

Mathematical Analysis of the Impact Path of Human Capital on Enterprise Performance

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Abstract: The human capital of entrepreneurs has a crucial impact on the performance of startups. We conducted a questionnaire survey on 2,000 young and middle-aged enterprise founders in Haidian District, Beijing, to explore the impact path of human capital on enterprise performance.

Keywords: Human Capital; Entrepreneurship; Enterprise Performance

Introduction

Since 2015, the state had gradually implemented the policy of “mass entrepreneurship and innovation” and actively encouraged young people to engage in innovation and entrepreneurship. So, how does human capital affect the performance of startups? Based on the survey data of young entrepreneurs in Haidian District, this study explored the impact path of human capital on the performance of startups.

1. Research Design

1.1 Basic Idea and Methodology

In 2015, Peking University conducted a questionnaire survey for entrepreneurs under the age of 40 in Haidian District, Beijing. The survey sample was from the Third National Economic Census Database. The survey focused on the basic information of the entrepreneurs and the operation status of the enterprises. The first stage of the sampling was based on the characteristics of the enterprise. The second stage used industry characteristics as the sampling basis to ensure the diversity of sample industries. The survey sample involved all industry types under the National Economic Industry Classification, except for international organizations, and the final effective sample size was 2000.

1.2 Concept Definition

Human capital: Human capital is a type of capital embodied in the entrepreneurs themselves, which is mainly measured by the knowledge level, resource level, working ability and motivation. In this study, the knowledge level of entrepreneurs was considered as the explanatory variable based on their educational level. The resource level was explained by the financing ability of entrepreneurs. The working ability was explained by the pre-entrepreneurial salary (if any) of the entrepreneurs. And the motivation was explained by entrepreneurial motivation.

Entrepreneurial performance: This study used indicators of enterprise survival status and enterprise size to evaluate entrepreneurial performance.

1.3 Variables and Data Description

The variable description is detailed in the table below:

Table 1 Description of variables

Variable	Variable Description	Variable Values
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Name		
EDU	Entrepreneurs' Education level	Tier 1: Below associate degree, Tier 2: Associate degree, Tier 3: bachelor degree, Tier 4: master degree, Tier 5: Doctor degree.
Resource	Entrepreneurs' financing ability	level 1: no financing needs, level 2: financing cannot meets financing needs, level 3: financing just meets financing needs, level 4: financing exceeds financing needs.
Hcapital	Entrepreneurs' pre-start salary	The logarithm of the entrepreneur's pre-start salary.
Motivation	Entrepreneurs' motivation	“Survival Entrepreneurship = 0”, “Opportunity Entrepreneurship = 1”. Survival Entrepreneurship: passively starting a business to make a living Opportunity Entrepreneurship: To seize business opportunities, have other job options, but due to individual preferences, actively start a business.
Industry	Enterprise industry	“Technical industry = 0”, “Non-technical industry = 1”. Technical industry: education, healthcare, IT engineering, finance, consulting, biotechnology, energy, design, communication, law, etc. Non-technical industry: sales, service, catering, etc.
Survive	Enterprise survival status	“Bankruptcy restructuring = 1”, “Share transfer = 2”, “Reluctantly maintaining operations = 3”, “Stable operation = 4”, “growing = 5”
Scale	Enterprise personnel size	The average number of personnel for normal operation of enterprises.

The sample data showed, entrepreneurs in the Zhongguancun area of Beijing were mainly bachelor's, with nearly 60% of them holding bachelor's or above degrees. Nearly 70% of the financing level could basically meet the financing needs of enterprises. The ratio of survival based entrepreneurship to opportunity based entrepreneurship was about 1:7. The number of non-technical industries was basically the same as that of technical industries, with enterprises in non-technical industries mainly focusing on sales, while enterprises in technical industries mainly focus on IT engineering and finance. The average operating time of the enterprise was 6.82 years, and the enterprise mainly operated smoothly, with about 15% of the enterprises no longer operating. Enterprises were mainly young and small, with 87% of enterprises with a size of less than 50 employees and only 1.5% of enterprises with a size of over 300 employees. The sample generally conformed to the characteristics of the startup group.

2. Research Results

In order to investigate the influence of human capital on enterprise performance, human capital variable such as “knowledge” was acquired by entrepreneurs and had strong subjective initiative, which could better reflect the degree of “human capital” motivation of entrepreneurs than other variables. The level of resources , working ability and entrepreneurs' motivation had been proven to be significantly influenced by entrepreneurs' knowledge in previous research. The difference in enterprise industry also affected Enterprise survival status and personnel size to a large extent. From a timeline perspective, it was preliminarily assumed that entrepreneurs acquire “knowledge level” first, and then entrepreneurs' motivation, industry selection, resource level, and working ability will jointly affect corporate performance. Overall, this study intended to use “knowledge level” as the initial independent variable, resource level, working ability, entrepreneurs' motivation and Enterprise industry as the intermediate variables. and enterprise performance as the dependent variable, which as a latent variable portrayed by two exogenous variables: Enterprise survival status and Enterprise personnel size. Knowledge level and resource level used dummy variables. The pre-start salary of entrepreneurs was taken as its linear logarithm. Considering that the five types of survival states didn't satisfy the nature of fixed-order dependent variables, the multivariate logit model is used here.

Structural equation model was used in this study. Based on previous research results and analysis, the preliminary theoretical hypothesis model was constructed. After SEM path analysis, the impact paths were shown as follows:

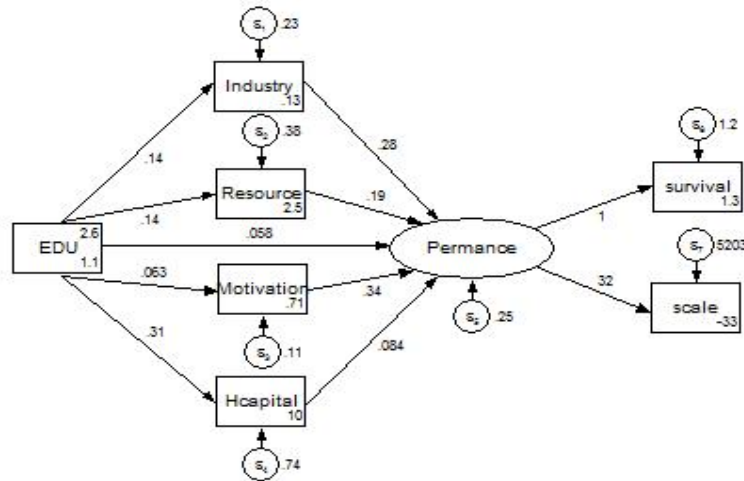


Figure 1 Hypothetical path diagram of the Impact of human capital on enterprise performance

The above model coefficients were significant at the 0.01 level except for Hcapital-Pearnance which was significant at the 0.05 level. Tested by fitting statistics, RMSEA=0.07. However, CFI = 0.863, Tucker-Lewis = 0.712, both of which didn't reach 0.9. Coefficient of determination R2 = 0.265. The model must still had the influence of relevant covariates, and the influence was not weak. The study would use model correction testing to identify key covariates using model fitting differences.

After the full coverage test of the model correction index, we found that there were five groups of covariates that played a crucial role in the model, industry selection and resource level, industry selection and entrepreneurs' motivation, industry selection and working ability, resource level and entrepreneurs' motivation, and entrepreneurs' motivation and working ability. The study was further re-fitted by adding key covariates, showing the following paths of influence:

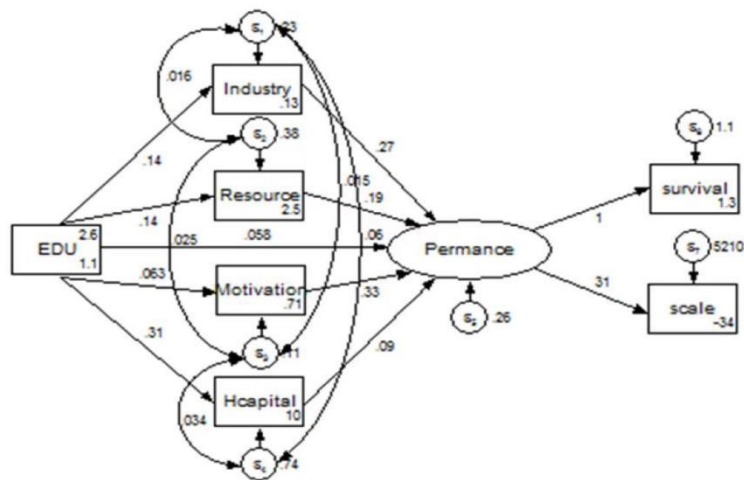


Figure 2 Path diagram of the Impact of human capital on enterprise performance (covariates)

After model correction, LR test of model vs. saturated: $\chi^2(5) = 28.26$, Prob > $\chi^2 = 0.0000$. RMSEA = 0.048, which can be considered reasonable at 90% confidence level of approximation error. Meanwhile, CFI = 0.968, Tucker-Lewis = 0.865, CFI = 0.9, the model fitted well, and the Coefficient of determination R2 = 0.363, which indicated to some extent that the path was reliable.

Table 2 Coefficient of the effect of human capital on Enterprise performance (absolute value)

Variables	Total Impact Factor Level	Direct Impact Factor level	Indirect Impact Factor Level	Indirect Impact Factor Level			
				Industry Selection	Resource Level	Entrepreneurs' motivation	Working Ability
Knowledge Level	0.174**	0.058***	0.116**	0.039***	0.028***	0.021***	0.028**
Industry	0.283**	0.270***	0.013**	--	0.003**	0.005***	0.005**

Selection							
Resource Level	0.206**	0.194***	0.012**	0.004**	--	0.008***	--
Entrepreneurs' motivation	0.337**	0.325***	0.012**	0.004***	0.005***	--	0.003**
Working Ability	0.117**	0.090**	0.027***	0.016***	--	0.011***	--

Note: *** p<0.01, ** p<0.05.

3. Conclusion and Discussion

From the path diagram and the influence coefficient, it can be seen that the ranking of the degree of influence on enterprise performance among human capital elements are entrepreneurs' motivation, industry selection, resource level, knowledge level and working ability. (1) the human capital factor that has the greatest impact on enterprise performance is entrepreneurs' motivation, and the entrepreneur's choice of "survival entrepreneurship" or "opportunity entrepreneurship" largely affects enterprise performance. Opportunity entrepreneurship can significantly improve enterprise survival status and personnel size, while entrepreneurs' motivation can also be influenced by industry selection, resource level and working ability. (2) Industry selection also has a direct impact on enterprise performance, with technical industries having better survival and personnel size than non-technical. In addition, industry selection also has an inverse effect on resource level, entrepreneurs' motivation. (3) For the level of entrepreneurs' resources, the stronger the access to resources, the higher the performance of the enterprise. In terms of indirect effects, resource acquisition ability has a relatively greater effect on enterprise performance through its influence on entrepreneurs' motivation, i.e., entrepreneurs with stronger resource acquisition ability are more likely to choose opportunity entrepreneurship and thus achieve better enterprise performance. (4) Entrepreneurs' pre-start working ability has a significant effect on subsequent enterprise performance, but the direct influence is relatively limited, mainly through the indirect effect on entrepreneurs' motivation and industry selection. The stronger the pre-start working ability of entrepreneurs, the more inclined they are to choose technology-based industries and opportunity-based entrepreneurship, and thus have relatively higher enterprise performance. (5) For the degree of knowledge, its effect on enterprise performance is both direct and indirect, where the indirect effect can be significantly realized through entrepreneurs' motivation, industry selection, resource level and working ability. The higher the degree of knowledge, the more likely it is to choose technology-based industries in the industry of entrepreneurship, and thus have higher enterprise performance. The higher the degree of knowledge, the more relative it is in the acquisition of resources, and thus have higher enterprise performance. The higher the degree of knowledge, the more entrepreneurs tend to engage in opportunistic entrepreneurship, resulting in higher enterprise performance. The higher the degree of knowledge, the stronger their working ability, and thus have higher enterprise performance.

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