

Quantitative Analysis of the Influencing Factors of Chinese Youth Entrepreneurial Activity based on Principal Component Analysis

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Abstract

Taking my country's youth entrepreneurial activity as the research object, on the basis of sorting out and statistical questionnaire data, the principal component analysis method is used to explore the factors affecting my country's youth entrepreneurial activity index, and finally five principal component factors that affect my country's youth entrepreneurial activity are found.

Keywords

Chinese Youth Entrepreneurial Activity; Innovation; Influencing Factors; Principal Component Analysis.

1. Introduction

General Secretary Xi Jinping pointed out: "The Chinese Dream is historical, realistic, and future; it belongs to our generation, and even more so for the younger generation. The Chinese Dream of the great rejuvenation of the Chinese nation will eventually be transformed into the relay struggle of generations of youth. Reality." The prosperity of the youth makes the country prosper, and the youth is strong, the country is strong. As the main force of the new era, young people have more active innovative thinking and stronger entrepreneurial motivation. In recent years, my country has attached great importance to the innovation and entrepreneurship of young people. In 2017, the State Council issued the "Medium and Long-Term Youth Development Plan (2016-2025)", which proposed to promote the all-round development of young people, build a platform for young people to grow into talents and make achievements, and stimulate the vitality of youth innovation and entrepreneurship. In October 2021, the General Office of the State Council once again issued the "Guiding Opinions on Further Supporting College Students' Innovation and Entrepreneurship", proposing to deepen the reform of innovation and entrepreneurship education in colleges and universities, run innovation and entrepreneurship education throughout the entire process of talent training, and establish an innovation and entrepreneurship-oriented education system. New talent training model. In order to improve the enthusiasm of young people in various regions of my country to join the entrepreneurial team, and also for local governments and education departments to grasp the development status of youth entrepreneurship in my country, it is necessary to study the factors that affect the activity of youth entrepreneurship in my country. On the basis of sorting out the current situation of Chinese youth entrepreneurship, this paper obtains relevant information and data based on a questionnaire survey designed, so as to conduct an empirical study on the factors that affect the activity of youth entrepreneurship in my country.

2. Literature Review

Do not number your paper: All manScholars have made numerous contributions to the research on Chinese youth innovation and entrepreneurship. In summary, there are two main aspects: one is to analyze the current situation of youth entrepreneurship; the other is to study the evolution and implementation of policies related to youth entrepreneurship.

2.1. Analysis on the Status Quo of Chinese Youth Innovation and Entrepreneurship

Understanding the current situation, difficulties and needs of youth innovation and entrepreneurship has a good role in promoting my country's youth entrepreneurial behavior and optimizing my country's economic development structure. Zeping Ren and Xuesong Bai (2022) described the portraits of young entrepreneurial groups in China from five dimensions: the basic characteristics of entrepreneurs, entrepreneurial capital, entrepreneurial driving force, entrepreneurial status and difficulties faced. The index system of China Youth Entrepreneurship Development Index is constructed from three dimensions. Based on a questionnaire survey, Chunlei Bao (2016) comprehensively analyzed the situation of youth entrepreneurship from the perspectives of entrepreneurial motivation, entrepreneurial direction, entrepreneurial performance, etc., and finally found that the vitality of youth entrepreneurship has been stimulated, and the society has gradually formed a good entrepreneurial atmosphere. However, there are still several problems such as shortage of funds and convergence of development directions in the process of entrepreneurship for young people, and further implementation work is urgently needed. Rural revitalization is an important aspect of my country's innovation and entrepreneurship tasks. The key to rural revitalization lies in people, especially young people. Young people returning to their hometowns to start businesses have an effective impetus for the realization of rural revitalization. Longfei Lin (2019) conducts research from the perspective of micro-personal significance, and the results show that the fundamental purpose of young migrant workers returning home to start a business is not to start a business, but to use it as a means of making a living, and a harmonious family life is the ultimate goal of their choice. , which has certain policy implications for the government to lead young people to return to their hometowns to start businesses.

2.2. Policy Research on Youth Entrepreneurship

Since the reform and opening up, governments at the national and local levels have paid more and more attention to youth entrepreneurship, and entrepreneurship policies have been continuously upgraded along with the transformation of the social and economic system. Weilin Sang (2018) summarized my country's youth employment and entrepreneurship policy into five stages according to the characteristics of my country's economic and social structure. Finally, through the research and comparison of the characteristics of the five stages, it was found that my country's youth employment and entrepreneurship policy still faces the coordination of policy subjects. Insufficient, the policy content is too fragmented, and the effect of policy implementation fails to achieve the expected goals. Zhiqian Xue (2017), aiming at the main content of my country's youth entrepreneurship support policy, believes that youth entrepreneurship support policy has the role of leading, regulating and guaranteeing. At the same time, combined with the policy experience of foreign developed countries, my country's youth entrepreneurship support policy is comprehensively optimized to improve the policy. Execution, pertinence, benefit and benefit. In addition, some scholars study the benefits of entrepreneurship policy research through quantitative methods. Yongan Zhang and Yuxiaodan Zhang (2018) used the DEA and Malmquist index methods to study the support efficiency of my country's innovation and entrepreneurship policies to regional new kinetic energy by building

an innovation and entrepreneurship policy evaluation index system, and finally found that there is a certain gap in the implementation of policies between regions. The effect is more ideal. At the same time, it can be seen from the dynamic level that the promotion effect of the policy is gradually emerging, but the overall efficiency is restricted by technology, which is slightly reduced.

Through literature review, it is found that although scholars have carried out in-depth research on the innovation and entrepreneurship activities of young people in my country, most scholars describe entrepreneurial activities from the aspects of entrepreneurial environment, entrepreneurial performance, etc. Quantitative research and positive analysis of the degree and its influencing factors. Based on this, this paper will take the youth as the specific research object, and collect the public's views on the factors affecting the entrepreneurial activity of Chinese youth through questionnaires, and then provide an optimized path for promoting youth innovation and entrepreneurship.

3. Research Methods and Processes

This study mainly used the method of literature search. By referring to the current research materials on employment and entrepreneurship at home and abroad, a questionnaire survey was designed for "Research on the Influencing Factors of Chinese Youth Entrepreneurial Activity". We first used the questionnaire to conduct a pre-investigation, conducted a reliability test of the collected preliminary questionnaire, and finally deleted the factors with low reliability. On this basis, the formal questionnaire used in this study was formed.

In the formal questionnaire, 14 factors that affect the activity of youth entrepreneurship in my country are listed (see Table 1). The specific method is to quantify the variables on a five-point scale, and the five answer options are recorded as 5, 4, 3, 2, and 1 points from high to low according to their willingness. That is, 5 points for choosing "completely agree", 4 points for choosing "somewhat agree", 3 points for choosing "moderate", 2 points for choosing "somewhat disagree", and 1 point for choosing "completely disagree". Afterwards, we use a formal questionnaire and use WeChat and other online platforms to fully distribute it, so as to ensure the integrity and authenticity of the questionnaire results. According to the statistical results of the questionnaires, a total of 428 questionnaires were distributed and 396 were recovered. The effective rate of the questionnaires reached 92.5%.

4. Principal Component Analysis of Influencing Factors of Chinese Youth Entrepreneurial Activity Research Methods and Processes

4.1. Quantification of Questionnaire Questions on Factors Affecting Youth Entrepreneurial Activity in My Country

After preliminarily sorting out the original collected data, using IBM-SPSS statistical software and the basic principle of principal component factor analysis method to conduct statistical correlation analysis on 14 types of evaluation variables, through the eigenvectors, eigenvalues and cumulative contributions of the sampled data We found out 5 principal component factors that influence the masses' influence on the youth entrepreneurship activity in our country, and made a quantitative evaluation on this basis.

Table 1. Explanation table of the masses on the factors affecting the entrepreneurial activity of young people in my country

Variable	Influencing Factors	Scoring Principle
X ₁	Macroeconomic Situation	
X ₂	GDP Per Capita	

X ₃	Start-up Costs	According to the five levels of "strongly disagree" to "strongly agree", they are rated as "2", "4", "6", "8" and "10".
X ₄	National Policy Orientation	
X ₅	Financial Support	
X ₆	Fiscal Spending on Science and Technology	
X ₇	Degree of Marketization	
X ₈	Proportion of Floating Population	
X ₉	Family Background	
X ₁₀	Higher Education Level	
X ₁₁	The Degree of Development of Innovation and Entrepreneurship Bases in Colleges and Universities	
X ₁₂	Youth Entrepreneurship Motivation	
X ₁₃	Youth Entrepreneurship Willingness	
X ₁₄	Youth Resilience	

4.2. Principal Component Analysis

4.2.1. Model Design and Solution

Considering that too many dimensions in the information will complicate the research, and there is correlation between some dimensions, this paper uses the PCA algorithm to reduce the dimensionality of the multi-dimensional information for evaluation. The PCA algorithm is an unsupervised algorithm that is widely used in dimensionality reduction. The main purpose is to express the original data with fewer dimensions.

The PCA algorithm synthesizes 14 eigenvectors into K new eigenvectors, namely principal components. Before performing principal component analysis, the data needs to be preprocessed. Since the dimensions of each dimension are different, it is necessary to perform zero-mean processing on each dimension first, and then use the standard deviation normalization method.

a. Computing the Elementary Loading Matrix

Calculate the eigenvalues and eigenvectors of the correlation coefficient matrix R, and the eigenvalues and eigenvectors are in one-to-one correspondence: $\lambda_1 \geq \lambda_2 \geq \lambda_3 \geq \dots \geq \lambda_p \geq 0$, $\mu_1, \mu_2, \mu_3, \dots, \mu_p$. The elementary loading matrix can be expressed as:

$$\Lambda_1 = [\sqrt{\lambda_1}u_1, \sqrt{\lambda_2}u_2, \sqrt{\lambda_3}u_3, \dots, \sqrt{\lambda_p}u_p] \quad (1)$$

b. Calculate the KMO Test Statistic

Table 2. KMO and Bartlett test table

KMO Sampling Suitability Quantity		0.825
Bartlett's Sphericity Test	Proximate Chi-square	1312.3
	Degrees of Freedom	120
	Salience	0.000

Assuming that there are p index variables for factor analysis, respectively $x_1, x_2, \dots, x_p$, then

$$KMO = \frac{\sum_{i \neq j} \sum_{j \neq i} r_{ij}^2}{\sum_{i \neq j} \sum_{j \neq i} r_{ij}^2 + \sum_{i \neq j} \sum_{j \neq i} p_{ij}^2} \quad (2)$$

Among them, r_{ij} is the simple coefficient of correlation analysis between variables x_i and other variables x_j , and p_{ij} is the partial correlation coefficient between variables x_i and variables x_j under the condition of controlling the remaining variables.

First, to verify the feasibility of principal component analysis, this paper conducts Bartlett sphere test and KMO measure on variable data. It can be seen from the results in Table 2 that the moderate determination value of KMO sampling is 0.825 (greater than 0.5), which can be used for principal component analysis, while testing the significance level P ($\text{sig}=0.000$) < 0.05, rejecting the null hypothesis H_0 (no correlation between variables), proving that the result is statistically significant.

Table 3. Influence Factor Index Rotation Component Matrix Table

	Factors					
	factor Z_1	factor Z_2	factor Z_3	factor Z_4	factor Z_5	factor Z_6
Macroeconomic Situation	0.514	0.257	-0.318	-0.287	0.314	0.192
GDP Per Capita	0.720	-0.082	-0.578	0.060	0.482	0.407
Start-up Costs	0.552	0.655	-0.099	0.201	-0.253	0.053
National Policy Orientation	0.702	0.480	0.249	0.411	0.214	-0.240
Financial Support	-0.109	0.609	0.439	-0.296	0.064	0.327
Fiscal Spending on Science and Technology	0.525	0.599	-0.097	-0.190	-0.651	-0.147
Degree of Marketization	-0.329	0.609	0.671	0.234	0.074	0.134
Proportion of Floating Population	0.729	0.256	0.631	0.343	-0.078	0.080
Family Background	-0.121	-0.209	0.669	0.514	0.116	0.434
Higher Education Level	0.566	0.125	0.326	0.782	-0.075	0.073
The Degree of Development of Innovation and Entrepreneurship Bases in Colleges and Universities	0.395	-0.507	0.030	0.515	-0.070	0.152
Youth Entrepreneurship Motivation	0.437	0.482	0.224	-0.057	0.761	-0.376
Youth Entrepreneurship Willingness	-0.260	0.113	0.486	0.616	0.526	0.341
Youth Resilience	0.588	0.048	-0.329	-0.020	0.435	0.462

c. Choose m ($m \leq p$) Main Factors

Second, the contribution rate of common factors is calculated, and m common factors are selected as the main factors.

Calculate the rotation factor loading matrix and get the matrix $\Lambda_2 = \Lambda_1^m T$

Construct the factor model:

$$x_i = a_{i1}F_1 + a_{i2}F_2 + \cdots + a_{im}F_m \quad (3)$$

$$x_p = a_{p1}F_1 + a_{p2}F_2 + \dots + a_{pm}F_m \quad (4)$$

In

$$\begin{bmatrix} a_{11} & \dots & a_{m1} \\ \vdots & \ddots & \vdots \\ \beta_{p1} & \dots & \beta_{pm} \end{bmatrix} \quad (5)$$

d. Calculate Factor Scores

Use the regression method to find the factor score function:

$$\hat{F}_j = \beta_{j1}x_1 + \beta_{j2}x_2 + \dots + \beta_{jp}x_p$$

Record the estimated value of the jth factor F_j for the ith sample point:

$$\hat{F}_{ij} = \beta_{j1}x_{i1} + \beta_{j2}x_{i2} + \dots + \beta_{jp}x_{ip}$$

Then there are:

$$\begin{bmatrix} \beta_{11} & \dots & \beta_{m1} \\ \vdots & \ddots & \vdots \\ \beta_{1p} & \dots & \beta_{mp} \end{bmatrix} \quad (6)$$

And $\hat{F} = (\hat{F}_{ij})_{k \times m} = X_0 R^{-1} \Lambda_2$, among them $X_0 = (a_{ij})_{k \times p}$, is the normalization matrix of the original k samples; R is the correlation matrix; Λ_2 is the loading matrix.

Table 4. Total Variance Interpretation Table

Element	Initial Eigenvalues			Initial Eigenvalues		
	Total	Percent Variance	Cumulative %	Total	Percent Variance	Cumulative %
1	3.187	22.764	22.764	3.187	22.764	22.764
2	1.946	13.900	36.664	1.946	13.900	36.664
3	1.934	13.818	50.482	1.934	13.818	50.482
4	1.324	9.460	59.942	1.324	9.460	59.942
5	1.104	7.888	76.580	1.104	7.888	76.580
6	.825	6.751	78.693			
7	.763	5.449	82.030			
8	.666	4.757	86.787			
9	.530	3.787	90.574			
10	.401	2.865	93.439			
11	.324	2.315	95.754			
12	.265	1.892	97.647			
13	.182	1.297	98.944			
14	.148	1.056	100.000			

After using the quantified variable values to calculate the above five principal components, and using the variance contribution rate of each principal component as a weight, the comprehensive evaluation index of the public's youth entrepreneurial activity is obtained:

$$F = 0.22764Z_1 + 0.13900Z_2 + 0.13818Z_3 + 0.09460Z_4 + 0.08751Z_5 \quad (7)$$

From the statistical results, a total of 5 factors with eigenvalue greater than 1 were extracted from the 14 influencing factors, and the variance explained by these 5 factors accounted for 76.58% of the total variance, indicating that these 5 influencing factors basically retained the original influencing factors. Information. In this way, through principal component analysis, we can convert the original 14 influencing factors into 5 principal component factors, which plays an effective dimensionality reduction role.

At the same time, according to Table 2, we can see that the 14 influencing factors have a high load under a certain principal component factor, and their structure is very clear and clear. Under the factor Z_1 conditions, the three influencing factors of "macroeconomic situation", "GDP per capita" and "start-up cost" have a relatively high load. These are the economic environment influencing factors related to the entrepreneurial activity of Chinese youth, so it can be named Z_1 is the influencing factor of "economic environment for youth entrepreneurship activity"; under the factor Z_2 conditions, the three influencing factors of "national policy orientation", "fiscal and financial support" and "financial science and technology expenditure ratio" have a relatively high load. The influencing factors of government behavior of youth entrepreneurship activity, so the factor Z_2 can be named as the influence factor of "government behavior of youth entrepreneurship activity"; High load, they are all market environment influencing factors related to youth entrepreneurship activity, so the factor Z_3 can be named as the "Youth Entrepreneurial Activity Market Environment" influencing factor; The three influencing factors of "base development degree" and "higher education level" have a high load. These are the influencing factors related to the educational environment of youth entrepreneurship activity, so it can be named as the influence factor Z_4 of "educational environment of youth entrepreneurship activity"; Under the factor Z_5 conditions, the three influencing factors of "youth's entrepreneurial motivation", "youth entrepreneurial willingness" and "youth's ability to resist pressure" have a high load, which can reflect the personal endowment of youth entrepreneurship, so the factors Z_5 can be named as "Influence factor of youth entrepreneurial activity personal endowment".

5. The Reliability and Validity Test of the Questionnaire

5.1. Reliability Test

Reliability, also known as reliability, refers to the degree of reliability of the questionnaire, which mainly reflects the consistency, consistency, reproducibility and stability of the test results. Repeated measurements of the same thing, the results should always remain the same to be credible. The evaluation system of the questionnaire is embodied in the form of a scale, and the rationality of the preparation determines the availability and credibility of the evaluation results.

This survey uses SPSS statistical analysis software, mainly through the Alpha reliability coefficient method to analyze the internal consistency of the questionnaire. The concept and basic theory of questionnaire reliability have been discussed in the pre-investigation analysis. Here, the Cronbach coefficient is directly used as the test standard. The test results show that our questionnaire is in the subjective scale structure, and the Cronbach α coefficient of each

level is greater than 0.7, belongs to a good situation, which shows the scientificity and rationality of the questionnaire structure and item design.

In order to ensure the validity of the questionnaire, we conducted a reliability test on the questionnaire data obtained from the formal survey, and modified the questionnaire accordingly to form a formal survey questionnaire. The reliability analysis of each latent variable by SPSS is used to find that the reliability of each latent variable is greater than 0.7, and the Cronbach's Alpha value of all variables is 0.807. Therefore, the formal questionnaire has high reliability and can be used for follow-up research.

Table 5. Latent Variable Reliability Test Table

Dimension	Cronbach Alpha	Number of Items
Knowledge of Entrepreneurship-related Policies	0.821	5
Satisfaction With the Current Entrepreneurial Environment	0.778	5
The Impact of Entrepreneurship on Society	0.794	5

Table 6. Reliability Analysis Table of Total Scale Questionnaire

Cronbach Alpha	Cronbach Alpha based on normalization term	Number of Items
0.807	0.829	15

5.2. Validity Test

Validity which refers to the degree to which the measured results reflect the content to be examined. The more consistent the measurement results are with the content to be examined, the higher the validity; otherwise, the lower the validity. There are three types of validity: content validity, criterion validity and construct validity. Construct validity refers to the degree of correspondence between a certain structure reflected in the measurement results and the measured values. In measurement theory, validity is defined as the ratio of the true variance relative to the purpose of the measurement to the variance of the score across a set of measures: In the process of practical operation, the first two kinds of validity usually require qualitative research by experts or measurement with recognized validity criteria, which are difficult to achieve. Therefore, this paper uses construct validity to test the questionnaire data. Sampling adequacy test (KMO) and Bartlett's sphericity test were required before factor analysis. When the sum of squares of correlation coefficients between variables is far greater than the sum of squares of partial correlation coefficients, the closer the KMO value is to 1, the stronger the correlation between variables, and the more suitable the variables are for factor analysis. The larger the value of Bartlett's sphericity test, the higher the independence between variables, and the lower the possibility of shared common factors between variables, which is more suitable for factor analysis.

Using SPSS software, KMO test and Bartlett's sphericity test were used to analyze the questionnaire to verify whether the commonality between items was significant. The test results are as follows:

Table 7. KMO and Bartlett Test Table

KMO Sampling Suitability Quantity		0.781
Bartlett's Sphericity Test	Proximate Chi-square	135.337
	Degrees of Freedom	36
	Salience	0.000

It can be seen from the results that the value of KMO is 0.781, which is between 0.7 and 0.9, indicating that the scale in the questionnaire is suitable for factor analysis. The null hypothesis is rejected, so the questionnaire has good validity.

Bartlett (Bartlett) sphericity test results: the chi-square value is 135.337, the value is large, which proves that the corresponding P value (0.000) < 0.05, so the Bartlett (Bartlett) sphericity test has significant significance. In addition, the significance of the Bartlett test of each scale is 0.000, indicating that the overall validity of this questionnaire is very good. Based on the above test results, the questionnaire used in our investigation can well achieve the purpose of this investigation.

6. Conclusion

On the basis of sorting out the existing literature, this paper designs a questionnaire of "Research on the Influencing Factors of Youth Entrepreneurship Activity in China", analyzes the influencing factors of youth entrepreneurship activity in my country, and systematically analyzes the public's attitude towards youth entrepreneurship activity. Awareness of influencing factors. Finally, according to the analysis results, 5 principal components are extracted from 14 influencing factors, and it is believed that the economic environment, government behavior, market environment, educational environment and personal endowment all have an important impact on the entrepreneurial enthusiasm of young people. In addition, our research found that the public has a high degree of awareness of the factors of youth entrepreneurial activity, which is of great help to our collection and analysis of the questionnaire.

The influence model of youth entrepreneurship activity in China constructed in this paper has certain reference significance for exploring the factors that affect the activity of youth innovation and entrepreneurship and how to further improve it. However, it is worth pointing out that this article is only a preliminary exploration of the factors influencing youth entrepreneurial activity. In future research, specific individual factors in the model can also be tested, and then the model can be continuously revised and improved to encourage youth Provide theoretical support for innovation and entrepreneurship.

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