Research on Regional Enterprise Innovation through the Innovation Survey in Haidian District, Beijing

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Extended Abstract

1. Introduction to the innovation survey

Independent innovation plays an extremely significant role in the process of China's development. Chinese government promulgated National Science and Technique Developing Programme for a Long Period (2006-2020) in Jan, 2006, and pointed out that the country should recognize independent innovation as a national strategy on the purpose of improving the competitiveness of China. Enterprises are the most powerful executants of innovation in a mature market economy system. Since innovation is the key point for a company to defeat other competitors in the market and to keep steady durative growth in the future, it should consist in the activities and plans of an enterprise, as well as the brains of entrepreneurs. Haidian district, which lies in the northwest of Beijing city, is a habitat center of high-tech corporations and the best universities and the top research institutions in China. This feature helps Haidian become the pioneer of innovation in all districts in China which are of the same grade.

Therefore, we make a survey which is made up of two questionnaires named Industrial Enterprise Innovation Questionnaire and Entrepreneur Questionnaire, choose Haidian district as a sample, and try to collect the information about the primary status, input, output, influencing factors, and entrepreneurs' cognition toward innovation. Finally we get the data of 638 cases.

2. Analysis on the different levels of enterprise innovation in Haidian

1) Introduction to the survey data and classification of the enterprises

Of those 638 enterprises, 483 have innovative activities. 72% of the 638 corporations created brand new or great improved products in 2004-2006; 51% adopted brand new or great improved producing activities; and 42% adopted brand new or great improved accessorial activities. Of the total 102,276 workers in the 638 enterprises, 35%, that is 35,428 workers, graduate from universities or graduate schools. The basic activity of innovation is internal Research & Development, which takes 97% of the 483 innovative enterprises. Training, marketing, getting equipments and software, external R&D, getting external techniques respectively take 70%, 69%, 57%, 22%, 16% of the innovative corporations. Innovative expenses in 2006 reached 5.41 billion RMB yuan. New production value in 2006 was 59.78 billion yuan. However, only 6% of the new products achieved the international innovative level, and 22% belonged to the domestic innovative level, while the other 72% are of the enterprise's innovative level. In another point of view, we find that only 66% of the 638 enterprises possess of their own brand.

In this section we partition the 638 enterprises into four levels through the innovative input and output (Table 1). Furthermore, we analyze the characteristics of those different groups.

2) Analysis on the effect of the four types of innovation

The first type enterprises are the principal part of innovation—they spend expenses on

innovative activities and get new products as rewards. From the frequency statistic, we find that the histograms of both the input and output indices have thin right tails. And from the Spearman correlations, we also find that the expenditures on different innovative activities have high correlations with the new product incomes.

Table 1 Classification of 638 enterprises in Haidian district

Type	Description	Amount	Average Innovative Expenditure (million Yuan)	Average New Product Incomes (million Yuan)
I	Have both innovative expenditure and new production	439	9.88	138.24
II	Have innovative expenditure but no new production	39	27.50	0
III	Have new production but no innovative expenditure	2	0	11.00
IV	Have neither innovative expenditure nor new production	158	0	0

Since the assumption of least square regression cannot be fit, we adopt more stable methods to structure the model between the input and output of enterprise innovation. Let X represents total innovative expenditure, and Y represents the new product incomes. The models of robust regression and quantile regression are as below (Fig.1):

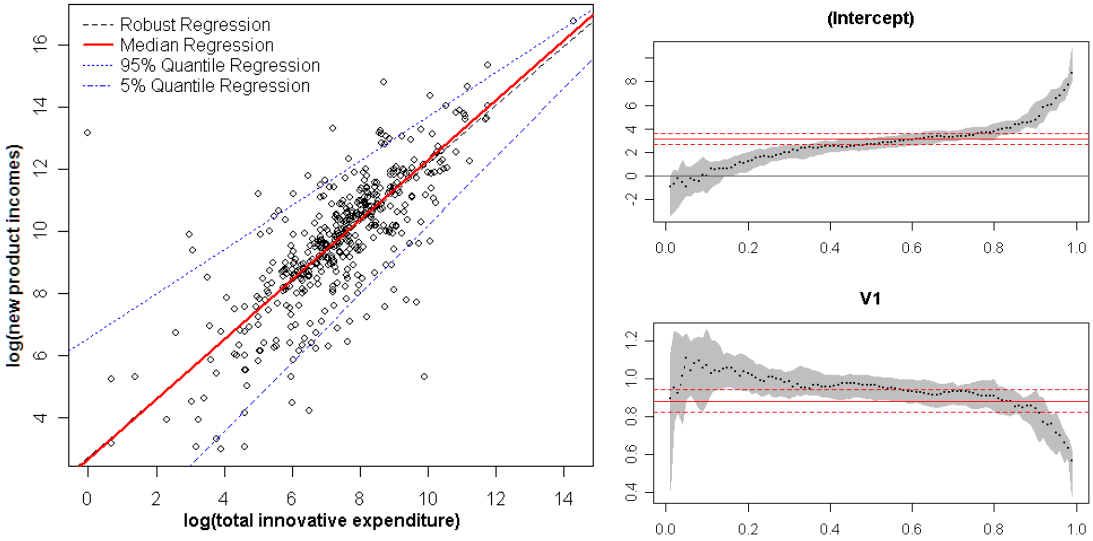

Figure 1 Robust and Quantile Regression Model with 95% Confidence Intervals

$$\text{Robust Regression:} \quad \log(Y) = \underset{(11.3)}{3.145} + \underset{(24.0)}{0.880}\log(X)$$

$$\text{Median Regression:} \quad \log(Y) = 2.664 + 0.964\log(X)$$

$$\text{95\% Quantile Regression:} \quad \log(Y) = 6.564 + 0.713\log(X)$$

$$\text{5\% Quantile Regression:} \quad \log(Y) = -0.887 + 1.107\log(X)$$

Clustering divides the 439 type I enterprises into 6 groups: abnormity level (whose indices are too large to sign in Fig.2), high level, low-input & hi-output level, hi-input & low-output level, low level, and poor level. Further research based on the characteristics of different levels indicates that internal R&D is essential for innovation output, especially international and domestic new products; the combination of external and internal R&D will improve the input-output efficiency; the combination of internal R&D and buying equipments & software will accelerate the high-tech innovative output.

The other three types are not as important as type I when we focus on the enterprises innovation. But the analysis on the effect of them also supplies some conclusion. More details are discussed in our complete research report.

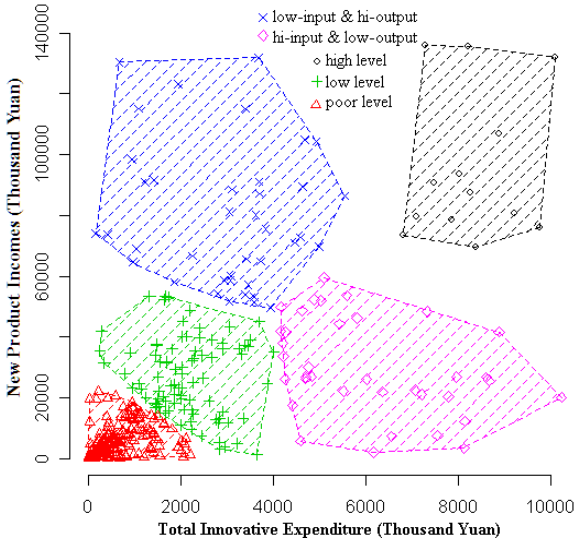

Figure 2 Clusters of Type I Enterprises

3. Analysis on the internal & external factors of enterprise innovation

1) Internal Factors

Background of the entrepreneurs, human resources, and funding sources are three noticeable internal factors of enterprise innovation. Most entrepreneurs have a degree of bachelor or master, and their ages distribute from 20 to 75 but the climax emerges at 40 to 45. From the survey we find that about 80% of the new products are created by their own employees; 7% from the cooperation with other corporations; 6% are from the cooperation with universities or institutions. By calculating the correlations we consider that enterprise's funds, governmental funds and financial loans are significant impacts on innovative expenditure and new production value.

2) External Factors

The main external factors of innovation are the influence from the government policies and the driving power from the market. From the survey we find that lightening tax burden is more favored by entrepreneurs than any other hortative policies and the unnecessary and overelaborate formalities is the main reason that limits the effect of those policies.

4. Conclusions and Suggestions

To summary, enterprises in Haidian district attach importance to innovation and have made great achievement. However, high concentration in several corporations indicates more companies only stay on a low innovative level. Our suggestions involve cultivating persons with ability, improving their own brands, promoting the innovation of high-tech new products, enhancing the cooperation with other corporations and institutions, and increasing the input-output efficiency.

Reference

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