College Students' Startup Model based on Analytic Hierarchy Process

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Abstract: According to the data collected by college students' questionnaires, this paper analyzed three models of starting up a business and their influence factors through analytic hierarchy process(AHP). The results show that the best model is that stating a business when students graduate from college. This is a social option from the realistic angle. Therefore, the reform of the higher education should be actively promoted, enhance the education of college students' post-graduation startup and the system of college students' innovation service should be perfected. Giving full play to the advantages of social network, the college students' post-graduation pioneering work is promoted.

Keywords: College students; Startup model; Analytic hierarchy process; Evaluation index

1. Introduction

With the rapid development of information technology, startup plays an increasingly important role in the social economic growth, scientific and technological progress and employment. College students has become a force to be reckoned with in the startup teams. College students are young and has relatively high professional culture quality and unique innovation spirits, which make them a special existence in the startup community. however, there are still some problems plaguing college students, their family, school and society have always been concerning such as "should students should leave school in business ?" and "how to deal with the relationship between business and study" and so on. These problems brought a lot of obstacles to the college students' startup business. Therefore in this article, we will have an analysis of the characteristics and applicability of all kinds of college students' startup models and have an analysis of the existing business problems, in order to help college students make better decisions when choosing the startup model.

2. The Analysis of the College Students' Startup Model

2.1. The Classification of the Model

College students' startup models mainly can be divided into part-time startup at school, quit-school startup and post-graduation startup. These three models are divided according to the college students' participation of time in startup , also they are the results of college students' practice.

2.2. The Precondition for Startup Model

When college students decides to start up a business, the first problem should be solved is that which startup model should be selected. For the selection of startup models, it mainly depends on: personal business objectives, business risks, initial startup resources, the efficiency of the startup opportunities.

3. The Evaluation of the College Students' Startup Models

3.1. The Principle of Evaluation of the Sartup Models

Every kind of startup model has advantages and disadvantages, whether the chosen model is appropriate or not mainly depends on the degree of benefit to the start-up, the influence of social and economic development, and the model feasibly. Therefore, we can appreciate the value of startup model according to the following three principles.
the principle of favor to the startup personal development
the principle of favor to social and economic development
the principle of feasibility.

3.1.1. The Principle of Favor to the Startup Personal Development

from the perspective of college students, the influence of different startup models to the development of startup personal are based on the growth's needs of the college students. Therefore, we will use three sub-goals to reflect the effect of the models to the college students' personal development. Three sub-goals, respectively is: students practical ability, students' innovative spirit and students' self-realization.

3.1.2. The Principle of Favor to Social and Economic Development

College students' startup have certain effect to promote social and economic development, it mainly displays in three aspects: (1) raise the employment rate (2) improve the conversion rate of science and technology (3) create direct economic benefits.

3.1.3. The Principle of Feasibility

When students choose a startup model, the feasibility of the model is a key factor. The feasibility of different startup models are vary, mainly manifest in two aspects: (1) the degree of risk (2) the difference of the possibility to obtain startup resources. According to the above analysis, we can get the corresponding evaluation index and startup model. As shown in Table 1.

3.2 The Methods and Procedures of the Evaluation of Startup Models

The mature statistical method- analytic hierarchy process (AHP) will be adopted in the evaluation of startup model. The concrete steps of AHP are as follows:

Set up Hierarchy Model:

On the basis of deeply analysis, the factors concerned in research problem in sequence from top to bottom is divided into three levels: the target layer (top level) ---to achieve the goal of the decision; Rule layer (middle level)-measures, policies and guidelines applied; Scheme layer (bottom level) - the alternative schemes participating in decision. A layer of adjacent special levels of all or part of the elements plays a dominant role, forming a top-down domination relationship step by step, namely hierarchical relationships.

Evaluation by 9 scaling method (Table 2). Through the analysis of the questionnaire data, we get the geometric Average of all the corresponding elements of judgement matrix , thus to construct a new comprehensive judgment matrix A.

Table 1. The Evaluation Index of Startup Models

	First grade indicator	second grade indicator
Models	The influence to the startup personal development	The influence of the ability of practice to startup personal.
		The influence of the creation spirit to startup personal
		The influence of the self-realization to start-up personal
	The influence to the social and economic development	The influence to employment
		The influence to the conversion rate of science and technology
		The influence of direct economic benefits
	Feasibility	the degree of risk
		the possibility to obtain startup resources

Table 2. 9 scaling method

Scale	Implication
1	Two factors are equally important
3	One factor is more important than another factor slightly
5	One factor is more important than another factor
7	One factor is more important than another factor obviously
9	One factor is more important than another factor extremely
2 4 6 8	Between the adjacent two judgement
	If the compare of factor i and j to get judgment a_{ij} then factor j and comparative judgment $a_{ij}=1/a_{ij}$

Single Hierarchical Arrangement

According to the judgement matrix A, the relative weight vector of each element w_i and I_{max} are separately calculated by using geometric mean formula under one calculation criterion. The Specific steps are as follows:

Calculate the product of all various elements of the judgment matrix A

$$m_i = \prod_{j=1}^{n} a_{ij} \qquad (1)$$

$$i = 1, 2, ..., n$$

calculate the n-th root i of m_i

$$\overline{w_i} = \sqrt[n]{m_i} \qquad (2)$$

do normalization processing to vector $\overline{w} = (\overline{w_1}\,\overline{w_2}...\overline{w_n})^r$

$$w_i = \overline{w_i} \Big/ \sum_{j=1}^{n} \overline{w_j} \qquad (3)$$

vector $w = (w_{1,}w_{2,}...w_n)^T$ is the wanted support vector

the maximum characteristic root of the computing matrix I_{max}:

$$l_{max} = \frac{1}{n}\sum_{i=1}^{n}\frac{(AW)_i}{w_i} \qquad (4)$$

For any $i = 1, 2, ..., n$, $(AW)_i$ in the matrix is the i-th element of the vector AW

do consistency text of judgment matrix and calculate the consistency index

$$CI = \frac{l_{max}-n}{n-1} \qquad (5)$$

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n is the order number of the judgment matrix, When the dimension of judgment matrix n is larger, the RI random consistency index should be introduced to make correction and get the relative consistency index $CR = \frac{CI}{RI}$, when CR ≤0.10, the sort of result is in satisfactory consistency, or the element values of the judgment matrix needs to be adjusted. RI is the mean random consistency index, it is the mean of the consistency of judgment according to enough random occurring judgment matrix calculation.

RI value （1~11order judgement matrix）

1	2	3	4	5	6	7	8	9	10
0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

Level Comprehensive Rank Order Method

Computing the synthesis weight of each element of the application layer relative to the overall goal and do the comprehensive evaluation of consistency check. The

Composite weight vector of the application layer elements is :

$$w = w_h \cdot w_{h-1} \cdot ... \cdot w_2 w_1 \qquad (6)$$

3.2.1. The Evaluation Model of Startup Model

According to evaluation index system of the startup model and the AHP model method, the hierarchical model of the startup model evaluation o is built, as shown in Figure 2.

3.2.2. The Process and Results of the Startup Model Evaluation

The process and results of the evaluation of startup model the calculating process of evaluation. Analyze the 10 copies of the questionnaire data handed out to 10 experts and then , the results are as follow:

the relative weight calculation of the index of the startup model evaluation.

Table 3. The Total Index Weight of the Startup Model

Startup model Y	X1	X2	X3	w_i	l_{max}	C.R
Influence to the startup personal development X1	1.000	0.500	0.200	0.112		
Influence to the social and economical development X2	2.000	1.000	0.200	0.179	3.03	0.06
Feasibility X3	5.000	5.000	1.000	0.709		

Table 4. The Index Weight of The Influence to Startup Personal Development

Influence to the startup personal developmentX1	X11	X12	X13	w_i	l_{max}	C.R
Influence to the startup personal developmentX1	1.000	0.200	0.333	0.109		
Influence to the social and economical developmenX2	5.000	1.000	2.000	0.582	3.15	0.04
FeasibilityX3	3.000	0.500	1.000	0.309		

Table 5. The Index Weight of the Influence to the Social and Economical Development

Influence to the social and economical developmenX2	X21	X22	X23	w_i	l_{max}	C.R
Influence to the employment rate of college X1	1.000	2.000	1.000	0.413		
Influence to the conversion rate of science and techno-logyX2	5.000	1.000	2.000	0.582	3.025	0.07
Feasibility X3	1.000	1.000	1.000	0.327		

Table 6. The Index Weight of the Feasibility

Feasibility X3	X31	X32	w_i	l_{max}	C.R
Risk X31	1.000	2.000	0.667	2.02	0.06
possibility of the access to startup resources X32	0.500	1.000	0.333		

Test the consistency of the above judgement matrix separately, both C. R.<0.1, past the test of consistency.

Calculation of the relative levels of each evaluation index of the three statup model the relative level of the influence to the development of startup personal.
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Table 7. The Influence to Startup Personal Practice Ability

the influence to startup personal practice ability	part-time startup	quit-school startup	post-graduation startup	w_i	l_{max}	C.R
part-time startup	1.000	0.333	0.143	0.081		
quit-school startup	3.000	1.000	0.200	0.188	3.15	0.004
post-graduation startup	7.000	5.000	1.000	0.731		

Table 8. The Influence to Startup Personal Creation Spirit

the influence to startup personal crea-	part-time star-	quit-school	post-graduation	w_i	l_{max}	C.R

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tion spirit	tup	startup	startup			
part-time startup	1.000	0.200	0.333	0.109		
quit-school startup	5.000	1.000	2.000	0.582	3.21	0.001
post-graduation startup	3.000	0.500	1.000	0.309		

Table 9. The Influence to Startup Personal Self-realization

the influence to startup personal self-realization	part-time star-tup	quit-school startup	post-graduation startup	w_i	l_{max}	C.R
part-time startup	1.000	0.500	0.333	0.169		
quit-school startup	2.000	1.000	1.000	0.387	3.23	0.005
post-graduation startup	3.000	1.000	1.000	0.443		

Table 10. Influence to the Employment Rate of College

influence to the employment rate of college	part-time star-tup	quit-school startup	post-graduation startup	w_i	l_{max}	C.R
part-time startup	1.000	0.200	0.111	0.063		
quit-school startup	5.000	1.000	0.333	0.265	3.02	0.001
post-graduation startup	9.000	3.000	1.000	0.672		

Table 11. Influence to the Conversion Rate of Science and Technology

influence to the conversion rate of science and technology	part-time star-tup	quit-school startup	post-graduation startup	w_i	l_{max}	C.R
part-time startup	1.000	0.200	0.143	0.072		
quit-school startup	5.000	1.000	0.333	0.279	3.08	0.01
post-graduation startup	7.000	3.000	1.000	0.649		

Table 12. Influence to the Direct Economic Benefits of Startup

influence to the direct economic bene-fits of startup	part-time star-tup	quit-school startup	post-graduation startup	w_i	l_{max}	C.R
part-time startup	1.000	0.500	0.200	0.122		
quit-school startup	2.000	1.000	0.333	0.230	3.2	0.006
post-graduation startup	5.000	3.000	1.000	0.648		

Table 13. Risk

risk	part-time startup	quit-school startup	post-graduation startup	w_i	l_{max}	C.R
part-time startup	1.000	0.500	2.000	0.311		
quit-school startup	2.000	1.000	2.000	0.493	3.06	0.02
post-graduation startup	0.500	0.500	1.000	0.196		

Table 14. Possibility of the Access to Startup Resources

possibility of the access to startup resources	part-time startup	quit-school startup	post-graduation startup	w_i	l_{max}	C.R
part-time startup	1.000	0.500	0.200	0.122		
quit-school startup	2.000	1.000	0.333	0.230	3.18	0.001
post-graduation startup	5.000	3.000	1.000	0.648		

Table 15. The Weight of the Evaluation Index of the Startup Model

	Personal development	Contribution to society	Feasibility	Weight w_i
Startup model	0.112	0.179	0.709	
Practice ability	0.109			0.012
Creative ability	0.582			0.065
self-realization	0.309			0.035
Employment rate		0.413		0.074
Conversation of science and technology		0.260		0.047
Economic benefit of company		0.327		0.059

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risk			0.667	0.473
Initial resources			0.333	0.236

$$Y = \begin{bmatrix} 0.081 & 0.109 & 0.069 & 0.063 & 0.072 & 0.122 & 0.311 & 0.122 \\ 0.188 & 0.582 & 0.387 & 0.265 & 0.279 & 0.230 & 0.492 & 0.230 \\ 0.731 & 0.309 & 0.433 & 0.672 & 0.649 & 0.648 & 0.196 & 0.648 \end{bmatrix} \begin{bmatrix} 0.012 \\ 0.065 \\ 0.035 \\ 0.074 \\ 0.047 \\ 0.059 \\ 0.473 \\ 0.236 \end{bmatrix} = \begin{bmatrix} 0.205 \\ 0.387 \\ 0.408 \end{bmatrix}$$

Table 16. The Ranking and Results of the Ultimate Evaluation of the Three Startup Models

Startup model	Total points	Comprehensive points
part-time startup	0.205	3
quit-school startup	0.387	2
post-graduation startup	0.408	1

Test the consistency of the above judgement matrix separately, both C. R.<0.1, past the test of consistency.
the weight of the evaluation index of the startup model. We can get the ultimate value of the three startup models by the following formula. the ranking and result of the compare are in the Table 16.
From the above figure, we can get that for the three kinds of startup models, the post-graduation model get the highest comprehensive points(0.408),the second highest is the quit-school startup model(0.387), the last is the part-time startup model (0.205). the series of points are decided by the characteristics of themselves and the outside environment. All of these are agree with the reality.

4. Conclusion

From the above analysis of the three startup models, we conclude that the best college students' startup model is the post-graduation startup. The evaluation of the startup model is mainly from the perspective of society and based on three principles. While in reality, when choosing the startup model, college students do not consider all of the influence of the three principles. Therefore, in the practice, when choosing a startup model, for the business smoothly, college students should be comprehensive thinking, combined with the various elements and carefully make a decision.

References

[1] Wang Wei,The Research of the Stratup Models of College Students[D]. Jilin:Jilin University,2004.

[2] Peng Xiaomei,Chen Zuxin, Ddiscussion of the Models of College Studetns' Startup [J]. Chinese High-Tech Enterprises, 2008 (1).

[3] Li Yongqiang, Bai Xuan, Mao Yu, Ceng Zheng. the Literature Review of the Factors Effecting the Will of Sartup[J]. Economics Information, 2008 (2) : 81-83 .

[4] Mao Yu. A Study of the Infulence of the College Startup Education on the Will of College Students' Stratup [D]. Southwestern University of Finance and Economics, 2008.

[5] He Dan. The Analysis of the Influence Factors of College Students' Startup Tendency [D]. Zhejiang University, 2006.

[6] Douglas W. Naffziger, Jeffrey S. Hornshy, Donald Furatko. A Proposed Research Model of Entrepreneurial Motivation[J]. Entrepreneurship Theory and Pratite, 1994(2):29-42.

[7] Huang Jingbao. The Literature Review of the Problems of Chinese College Students'Sstartup.Reform and Strategy, 2011, (11): 184-186.

[8] Scott M.G., Twomey D. F. The long-termsupply of entrepreneur: students'career aspirations in relation to entrepreneurship[J]. Journal of Small Business Manangement, 1988(26): 5-13.