

Evaluation and Application Research of Entrepreneurs' Selection Based on Factor Analysis Method

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Abstract

This paper applies the approach of literature analysis to induce and summarize the index element of entrepreneur's selection and evaluation, and constructs the index model of entrepreneur's selection and evaluation. The paper uses factor analysis of statistical theory to fit and apply the model, sequence and analyze separately according to comprehensive score and single factor score which provides scientific evidence fairly and reasonably for the choice of entrepreneur.

Keywords: Factor analysis method, Entrepreneur, Selection, Evaluation, Application research

In the course of state-owned enterprise reform in the past 30 years, its progress and results are unsatisfactory. Objectively speaking, the causes of the struggling state-owned enterprise reform are structural and not a particular factor. However, the lack of scientific and effective entrepreneurs' selection mechanism in state-owned enterprises is one critical factor. In the entrepreneur mechanism, the entrepreneur selecting is not only the first link of entrepreneur mechanism, in particular a key factor related to the state-owned enterprise reform in the success or failure, but also are the difficulties and weak links in the existing theory. I summarize the entrepreneurial selection evaluation index system, according to the research of entrepreneurship theory by domestic and foreign experts and scholars on.

1. Related research both inside and outside

Study abroad in entrepreneurship theory, until 40's in 20 centuries, has been focused on the entrepreneur as a leader in personality and characteristics; research shows that these in physical factors, mental factors, interest factors, cultural factors, skills and personal qualities and characteristics have created the role of entrepreneurs. There are more representatives:

James•Kouzes and Barry•Posner's survey (James Kouzes & Bali Bersna, 1999) shows that, the features of the leader are: honest, forward-looking, inspiring, talented, fair, broad-minded, frank, decisive, ambitious, self-control, independence etc. American management psychologists Jisrael researches 306 intermediate leaders in random sample of 26-42 years of age in 90 different business organizations nationwide, 90% of these subjects were trained with a college degree or higher qualifications education. Studies show that these leaders themselves have 13 kinds of major quality. American Management Association spending five years in the 70s conducted a survey and research on career success in the 1812 executives, found that the successful main managers generally are provided with high efficiency; provided with a pro-active spirit; good at analyzing problems; capable of affecting people in their own behavior; good at the right; good at mobilizing the enthusiasm of others; good use of talk to do the job; passion to care for others; capable of making a positive and optimistic people to work; to collective leadership; capable of objectively listening to the views; capable of correcting valuation of their own; capable of making up their own-short with others-long; the Japanese concept of effective leadership with 10 character respectively: mission; responsibility; credibility; enthusiasm; honest and faithful; enterprise; endurance; fair; passion; courage.

Since the beginning of 70s and 80s in the 20th century, some foreign scholars study the quality of leadership through the use of tracing the history and system analysis methods, point out that leadership qualities are not innate, but have gradually accumulated in the practice. More representatives of this view are: Peter Drucker thinks that (Peter Drucker, 1998), an effective leader must possess the following five key habits: to be good at

handling and using of their time; good at discovering and employing the talents; to distinguish between primary and secondary work; to focus on a few key areas; able to make effective decisions. R • M • Stogdill summarized six categories in the leading characteristics (Tom Severance, 1999): physical characteristics; social background characteristics; intellectual property; personality characteristics; and work-related characteristics; sociability features. Tom Severance points out that (Stogdill R M, 1950; Yukl G., 1998): entrepreneurs should have the honesty, fairness, optimism and spirit of cooperation; direct and effective communicator; self-confidence and self-management; the driving force of success; not afraid of failure; active policy makers; continuous learners; excellent physical and lifestyle quality etc. Princeton University professor W • J • Banmol (W•J•Banmol & McGrath J E., 1962; K J Klein etc., 2005) points out that corporate leaders should have ten conditions: the spirit of cooperation; decision-making human capital; organization of human capital; skilled in authority; good response; dare to innovate; a sense of responsibility; dare risk; respect for others; moral standing.

Chinese scholars from the early 80s in 20th century begin to carry out a series of theoretical studies of the entrepreneur's ability and quality, research results are emerging that the entrepreneur should have the capacity and quality, representative studies: Yuan Baohua points out that entrepreneurs in China should have five basic qualities: a strong sense of professionalism; able to correctly handle the interest relationship of workers, businesses and the state; to continuously improve the economic efficiency, to ensure companies in an invincible position in the competition; having the right human capital decision-making; entrepreneurs should be a politician and social activist. Li Yining (He & Li, 2005) points out that the entrepreneurs not only have the quality of the vision; the courage, to make decisions finalized; organizing human capital etc, but also have the concepts of an interest-oriented, to understand the experts compared decision-making approach and to build up lifelong learning. Zheng Haihang thinks mature entrepreneurs should have the qualities themselves of daring to take risks with human capital, expertise and scientific management knowledge, combined with innovating the human capital, strategic vision, good interpersonal communication human capital etc. Wang Anquan and others think that successful entrepreneurs should possess the quality of the five main personalities and characteristics: self-efficacy, independence, achievement motivation, risk-taking and good at learning from failure.

Looking at domestic and international research results on the entrepreneur, studies have very deeply on entrepreneur's ability, quality and human capital, and make a lot of practical results, based on the research results of scholars from home and abroad, the author combines entrepreneurs' capacity, quality and human capital of entrepreneurs to build evaluation system for the entrepreneurs, provide the basis for selection and evaluation of entrepreneurs. Entrepreneur evaluation indexes construction includes four areas in knowledge, intelligence, quality and health. Knowledge includes the organization knowledge, environmental knowledge and expertise knowledge; intelligence includes decision-making, analytical skills, innovation capacity and etc; quality includes personality traits and political quality; health includes mental health and physical health. Then the elements of each indicator are consisting of several specific component elements.

2. Research methods - factor analysis method

Factor analysis method is a multi-variable statistical method transforming a few more variables into several comprehensive variables. The process of analysis requires attention to several issues: (1) standardization of raw variables. Obtaining m-primary variables through factor analysis, there are m characteristic equations; there are also m eigenvalues equations. Eigenvalues reflect the re-allocation results of the total variance of the original variable in every component. Since there is a unit in variance, so in the process of solving factor, first of all, we should standardize each variable involved in the analysis with mean 0 and standard deviation of 1. (2) Factor in selection. There are two ways in determining the number of factor: Firstly, we should take all the elements of the eigenvalues greater than 1 as a factor; secondly, we should determine the percentage of value based on the cumulative contribution rate. For example, taking the cumulative contribution rate of 80%, which means that the information contained in the previous m-components (new variables) accounts for 80% in total information of original variables, and the remaining m-1 new variables influence variance a little, we think that they can not be considered, then take the previous m-components as factors.

3. Model checking and application of selection and assessment of entrepreneurs

This data are collected by questionnaire survey, questionnaire structure is divided into two parts: background information, evaluation indexes in entrepreneurs selection, some background information includes age, gender, education, corporate nature and the job grade and other items, filling in multiple choice approach. Part of evaluation indexes in entrepreneurs selection: using coding order forming questionnaire 32 items of evaluation indexes in entrepreneurs selection, with Lister 5 point scale method, the project scoring 1, 2 for the poor, 9, 10 for the best. Aiming at the 10 candidates for entrepreneurs of some province I conduct survey to the senior

leaders in large and medium enterprises, and explain the meaning and purpose of the survey before the survey, there are 15 companies participated in the survey. In this survey 118 questionnaires are returned in the total issues of 150, response rate is 78.67%, of which 102 questionnaires are valid, representing 68% of the total recovery. Using SPSS16.0 for exploratory analysis on 102 valid questionnaires, this paper uses factor analysis and varimax orthogonal rotation methods to determine the principal component factors of evaluation indexes in entrepreneur's selection.

This paper collects the selected indicators through questionnaires surveys method and uses principal component analysis on the selected indicators at all levels to conduct repeatedly principal component extraction, conducts the normal distribution K-S test and KMO-Bartlett's factor appropriate test after extraction of the indicators, conducts factor rotation after verifying, extracts common factors, obtains the factor scores coefficient by the Thomson regression equation, establishes factor score model to calculate the factors and their scoring, and to make their rank, so as to provide the scientific strong basis for the selection of entrepreneurs.

First of all, conducting the principal components extraction of the original data obtained through the questionnaire survey within the third level organization of institutions and policies V111; business major work processes V112; agencies setting and departments duties V113; organizational culture V114 indicators, the organizational knowledge indicators V11 named the second level of the final extraction of the principal component, are taken as a basis for further analysis.

Similarly, conducting the principal components extraction of the original data obtained through the questionnaire survey on the national legislation and legal V121; national policies V122; industry developments V123 indicators, the environmental knowledge indicators V12 named the second-level of the final extraction of the principal component, are taken as a basis for further analysis.

Conducting the principal components extraction of the original data obtained through the questionnaire survey on innovation V21; decision-making ability V22; foresee judgment V23; analytical V24; synergy V25; adaptability V26; social skills V27; learning V28 indicators, the final principal components extracted name first-level indicators of intellectual V2.

Conducting the principal components extraction of the original data obtained through the questionnaire survey on honest and integrity V311; self-discipline V312; criticism and self-criticism V313; independence V314; affinity V315; principle V316 indicators, the final extractions of the principal component name the second-level of personality features indicators V31.

Conducting the principal components extraction of the original data obtained through the questionnaire survey on the political cultivation V321; political awareness V322; high sense of social responsibility V323 indicators, the final principal components extracted name second-level indicators V32 of the political quality.

Conducting the principal components extraction of the original data obtained through the questionnaire survey on the spirit of innovation V331; adventurous spirit V332; enterprise V333; professionalism V334 indicators, the final principal components extracted name second-level indicators V33 of mental quality.

The data are shown in table 1 after the final extraction of the principal components.

Secondly, conducting the K-S normal test and KMO-Bartlett's factor appropriate test after extraction of the main components, K-S test results show that the obtained data fully are in line with normal distribution; KMO-Bartlett's factor appropriate test results are 0.684, the results show that data meet the fitting conditions as the factor analysis appropriate value is greater than 0.5.

Conducting varimax orthogonal rotation on the test results, the rotating results are shown in table 2. Factor rotation matrix can show that the information represented by the main ingredient in all the variables is clearer than the information represented by the principal component matrix not rotated.

Finally, we obtain factor score coefficient through the Thomson regression equation, establish factor score model to calculate the factors and their scoring, and to make their ranking. The results are shown in table 3.

The analysis from ranking results shows that the former three E1, E10, E9 are better evaluation of selected entrepreneurs, while the bottom three E6, E7, E8 are rated poorer evaluation of elected entrepreneurs. The results can provide the scientific basis for the selection of the business entrepreneurs.

This paper builds evaluation indexes system of entrepreneurs selection through literature search and analysis, applies factor analysis on the system to fit the merger and practice, ranks and analyzes separately according to their composite scores and the factors scores to obtain good results, it overcomes the larger defects influenced by subjective factors in application of other quantitative methods in the course of evaluation of the previous

selection in the entrepreneurial, therefore has a more accurate assessment, can obtain an objective of, scientific conclusions.

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Table 1. The System of evaluation index of entrepreneur's selection after exaction

Entrepreneur	Organization Knowledge	Environmental knowledge	Core expertise	Relevant professional knowledge	Intelligence scores	Personality scores	Political quality	Mental quality	Mental health	Physical health
E1	7.481	9.499	8.366	8.388	9.303	9.376	11.053	9.629	8.872	8.894
E2	7.439	9.376	8.229	8.227	9.007	8.901	10.367	8.941	8.183	8.181
E3	7.398	9.252	8.092	8.066	8.711	8.427	9.464	8.428	7.494	8.268
E4	7.357	9.128	7.955	7.905	8.415	7.953	9.442	8.243	7.505	8.355
E5	7.315	9.004	7.818	7.744	8.120	7.478	10.757	8.058	8.516	8.442
E6	7.274	8.880	7.681	7.583	7.858	7.004	10.489	8.277	8.527	8.529
E7	7.233	8.756	7.544	7.422	7.722	7.614	10.584	8.092	8.538	8.616
E8	7.191	8.633	7.407	7.261	7.734	8.226	10.219	8.11	8.549	8.703
E9	7.468	9.154	8.230	8.220	8.877	8.794	10.313	8.159	8.560	8.790
E10	7.47	9.119	8.225	8.213	8.863	8.761	10.408	8.09	8.571	8.877

Standardized treatment of the table 1 and the results are omitted.

Table 2. Principal component matrix after factors rotation

Evaluating indicators	Principal components		
	1	2	3
Organizational knowledge	.978	.121	.069
Environmental knowledge	.864	.434	-.202
Core expertise	.969	.201	.003
Relevant professional knowledge	.967	.208	-.003
Intelligence	.956	.290	.019
Personality	.496	.893	.215
Political quality	-.132	.759	.496
Mental quality	.439	.875	-.015
Mental health	.400	.386	.893
Physical health	.114	-.034	.962

Table 3. The ranking of comprehensive score and single factor score

Entrepreneur	Comprehensive score	Ranking	F1 Score	F1 Ranking	F2 Score	F2 Ranking	F3 Score	F3 Ranking
E1	1.227	1	0.894	3	2.137	1	1.045	2
E10	0.533	2	1.041	2	-1.131	10	1.223	1
E9	0.507	3	1.053	1	-1.028	9	0.867	3
E2	0.450	4	0.608	5	1.179	2	-1.216	8
E3	0.003	5	0.636	4	-0.510	7	-1.488	10
E4	-0.253	6	0.184	6	-0.630	8	-1.250	9
E5	-0.384	7	-0.644	7	0.000	5	-0.031	6
E6	-0.628	8	-1.099	8	0.143	3	-0.102	7
E7	-0.692	9	-1.302	9	0.015	4	0.425	5
E8	-0.759	10	-1.371	10	-0.176	6	0.551	4