

Empirical Study on the Impact of Creative Self-Efficacy of College Student Entrepreneurs on Innovative Behavior

Wang Nan

School of Marxism, Tianjin University of Finance and Economics, Tianjin, China

Email address:

23402592@qq.com

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Abstract: College students' entrepreneurship driven by innovation has made great contribution to the scientific and technological progress as well as economic development of the society, and has become a kind of value orientation and spirit of the time at present. However, the innovative behavior of college student entrepreneurs is influenced by their creative self-efficacy and innovative motivation. This paper introduces the Self-Efficacy Theory of psychology into the innovation research field and conducts questionnaire survey on 150 college student entrepreneurs from maker spaces of colleges and universities in Tianjin City, China by means of creative self-efficacy scale, intrinsic motivations scale, extrinsic motivations scale and innovative behavior scale, in order to empirically study the dynamic relations among the creative self-efficacy, intrinsic motivations, extrinsic motivations and innovative behavior of the college student entrepreneurs. According to the study results, it is found that the creative self-efficacy, intrinsic motivations, extrinsic motivations and innovative behavior are all significantly and positively correlated with each other. Besides, the creative self-efficacy, intrinsic motivations and extrinsic motivations all can positively predict the innovative behavior. In addition, both the intrinsic motivations and extrinsic motivations play a multiple mediating role between the creative self-efficacy and the innovative behavior.

Keywords: College Student Entrepreneurs, Innovative Motivation, Self-efficacy, Innovative Behavior

1. Introduction

Under the big background of the era when the world is striding from IT (Information Technology Age) to DT (Data Technology Age), China's economy is in the critical period for transforming from rapid growth to high-quality development, and college students' entrepreneurship driven by innovation has made great contribution to the scientific and technological progress as well as economic development of China. This kind of innovation and entrepreneurship has not only enhanced the innovation quality and employment ability of college students, but also provided more employment opportunities to the society, which stimulates the entrepreneurial spirit at the starting stage of business, promotes the local economic development and gradually becomes an inexhaustible impetus for China's innovation-driven strategy. In the perspective of psychology, the innovative behavior of college student entrepreneurs is affected by the creative self-efficacy and innovative motivation to varying degrees. This paper introduces the

Self-Efficacy Theory put forward by Albert Bandura, the founder of the Social Learning Theory in psychology, into innovation management field, and studies the impact of the creative self-efficacy of college student entrepreneurs on innovative behavior.

As a measurement of the self-expectation reflected by an individual in innovation activities, the creative self-efficacy refers to the individual's evaluation on its capability and confidence to have innovative behavior in the specific task that it undertakes. Some research results show that the creative self-efficacy can promote the birth of innovative behavior directly or indirectly with the help of other factors [4, 5]. In the way of big-sample questionnaire survey on staff from service enterprises, Feng Xu find that the creative self-efficacy can stimulate the emergence of innovative behavior, and facilitate the generation of innovative behavior with the help of intrinsic motivation and extrinsic motivation. Other studies prove that the creative self-efficacy plays a mediating role between the innovative behavior and other influencing factors [6]. All these study results show that

creative self-efficacy is the key premise of innovative behavior.

The innovative behavior refers to the act of an individual to generate, facilitate and realize its novel idea in the work group or organization consciously [8]. As an inexhaustible impetus supporting national economic and social development in a rapidly developing society of knowledge economy, the scientific and technological innovation draws wide attention from lots of business managers and scholars, and is therefore regarded as a critical factor for the organization to survive and develop. The innovative behavior is highly uncertain and risky, and it needs strong conviction and courage to support [6]. Meanwhile, the lack of confidence and entrepreneurial spirit is the greatest barrier that hinders innovative behavior. Therefore, the faith assessment of an individual on the innovative achievements that it achieves has a significant impact on the innovative behavior.

Although some studies have preliminarily proved that the creative self-efficacy plays an important role in the generation of innovative behavior, its specific mechanism of action still needs to be further clarified. Besides, the theoretical discussion and empirical study on the related topics are quite deficient yet. Bandura thinks that the self-efficacy can affect individual behavior by means of intermediate variables including motivation, cognition, emotion and the like. The innovative motivation acts as the impetus promoting an individual to transform its innovative behavior from potential state to actual state. From the viewpoint of the Self Determination Theory (SDT), the innovative motivation can be divided into three categories, including intrinsic motivation, extrinsic motivation and a motivation, and the above three are distributed on a continuum of self-determination due to their difference in the degree of self-determination. Some researchers have preliminarily tested the relations among creative self-efficacy, work motivation and innovative behavior, finding that motivation plays a mediating role between creative self-efficacy and innovative behavior [3]. Through conducting a big-sample questionnaire survey on the enterprise staff, Gu Yuandong and Peng Jisheng discovered that the creative self-efficacy can directly promote the generation of innovative behavior, and also indirectly affect staff's innovative behavior with the mediating role played by the achievement motivation and work involvement.

Nevertheless, the existing studies still have some shortcomings. On the one hand, there is short of elaborate inquiry on the mutual relation between intrinsic motivation and extrinsic motivation in the aforementioned mediating role. Controversies about the relation between extrinsic motivation and intrinsic motivation still exist in the present motivation research field. Some researchers find that the extrinsic motivation can weaken the intrinsic motivation, namely, the extrinsic reward may reduce the individual autonomy and impede the pursuit of more effective solutions, thus weakening the intrinsic motivation [2]. However, other researchers find that the extrinsic motivation can strengthen the intrinsic motivation instead of weakening it and believe that material reward can build up individual self-determination, then reinforce the intrinsic motivation as a result. On the other hand, there are quite a few studies on the innovation and entrepreneurship of students from colleges and universities, but it is rare to conduct quantitative study on the innovative motivation and innovative behavior of college student entrepreneurs, with the psychological element of self-efficacy in the study. Most of available literature experiments on staff from service industry as samples, but less involves college student entrepreneurs. In consideration of the difference between the above two groups in aspects of education level, job nature and the like, carrying out related studies on the innovative motivation of college student entrepreneurs can further verify and enrich the existing study results. Therefore, it is very important and necessary to examine the mutual relationship of the extrinsic motivations and intrinsic motivations of college student entrepreneurs and the mediating role played by them between the creative self-efficacy and innovative behavior.

In conclusion, this topic divides innovative motivation into intrinsic motivation and extrinsic motivation. The intrinsic motivation refers to the wish of an individual to work hard due to its intrinsic interest, curiosity and joy in the job that it undertakes, and the extrinsic motivation refers to the wish of an individual to work hard in order to attain the desired results or avoid the negative consequences from its engaged work. Taking the college student entrepreneurs as the objects of study, this paper probes into the relations among creative self-efficacy, extrinsic motivation, intrinsic motivation and innovative behavior, and examines the chain mediating role played by the extrinsic motivation and intrinsic motivation (See Figure 1).

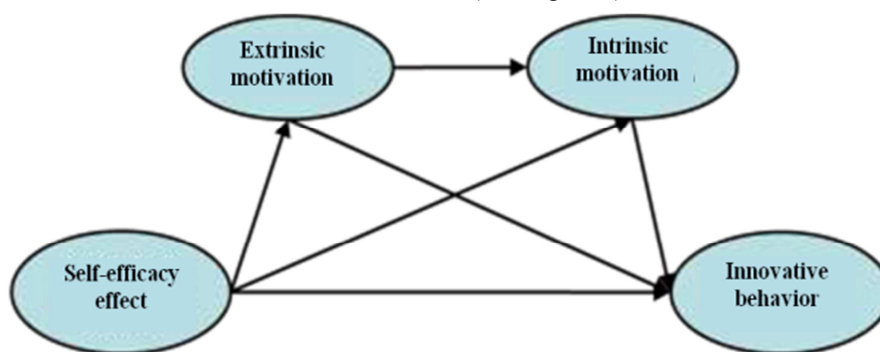


Figure 1. Mediating Model of Innovative Motivations.

2. Theoretical Framework

Based on the above theoretical analysis and the previous research results, the following hypotheses are proposed in this study: 1) the creative self-efficacy affects innovative behavior through the extrinsic motivations of the college student entrepreneurs; 2) the creative self-efficacy affects innovative behavior through the intrinsic motivations of the college student entrepreneurs; 3) the creative self-efficacy affects innovative behavior through the mediating chain of extrinsic motivations-intrinsic motivations of college student entrepreneurs.

3. Empirical Analysis

3.1. Data Source

This paper, by way of convenience sampling, carries out investigations on the entrepreneurs of students within the Marker Space of Tianjin University of Finance and Economics, Tianjin Foreign Studies University, Tianjin Normal University, Tianjin University of Technology and Tianjin Polytechnic University, through a variety of methods such as individual measurement and WJX statistics software. A total of 200 questionnaires were distributed, and 150 valid questionnaires were finally collected, with an effective recovery rate of 75%. The objects are aged from 18 to 25 (the average age: 21.13 years old), among which 72 are males, accounting for 48%, and 78 are females, accounting for 52%. The students majored in the Law, Accounting and other liberal arts account for 35.6%, students majored in Machinery, Mathematics and other polytechnic majors account for 42.3%, while students majored in Visual, Design and other arts majors account for 22.1%.

3.2. Questionnaire

The questionnaires adopted in this paper all come from the psychological literature published on the mainstream foreign periodicals, and the original questionnaires are in English. In order to ensure consistency between Chinese version and English version, we have translated the original one into Chinese by adhering to the standard translation-Back Translation Procedure [2].

3.2.1. Creative Self-efficacy Scale

The creative self-efficacy scale developed by Carmeli and Schaubroeck is adopted in this paper, containing eight items in total and involving in many aspects of the creative performance of the college student entrepreneurs, such as confidence assessment of the ability to fulfill the task creatively and overcome difficulties and challenges creatively, etc. The questionnaire adopted the Likert's 5-point Scaling Method, from "1" which indicates serious disagreement to "5" which indicates strong agreement. The internal consistency coefficient of this scale in this questionnaire is 0.92.

3.2.2. Intrinsic Motivations Scale

The intrinsic motivations scale prepared by Grant is adopted in this paper, containing four items in total, such as "because I am very interested in the innovation and entrepreneurship itself", etc. The questionnaire adopted the Likert's 5-point Scaling Method, from "1" which indicates serious disagreement to "5" which indicates strong agreement. The internal consistency coefficient of this scale in this questionnaire is 0.88.

3.2.3. Extrinsic Motivations Scale

The extrinsic motivations scale developed by Grant and Berry is adopted in this paper, containing four items in total, such as "because I need the higher incomes brought by the innovation and entrepreneurship", etc. The questionnaire adopted the Likert's 5-point Scaling Method, from "1" which indicates serious disagreement to "5" which indicates strong agreement. The internal consistency coefficient of this scale in this questionnaire is 0.82.

3.2.4. Innovative Behavior Scale

The innovative behavior scale prepared by Janssen is adopted in this paper, containing nine items in total, such as "searching for the new innovative entrepreneurial methods, innovative entrepreneurial skills and innovative entrepreneurial tools", etc. The questionnaire adopted the Likert's 5-point Scaling Method, from "1" which indicates "never doing this" to "5" which indicates "always doing this". The internal consistency coefficient of this scale in this questionnaire is 0.94.

3.3. Data Processing Methods

SPSS19.0 is used to manage and analyze data. In recent years, most of the papers published on the international-level academic journals in the fields of psychology, consumer behavior and organizational behavior have used the Bootstrap method to carry on the test of mediating effect. However, few papers in the domestic academic journals use the Bootstrap method to analyze the mediating effect. In view of the better effectiveness of the deviation corrected percentile Bootstrap method than the traditional Sobel test effect [3], the Bootstrap method is used in this study to estimate the 95% confidence interval of the mediating effect by taking 5000 Bootstrap samples, and to make the difference significance test on the mediating effect of different innovative motivations at the same time.

3.4. Data Processing Results

3.4.1. Control and Test of Common Method Deviation

In view of the fact that all the variables in the current study are self-reported by the subjects investigated, there may be a common method bias effect. We use the balance questionnaire order and anonymous filling of questionnaire to control the common method deviation effect in the process of questionnaire survey, in order to eliminate the influence of the

common method deviation on the study data. In addition, we also use the Harman single factor test method to measure the common method deviation effect, that is, making analysis of the unrotated factors after putting all the measurement items of all variables together. If there is only one factor or a certain factor that explains most of the variations, we can confirm that there is a serious common method deviation; to the contrary, there is no serious common method deviation effect. Referring to the above analysis procedure, the current study results show that the variance explained by the first principal component is less than a half of the total variances which are explained. Therefore, there is no common method bias effect among the variables measured in this study, and the relationships deduced from the data are credible.

3.4.2. Descriptive Statistics and Correlation Analysis

Table 1 shows the mean, standard deviation and correlation coefficient of the main variables. Based on the results of the correlation analysis, it can be seen that both intrinsic motivation and extrinsic motivation have significant positive correlation with creative self-efficacy ($r=0.44$, $p<0.001$; $r=0.33$, $p<0.001$); there is a significant positive correlation between the creative self-efficacy and the innovative behavior ($r=0.27$, $p<0.001$); and significant positive correlation between intrinsic motivation and extrinsic motivation and innovative behavior ($r=0.42$, $p<0.001$; $r=0.41$, $p<0.001$).

Table 1. Descriptive Correlation between the Statistical Results and Variables (N=150).

Variable	Mean	Standard Deviation	1	2	3	4
1. Creative self-efficacy	3	0.87	(0.74)			
2. Intrinsic motivation	2.85	1.06	0.4397***	(0.94)		
3. Extrinsic motivation	2.84	0.79	0.3325***	0.4699***	(0.937)	
4. Innovative behavior	3	0.83	0.2684***	0.4231***	0.4094***	(0.95)

Note: ** $p<0.01$, *** $p<0.001$ and the same below. The number in the brackets stands for the internal consistency coefficient of the variable in this test.

3.4.3. Analysis of the Intermediate Model among Variables

Regression analysis of the relationships among variables is shown in Table 2. From the analysis results, it is found that the creative self-efficacy can positively predict the extrinsic motivations of college student entrepreneurs significantly ($\beta=0.39$, $t(150)=4.93$, $p<0.001$); both the creative self-efficacy and extrinsic motivations can positively predict the intrinsic motivations significantly ($\beta=0.45$, $t(150)=4.92$; $\beta=0.42$, $t(150)=4.81$, $p<0.01$); when the creative self-efficacy, extrinsic motivation and intrinsic motivation predict the innovative behaviors of college student entrepreneurs

simultaneously, the extrinsic motivation has an edge significant positive prediction on the innovative behavior ($\beta=0.19$, $t(150)=3.69$, $p<0.001$), and both the creative self-efficacy and intrinsic motivation have significant positive prediction on the innovative behavior ($\beta=0.41$, $t(150)=6.42$, $p<0.001$; $\beta=0.18$, $t(150)=3.03$, $p<0.001$). Considering the obvious direct impact of the creative self-efficacy on innovative behavior, the extrinsic motivations and intrinsic motivations play a partial mediating role between the creative self-efficacy and innovative behavior.

Table 2. Regression Analysis of the Relations among Variables.

Regression Equation		Integral Fitting Indexes				Regression Coefficient Significance		
Result variable	Variable prediction	R	R ²	F	p	β	t	p
Extrinsic motivation	Creative self-efficiency	0.38	0.141	24.29	<0.001	0.39	4.93	<0.001
	Extrinsic motivation	0.58	0.34	37.85	<0.001	0.42	4.81	<0.001
Intrinsic motivation	Creative self-efficiency	0.72	0.52	52.38	<0.001	0.45	4.92	<0.001
	Intrinsic motivation					0.18	3.03	
Innovative behavior	Extrinsic motivation	0.41	6.42	<0.001	<0.001	0.19	3.69	<0.001
	Creative self-efficiency					0.41	6.42	

Table 3 shows the indirect effects corresponding to the three indirect ways through which the creative self-efficacy affects innovative behavior, and reflects the significant test of their differences. There is no "0" in the Bootstrap 95% confidence interval of total indirect effect of extrinsic motivations and intrinsic motivations (0.07, accounting for 32.67% of the total effect), indicating that the two mediators have significant partial mediating effects between the creative self-efficacy and the innovative behavior. The mediating effect shall include the indirect effects arising from the three ways, of which the first way is the creative self-efficacy \rightarrow extrinsic motivation \rightarrow innovative behavior, with the indirect effect value of 0.03 and without "0" in the confidence interval, which indicates that the extrinsic

motivation has a significant indirect effect between the creative self-efficacy and the innovative behavior; the second way is creative self-efficacy \rightarrow extrinsic motivation \rightarrow intrinsic motivation \rightarrow innovative behavior, with the indirect effect value of 0.01 and without "0" in the confidence interval, which indicates that the indirect effect generated in this way is significant; the third way is creative self-efficacy \rightarrow intrinsic motivation \rightarrow innovative behavior, with the indirect effect value of 0.02 and without "0" in the confidence interval, which indicates that the indirect effect generated in this way is also significant.

Compared in pairs, the significance test conducted on the difference between the indirect effects produced by different ways shows that there is no "0" in the Bootstrap 95%

confidence interval of the comparison 3 (the difference between indirect effect 2 and indirect effect 3), which indicates that the indirect effect 3 is significantly higher than that of the indirect effect 2; while there is “0” in the Bootstrap 95% confidence interval of the comparison 1

(difference between indirect effect 1 and indirect effect 2) and comparison 2 (difference between indirect effect 1 and indirect effect 3), which indicates that both the indirect effects of comparison 1 and comparison 2 are not significant.

Table 3. *The Analysis of the Intermediary Effect of External Motivation and Internal Motivation.*

	Indirect effect value	Boot standard error	Boot CI lower limit	Boot CI upper limit	Relative mediating effect
Total indirect effect	0.07	0.06	0.60	0.83	32.67%
Indirect effect 1	0.03	0.06	-0.11	0.14	6.92%
Indirect effect 2	0.01	0.07	-0.10	0.15	3.06%
Indirect effect 3	0.02	0.03	-0.03	0.11	20.92%
Comparison 1	0.011	0.02	-0.03	0.06	
Comparison 2	-0.11	0.05	-0.21	0.02	
Comparison 3	-0.10	0.03	-0.20	-0.04	

Note: The Boot standard error, the Boot CI lower limit and the Boot CI upper limit respectively refer to the standard error, lower limit and upper limit of 95% confidence interval of the indirect effect calculated by the Bootstrap method; the values are generally rounded up to two decimal places, but some individual values need to be retained in multi-digit decimal in order to compare with other values.

4. Discussion of Data Results

This study also examines the mediating role of the extrinsic motivations and the intrinsic motivations between the creative self-efficacy and innovative behavior, and their mutual interactions. From this study, it is found that there is a significant positive correlation between the creative self-efficacy and the innovative behavior, that is, with the rise of the creative self-efficacy, the innovative behavior of the student entrepreneurs is obviously enhanced, which is consistent with the existing research results [4, 5]. In other words, the creative self-efficacy is an important factor to induce innovative behaviors of college student entrepreneurs, and good creative self-efficacy can effectively promote the generation of innovative behavior. In the meanwhile, the results show that the extrinsic motivations and intrinsic motivations play a multiple mediating role in the relationship between the creative self-efficacy and the innovative behavior and this mediating role is produced through three indirect ways: first, it plays an independent role through the extrinsic motivations; secondly, it plays an independent role through the intrinsic motivations; thirdly, it plays a joint role through the extrinsic motivations and intrinsic motivations.

4.1. Relation between Creative Self-efficacy and Innovative Behavior: The Mediating Role of Extrinsic Motivations

The multiple mediating effect test, in this study, shows that the creative self-efficacy can indirectly influence the innovative behavior through extrinsic motivation alone. In other words, a higher sense of creative self-efficacy can enhance the extrinsic motivations of college students, and further enhance their innovative entrepreneurial behaviors. Learned Industriousness Theory (LIT) believes that the extrinsic incentives can promote individuals' innovative behaviors by establishing a relationship between the innovative behavior and improvement, in which the extrinsic motivations derive from factors beyond the work, such as performance reward, expectation evaluation, etc.. Since

people intend to have more social resources, the college student entrepreneurs with higher self-efficacy also have higher extrinsic motivations, in order to obtain fairer and richer performance rewards and social evaluations, and ultimately promote the generation of innovative entrepreneurial behaviors. Some studies have found that self-efficacy is positively correlated with innovative behaviors, and the extrinsic motivations can regulate the relationship between the two. The current study results are consistent with this, suggesting that the extrinsic motivations play an incomplete mediating role between creative self-efficacy and innovative behavior.

4.2. Relation between the Creative Self-efficacy and the Innovative Behavior: The Mediating Role of Intrinsic Motivations

The test on the multiple mediating effect in this study reflects that the creative self-efficacy can indirectly influence the innovative behavior through intrinsic motivation along, which is the most important mediator. In other words, the stronger the creative self-efficacy of the college student entrepreneurs, the higher the level of their intrinsic motivations on innovation and entrepreneurship, and the greater the possibility of producing the innovative entrepreneurial behavior. The Self-determination Theory (SDT) emphasizes that the behavior driven by intrinsic motivations is often influenced by the individual's psychological needs, such as autonomy, self-efficacy and relevance. Individuals with higher sense of self-efficacy tend to be more willing to participate in the challenging activities and explore new ways to accomplish various kinds of tasks. Compared to daily activities, the innovative behavior is more complex and has higher risk and uncertainty, therefore, it requires individuals to overcome all types of difficulties and obstacles encountered in the process of innovation. Finally, the individuals who believe that they can overcome difficulties and accomplish innovative behaviors tend to have stronger intrinsic motivations to carry out and complete the innovative behaviors. Some studies have found that the

self-efficacy is positively correlated with the innovative behavior, and the intrinsic motivations can regulate the relationship between the two. The current study results are consistent with this, suggesting that the intrinsic motivations play an incompletely mediating role between the creative self-efficacy and the innovative behavior.

4.3. Relation between the Creative Self-efficacy and Innovative Behavior: The Chain Mediating Effect of Extrinsic Motivations-Intrinsic Motivations

The test on the multiple mediating effects in this study reflects that the creative self-efficacy can enhance the level of extrinsic motivations of individuals, then the intrinsic ones, and ultimately promote the creation of innovative behaviors. That is to say, the stronger the creative self-efficacy of the college student entrepreneurs, and the higher the level of their extrinsic motivations, the higher the level of their intrinsic motivations, thus promoting the emergence of their innovative entrepreneurial behaviors. As mentioned above, the individuals with higher self-efficacy also hope to get more extrinsic rewards, such as post promotion, performance reward, etc., and these extrinsic performance rewards and social evaluation will enhance their own values, promote their interests, happiness and other intrinsic motivations in the issues to be completed and finally facilitate the generation of their innovative behaviors. Some researchers emphasize that the extrinsic motivations often have to do with intrinsic motivations to promote the innovative behaviors [1], and some studies have found that the extrinsic motivations can affect the individuals' innovative behaviors by affecting their intrinsic motivations [4]. The current findings are consistent with this, suggesting that the extrinsic motivations and intrinsic motivations play a chain mediating role in the impact of the creative self-efficacy on innovative behavior.

5. Study Conclusions and Policy Recommendations

Firstly, this paper, in the field of college students' innovation and entrepreneurship, probes into and tests the multiple mediating role of the extrinsic motivations and intrinsic motivations in the impact of the creative self-efficacy on the innovative behavior, re-exams the relations between the creative self-efficacy and innovative behavior among college student entrepreneurs, verifies the former study results regarding enterprise employees as samples, and provides valuable reference for the teaching and management of the innovation and entrepreneurship in colleges and universities. Although the identity of college student entrepreneurs is different from that of ordinary technology innovators, they share common characteristics in the practice of innovation and practice. Colleges and universities can learn the innovative management mode and advanced experience from other areas to conduct the entrepreneurship management for students of colleges and universities.

Secondly, this study reveals that the creative self-efficacy

plays a role in promoting the generation of the innovative behavior, and the extrinsic motivations and intrinsic motivations have joint effects between the creative self-efficacy and innovative behavior, and confirms the three ways through which the creative self-efficacy effects on the innovative behavior, that is, it verifies the theoretical hypothesis through the indirect effect of extrinsic motivations, intrinsic motivations and extrinsic motivation—intrinsic motivations. Therefore, inspiring and arousing the creative self-efficacy of college students in innovation is an important part in the teaching and education of innovation and entrepreneurship in colleges and universities. It is suggested that, in the classroom teaching and extracurricular practice, teachers shall stimulate and protect the entrepreneurial enthusiasm and confidence of college students.

Finally, in the management and teaching practice of innovation and entrepreneurship in colleges and universities, teachers and managers should not only pay attention to cultivating and stimulating the intrinsic motivations of college student entrepreneurs, such as guiding college students to devote themselves into the innovation and entrepreneurship through the course of entrepreneurship, creating a good dual creation environment, and inducing college students to take the entrepreneurship as a new form of employment and inspiring student entrepreneurs to be brave and active in the entrepreneurship, but also shall enhance the extrinsic motivations of college students, such as offering them generous subsidies, scholarships, financial support for large innovative projects.

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