on talents' attraction.

Hebei's regression results are as follows, four model fit well and all pass the significant test. In model 1, coefficients of RJGDP, GDSSB and CW are negative, RND is positive, which means only science-technology is used to attract talents. The conclusions of the other three models are basically the same. Coefficient of RJCS is very small that means culture is not a positive factor. RJGZ is another a negative factor, which means RJGZ has no influence on talents' attraction.

## Conclusion

Empirical model results confirm that three place have different factors to attract sci-tech talents. There are rich talents resources in Beijing-Tianjin-Hebei area with a huge potential but non-cooperative policy is the main factor of talents' attraction. Without a top-designed policy may lead a vicious competition of talent. So the three places need to be people-oriented, promote the flow of sci-tech talents from the point of attraction factors, to promote integration of regional synergy development.

Beijing is not only the core of Beijing-Tianjin-Hebei, also the political and cultural center. It is necessary to divert portions that do not meet the central city, while also to strengthen science and technology innovation and cooperate with Tianjin and Hebei in the talent agreements, playing a leading role in the region. Medical care, technology and wage are advantages to attract talents and also become the hinder of talents' outward flowing. Recommendation is Beijing should take advantage of regional center to improve the sci-tech talents' services such as medical care, culture and

education, to eliminate the worries of sci-tech talents movement and to break flow barriers for promoting regional integration.

Tianjin has good location and a lot of advantageous industries. Empirical model result shows RND is weakness of Tianjin's attraction. Recommendation is increasing investment in science and research, for example building related industry technology institute and technology park to stimulate innovation. Also training sci-tech talents from enterprise, institution, university and college to enrich talent resources. In addition, eliminating identification barrier and providing research funding support and life help to attract talents settled in. What's more, government sector should attach great importance on technology cooperation, establishing a cooperation and learning platform to creating a favorable environment in sci-tech talents service.

For a long time, Hebei suffers a serious brain-drain and has a slow-growing economy in the Beijing-Tianjin-Hebei region. Empirical model result shows Hebei rely solely on research funding that obviously is difficult to substantially change the status of sci-tech talents. Government should focus on to undertake the capital industry transfer and transformation of sci-tech achievements of Beijing and Tianjin. In order to attract talents, promote industrial restructuring and upgrading that would increase the talent demand of relative industry. Furthermore government should improve social environment, perfect technology talent public service system (offsite medical settlement has been implemented), and guarantee talent's research allowance, housing and children education. A possible way to attract sci-tech talents is to satisfy their reality needs, to promote flow of both talents and tech achievements and speed up regional economic integration.

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