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Investigation of High-level Ph.D. Talents' Innovative Entrepreneurial Environment: Based on Chinese Background

ZHAO Ning[a]; FAN Wei[a],*; CAI Xuejun[a]

[a]Chinese Academy of Personnel Science.
* Corresponding author

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Abstract

As representatives of Chinese high-level talents, Ph.D. graduates' acknowledgement on innovative entrepreneurial environment reflects the development level of a certain country's or area's innovative entrepreneurial environment. This research investigates 1960 Ph.D. graduates by virtue of the assessment of the application of "National middle and long term talents development planning outline (2010-2020)". By comparing the assessments of the significance and satisfaction of them, this paper finds that China has great demand for high-level talents in innovative entrepreneurial environment development and thus gives out suggestions on scientific decision making and theoretical researches.

Key words: Ph.D. graduates; High-level talents; Innovative entrepreneurial environment

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INTRODUCTION

Nowadays, economic globalization develops deeper, scientific and technological progress changes quickly, and knowledge economy is in the ascendant. In the drastic international talent competition, the amount and effect of Ph.D. graduates have become very important index for evaluating a country's or an area's hi-tech innovation capacity and talents competition. High-level talents', especially the Ph.D. graduates', knowledge on innovative entrepreneurial environment can reflect more about the innovative entrepreneurial environment development level of a country or an area. This research did systematical analysis on 1960 Ph.D. graduate samples with the help of the "National middle and long term talents development planning outline (2010-2020)" in order to further reveal the requirement of China's Ph.D. talents in innovative entrepreneurial environment development through scientific data analysis and also provide effective references for scientific decision making and theoretical researches.

1. METHODOLOGY

The research method used in this paper is the questionnaire survey. By combining GEM and Gnyawali & Fogel models, the research focuses on the 30 indexes of four dimensions. They are: (1) Social environment (7 indexes): living conditions, medical conditions, educational facilities, popularity degree of computers and internet, incubating facilities of high-tech enterprises, social security status, and cultural facilities; (2) economic environment (5 indexes): economic development level, wage and income level, employment situation, degree of market opening, and consumption level; (3) entrepreneurial environment (13 indexes): availability of qualified engineers, science and technology popularization and interaction degree, the degree of intellectual property rights protection, the degree of the cooperation between higher education institutions and corporations, government policies encouraging entrepreneurial innovation, governmental programs supporting entrepreneurial innovation, the degree of financial support for entrepreneurial innovation, preferential taxes, laws and regulations implementation degree, science park/high-

tech incubator incubation conditions, the scale and quality of venture investment, the activity of social intermediary service institutions, and the transfer efficiency of new technology from scientific research institutions to the market; (4) cultural environment (5 indexes): trust degree in interpersonal communication, containment of outlanders, the attention paid on education, the degree that local people's acknowledge on innovation, and social atmosphere for encouraging entrepreneurship.

Evaluation of the first anniversary of the implementation "National middle and long term talents development planning outline (2010-2020)" investigated 24,006 professionals in 10 different work areas in 8 provinces in total. Sample distribution according to education degrees is as follows: the sample size of degrees below technical secondary school is 398 accounting for 1.7% of the total samples; the size of junior college degree is 3053 taking up 12.7% of the total; the size of undergraduate is 13,862 taking up 57.4% of the total; the size of master degree is 4793 taking up 19.9%; and doctoral degree size is 1960 accounting for 8.1% of the total.

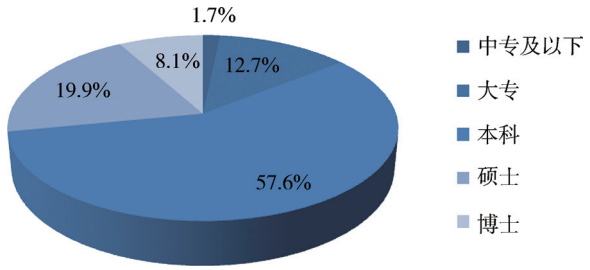

Figure 1
Educational Background Distribution Diagram of 10 Kinds of Professionals

This research makes special analysis on professionals having doctoral degrees so that to investigate their satisfaction difference and significance over various indexes of innovative entrepreneurial environment and the importance of different degrees in various social environment, economic environment, entrepreneurial environment, and cultural environment.

2. COMPARATIVE ANALYSIS ON PH.D. TALENTS' SATISFACTION AND SIGNIFICANCE ON ENTREPRENEURIAL ENVIRONMENT

2.1 Comparisons of Ph.D. talents' evaluations over the significance and satisfaction on various indexes of social environment

Social environment is social life and cultural environment including 7 indexes: living conditions, medical conditions, educational facilities, popularity degree of computers and internet, incubating facilities of high-tech enterprises, social security status, and cultural facilities.

Table 1
Significance and Satisfaction of People having Different Degrees on Social Environment

Final degree	Significance		Difference	Satisfaction	
	Sample size	Average		Average	Sample size
Technical secondary school and below	379	3.70	-0.43	3.27	367
Junior college	2931	3.83	-0.50	3.33	2882
Undergraduate	13401	3.92	-0.59	3.33	13257
Master	4668	3.93	-0.79	3.14	4590
Doctor	1897	3.82	-0.79	3.03	1870
Total	23276	3.90	-0.63	3.27	22966
F Value		8.808***		40.180***	
Sig.		.000		.000	

Note: ***p<.001

As indicated by the data that employees having different educational backgrounds have significant differences in social environment significance and satisfaction. Through the comparison of the average values, in the aspect of significance, the highest is the "master", "undergraduate" is the second and the last is the "technical secondary school and below". However, in the satisfaction aspect, "junior college" and "undergraduate" are the highest, "technical secondary school and below" is the second, and the lowest is the "doctor". From the comparison of the D-value of satisfaction and significance, it can be seen that "technical secondary school and below" has the lowest D-value while "master" and "doctor" have the highest. (See Table 1)

Table 2
Comparison of Ph.D. Talents' Satisfaction and Significance Values on Social Environment

Social environment elements	Significance			Satisfaction	
	Sample size	Average	D-value	Average	Sample size
Living conditions	1936	3.78	-1.06	2.72	1917
Medical services	1933	3.83	-0.99	2.84	1918
Educational facilities	1930	3.89	-0.94	2.95	1911
Popularity degree of computers and internet	1932	3.93	-0.44	3.49	1921
incubating facilities of high-tech enterprises	1920	3.69	-0.68	3.01	1904
Social security status	1934	3.90	-0.77	3.13	1920
Cultural facilities	1932	3.73	-0.64	3.09	1919
Total	13517	3.82	-0.79	3.03	13410

The result of the data shows that the satisfaction values of all indexes in social environment are lower than the significance values and the difference of the average value is -0.79 among which the largest value is -1.06 representing the living conditions; the second is medical services with -0.99; the last is the popularity degree of computers and internet with only -0.44. (See Table 2)

2.2 Comparisons of Ph.D. Talents' Evaluations Over the Significance and Satisfaction on Various Indexes of Economic Environment

Economic environment refers to social economic status and elements that influencing consumers' purchasing power and ways of making expenses. There are five indexes involved: economic development level, wage and income level, employment situation, degree of market opening, and consumption level.

Table 3
Significance and Satisfaction of People having Different Degrees on Economic Environment

Final degree	Significance		Satisfaction		
	Sample size	Average	Sample size	Average	Sample size
Technical secondary school and below	379	3.68	-0.53	3.15	370
Junior college	2946	3.77	-0.57	3.20	2906
Undergraduate	13417	3.87	-0.66	3.21	13280
Master	4673	3.87	-0.84	3.03	4607
Doctor	1908	3.74	-0.81	2.93	1887
Total	23323	3.85	-0.70	3.15	23050
F Value		9.169^{***}		36.103^{***}	
Sig.		.000		.000	

Note: ***p<.001

Data shows that employees with different educational backgrounds have great differences in economic environment significance and satisfaction. By combining with the average values, "undergraduate" and "master" have the highest values in significance values, "doctor" is the second, and the lowest is the "technical secondary school and below". In the aspect of satisfaction value, "undergraduate" has the highest value followed by the "junior college" and the lowest is the "doctor". From the comparison of the difference of satisfaction and significance, "master" and "doctor" have the highest D-values and "technical secondary school and below" has the lowest D-value of all. (see Table 3)

Table 4
Comparison of Ph.D. Talents' Satisfaction and Significance Values on Economic Environment

Economic environment elements	Significance		Satisfaction		
	Sample size	Average	Sample size	Average	Sample size
Economic development level	1932	3.83	-0.63	3.20	1923
Wage and income level	1937	3.95	-1.27	2.68	1925
Employment situation	1927	3.75	-0.83	2.92	1914
Degree of market opening	1927	3.70	-0.65	3.05	1912
Consumption level	1923	3.50	-0.66	2.84	1910
Total	9646	3.75	-0.81	2.94	9584

The result of the data shows that every satisfaction value of economic environment is lower than the value of significance and the difference value goes up to -0.81. Wage and income level has the greatest difference value of all which is -1.27, the second is employment situation (-0.83), and the last is economic development level (-0.63). (See Table 4)

2.3 Comparisons of Ph.D. Talents' Evaluations Over the Significance and Satisfaction on Various Indexes of Entrepreneurial Environment

Entrepreneurial environment includes a series of concepts and a combination of various elements. There are 13 indexes involved: availability of qualified engineers, science and technology popularization and interaction degree, the degree of intellectual property rights protection, the degree of the cooperation between higher education institutions and corporations, government policies encouraging entrepreneurial innovation, governmental programs supporting entrepreneurial innovation, the degree of financial support for entrepreneurial innovation, preferential taxes, laws and regulations implementation degree, science park/high-tech incubator incubation conditions, the scale and quality of venture investment, the activity of social intermediary service institutions, and the transfer efficiency of new technology from scientific research institutions to the market.

Table 5
Significance and Satisfaction of People Having Different Degrees on Entrepreneurial Environment

	Significance		Satisfaction		
Final degree	Sample size	Average	Sample size	Average	Sample size
Technical secondary school and below	366	3.45	-0.27	3.18	355
Junior college	2854	3.66	-0.42	3.24	2795
Undergraduate	13177	3.77	-0.51	3.26	12969
Master	4576	3.77	-0.74	3.03	4510
Doctor	1864	3.65	-0.76	2.89	1850
Total	22831	3.74	-0.56	3.18	22479
F Value		8.842***		38.191***	
Sig.		.000		.000	

Note:***p<.001

Data result shows that employees with different educational backgrounds have great differences in entrepreneurial environment significance and satisfaction. By combining with the average values, "undergraduate" and "master" have the highest values in significance values, "doctor" is the second, and the lowest is the "technical secondary school and below". In the aspect of satisfaction value, "undergraduate" has the highest value followed by the "junior college" and the lowest is the "doctor". From the comparison of the difference of satisfaction and significance, "doctor" has the highest D-values and "technical secondary school and below" has the lowest D-value of all. (see Table 5)

Table 6
Comparison of Ph.D. Talents' Satisfaction and Significance Values on Entrepreneurial Environment

	Significance		Satisfaction		
Entrepreneurial environment elements	Sample size	Average	Sample size	Average	Sample size
Availability of qualified engineers	1920	3.52	-0.58	2.94	1904
Science and technology popularization and interaction	1919	3.54	-0.55	2.99	1912
Intellectual property rights protection	1922	3.83	-0.90	2.93	1911
cooperation between higher education Institutions and corporations	1924	3.73	-0.83	2.93	1914
Government policies encouraging entrepreneurial innovation	1925	3.81	-0.76	3.05	1915
Governmental programs supporting entrepreneurial innovation	1925	3.75	-0.72	3.03	1918
Financial support for entrepreneurial innovation	1925	3.65	-0.83	2.82	1913
Preferential taxes	1921	3.63	-0.81	2.82	1915
Laws and regulations implementation	1926	3.77	-0.97	2.80	1913
Science park/high-tech incubator incubation conditions	1923	3.58	-0.59	2.99	1908
The scale and quality of venture investment	1915	3.48	-0.66	2.82	1901
Activity of social intermediary service institutions	1923	3.43	-0.61	2.82	1906
Transfer efficiency of new technology from scientific research institutions to the market	1917	3.70	-0.95	2.75	1910
Total	24985	3.65	-0.75	2.90	24840

The result of the data shows that every satisfaction value of entrepreneurial environment is lower than the value of significance and the difference value goes to -0.75. Transfer efficiency of new technology from scientific research institutions to the market has the greatest difference value of all which is -0.95, the second is intellectual property rights protection (-0.90), and the last is science and technology popularization and interaction (-0.55). (See Table 6)

2.4 Comparisons of Ph.D. Talents' Evaluations Over the Significance and Satisfaction on Various Indexes of Cultural Environment

Cultural environment is the living environment of human being including attitudes toward societal community, belief, and acknowledgement of environment. It is an invisible environment. There are five elements involved: trust degree in interpersonal communication, containment of outlanders, the attention paid on education, the degree that local people's acknowledge on innovation, and social atmosphere for encouraging entrepreneurship.

Table 7
Significance and Satisfaction of People Having Different Degrees on Cultural Environment

	Significance		Satisfaction		
Final degree	Sample size	Average	Sample size	Average	Sample size
Technical secondary school and below	383	3.73	-0.40	3.33	374
Junior college	2966	3.81	-0.44	3.37	2926
Undergraduate	13495	3.90	-0.52	3.38	13399
Master	4698	3.88	-0.70	3.18	4663
Doctor	1914	3.74	-0.69	3.05	1906
Total	23456	3.87	-0.56	3.31	23268
F Value	9.317***			40.615***	
Sig.	.000			.000	

Note: ***p<.001

Data shows that employees with different educational backgrounds have great differences in cultural environment significance and satisfaction. By combining with the average values, "undergraduate" has the highest values in significance values, "master" is the second, and the lowest is the "technical secondary school and below". In the aspect of satisfaction value, "undergraduate" has the highest value followed by the "junior college" and the lowest is the "doctor". From the comparison of the difference of satisfaction and significance, "master" has the highest D-values and "technical secondary school and below" has the lowest D-value of all. (see Table 7)

Table 8
Comparison of Ph.D. Talents' Satisfaction and Significance Values on Cultural Environment

	Significance		Satisfaction		
Cultural environment elements	Sample size	Average	Sample size	Average	Sample size
Trust degree in interpersonal communication	1925	3.73	-0.94	2.79	1914
Containment of outlanders	1926	3.68	-0.59	3.09	1914
Citizens' attention paid on education	1927	3.91	-0.53	3.38	1919
The degree that local people's Acknowledge on innovation	1926	3.67	-0.66	3.01	1916
social atmosphere for Encouraging entrepreneurship	1923	3.72	-0.71	3.01	1917
total	11544	3.73	-0.68	3.05	9580

The result of the data shows that every satisfaction value of cultural environment is lower than the value of significance and the difference value goes to -0.68. Trust degree in interpersonal communication has the greatest difference value of all which is -0.94, the second is social atmosphere for encouraging entrepreneurship (-0.71), and the last is citizens' attention paid on education (-0.53). (See Table 8)

3. CONCLUSION

3.1 Ph.D. High-Level Talents Have Low Approval Degrees in Living Conditions, Medical Services, and Educational Facilities and other Social Fundamental Facilities While have high Approval Degree in Internet and Computer Popularity

Every index in social environment scores between 3.69 to 3.93 which shows no obvious difference. The satisfaction

value is among 2.72 to 3.49 which gives great difference instead. As data result show, Ph.D. high-level talents have low approval degrees in living conditions, medical services, and educational facilities and other social fundamental facilities while have high approval degree in internet and computer popularity but their real satisfaction is relatively low. In all of these indexes, living conditions is recognized by them as the one differs the most from their expectations; the second is medical services and educational facilities. Although computer and internet popularity's satisfaction value is lower than significance value, its difference value is the smallest. Ph.D. talents have high approval value in this aspect.

3.2 Ph.D. High-Level Talents Have Low Approval Degrees in Indexes Directly Relating to Living Such as Wage and Income Level, Employment Situation, and Consumption Level, etc.

Every index in economic environment scores between 3.50 to 3.95 which shows no great difference value. The satisfaction value is among 2.68 to 3.20 and the difference is obvious. According to data result, Ph.D. high-level talents have low approval degrees in indexes directly relating to living such as wage and income level, employment situation, and consumption level, etc.. In fact, their satisfaction value is relatively lower. In all of these indexes, wage and income level is the one that recognized as differing the most from their expectation and the second is employment situation and consumption level. Although economic development level's satisfaction value is lower than significance value, its difference value is the smallest with only 0.63.

3.3 Ph.D. high-level talents have high requirements on the protection degree of intellectual property rights, governmental policies encouraging innovative entrepreneurship, and implementation of laws and regulations while in fact they have low satisfaction values in these aspects

All entrepreneurial environment indexes score between 3.43 to 3.84 without showing great differences. However, the satisfaction values are among 2.75 to 3.05 which is relatively low in total. Data shows that Ph.D. talents have high requirements on the protection degree of intellectual property rights, governmental policies encouraging innovative entrepreneurship, and implementation of laws and regulations while in fact they have low satisfaction values in these aspects. Thereinto, the implementation of laws and regulations are recognized as the one falls the most from their expectations and the second is the transfer efficiency of new technology from scientific institutions to market and the intellectual property right protection. The popularity of science and technology has the lowest difference value (0.55) between significance and satisfaction.

3.4 Ph.D. high-level talents have high requirements on the trust degree of interpersonal communication and social atmosphere for encouraging entrepreneurship while have low data in real satisfaction values

Every index in cultural environment scores among 3.67-3.91. There is no great differences between these scores. However, the satisfaction scores of all indexes are among 2.79-3.38. The overall score is relative low. As data analysis result shows, Ph.D. talents have high requirement on the trust degree of interpersonal communication and social atmosphere for encouraging entrepreneurship while have low data in real satisfaction values. Hereinto, interpersonal communication trust degree is marked by Ph.D. talents as the one falls most from their minds and social atmosphere encouraging entrepreneurship follows. Citizens' emphasis on education has the smallest D-value of significance and satisfaction (only 0.53) and meanwhile has much higher scores (significance 0.91, satisfaction 0.38).

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