

Study on Improvement in Employment Quality of College Students

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ABSTRACT

This research mainly explored which factors can affect the employment quality of college students based on human capital and social capital. Firstly, the work took the graduation destination and salary level as the measurement indexes of employment quality, and then used the feature selection test and multiple logistic regression as research methods. Our study demonstrated that students with rich knowledge and human capital and rich social capital have a higher probability of obtaining high salaries in future employment, while individuals with rich skilled human capital have a higher employment rate. This research has discovered the hidden value behind education data, explored the mechanism by which student characteristic information affects employment quality, and provided a useful supplement to employment quality research. It further provided practical enlightenment for college informatization construction, teaching reform and employment guidance.

Keywords: *employment quality; data mining; multiple logistic regression; college students*

1. INTRODUCTION

In the context of China's economy entering the "new normal", the situation of the government, employers, universities and students has changed. The problem of the quality of employment of college graduates is increasingly complicated and the contradictions are becoming increasingly prominent. On the other hand, students pursue personality liberation, in order to achieve planning, it is needed to understand the influencing factors and mechanism of employment quality. But the scattered and fragmented information storage mode and simple inquiry statistics in Colleges and universities are difficult to meet the requirements. Therefore, under the background of big data, it is necessary to find and identify the factors that affect the quality of employment hidden in the data through the integration and mining of multi-sectoral data, which has important theoretical value and practical significance for the higher education reform and personnel reform and development in China.

2. INDICATOR SELECTION

2.1. Employment Quality

Employment quality is a multidimensional concept, and the employment rate or starting salary level are the most commonly used indicators to measure employment quality. Anne Gasteen and John Houston (2007) [1] believed that

the starting salary of graduates is the most important indicator of employment quality. Shi Hongmei et al. (2017) [2] believed that the graduates' employment quality can be measured from the level of wages, the type of employment units and subjective satisfaction. Some scholars also believe that the above indicators cannot objectively reflect the employment quality of college students. They proposed an employment quality index system of college students including employment probability, occupational social status, health and welfare and job satisfaction. Based on the above research, this study uses the student salary scale and graduation destination as indicators to measure employment quality, the reasons are as follows:

First, it is difficult for the employment rate to reflect the true employment status of different types of graduates, especially the difference in the quality of employment. Therefore, it is necessary to further refine the graduation destination in the employment rate, the graduation destination is chosen to replace the employment probability, which reflects the employment quality of college graduates from the social dimension.

Second, the salary level is chosen as the measurement index of employment quality. Through standardization and discretization, it can better reflect the difference of college students' salary in different years than salary level, and reflect students' employment quality from the economic dimension.

2.2. Human Capital

According to Schultz's definition, human capital refers to the sum of quality factors with economic value such as knowledge, technology, ability and health acquired that

exist in the human body. For college students, the generation of human capital is mainly the value condensation of investment in education. The education described here contains two aspects. In the traditional sense, the education of college students is through formal institutions (universities), formal channels (classroom teaching), and in written or documentary form (textbooks, etc.) to develop college students' knowledge system. (Bates,1995;Honig,1998)[3] [4]. On the other hand, in a broad sense, education includes skills training, accumulation of social experience or career-oriented practical experience. In combination with previous studies, this study selects the following factors to measure human capital.

Knowledge indicators obtained through school education include:

- Performance ranking: which reflects the position of the student in the class and the actual effect of receiving higher education.
- The highest level of scholarship: which reflects the overall quality of college students or excellence in some aspects.

- Results of CET-4 and CET-6: A mastery of certain English knowledge is a prerequisite for modernization, reflecting the general human capital.
- Participation in minor/dual degrees: By participating in specific courses of interest, students can improve the general human capital status.

Skill indicators formed through extracurricular practice include:

- Student cadres or not: reflecting students' organizational and coordinating abilities.
- Participation in innovative entrepreneurship activities: reflecting students' thinking ability, innovative entrepreneurship ability and so on.
- Types of practice units: There is a strong correlation between the types of practice units and the types of graduation destinations.
- Number of internship days: which measures students' time and energy during the internship.

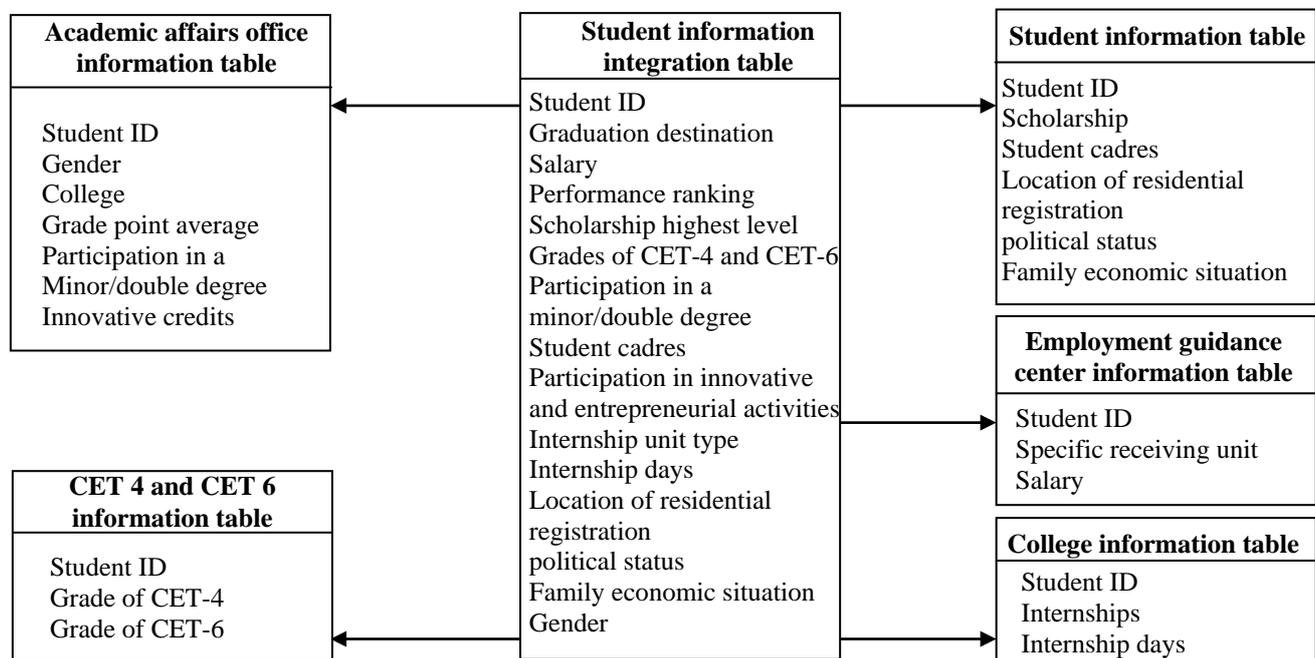


Figure 1. Structure of the data warehouse

2.3. Social Capital

American sociologists Blau and Ducan (1967) [5] explored the influence of personal "pre-endowment factors" (father's education level and father's professional status) and "post-inducement factors" (personal education level) on personal career acquisition in American society. Based on previous

studies, data availability and definition of social capital in Blau-Ducan model, this study chooses the following factors to measure social capital:

- The location of the household registration: which reflects the status of the students in the urban and rural fields, is one of the criteria for dividing the family's status in society.

- Political status: which reflects the student's political capital status and status in the school field.
- Family financial situation: which reflects the financial status of the students' family and their status in the social class.

The two factors of gender and student's college have an important impact on the employment quality of college students, and they are of great significance to the management of colleges and universities. It is needed to list them separately for data mining.

3. IDENTIFICATION OF FACTORS INFLUENCING EMPLOYMENT QUALITY

3.1. Basic Situation of the Research Object

The study objects are the undergraduate graduates from A University, and the 2013-2018 graduates from the School of Management and the School of Economics were selected for the study. Since the on-line information system of each department of A University has been launched, the student's personal information, activity information, graduation destination, salary information and other historical information will be stored in the system. However, due to the different types, purposes and systems of information collected by various departments, students' data are duplicated, stored dispersedly and deposited in various departments. Few people have studied it. Therefore, the factors affecting the employment quality of graduates are a black box, which needs to be explored urgently.

3.2. Data Extraction and Integration

The data tables for different departments and their associations are shown in Figure 1. In this study, the student number is used as the primary key to connect the data tables of different departments. After the completion, the data items related to the data mining task are selected from the data warehouse to form a data set and integrated into a unified student information integration table.

3.3. Data Cleaning and Conversion

In the process of data storage and collection, there are inevitably some erroneous, repetitive and incomplete data. For data with extreme values, duplication and obvious errors, this study will eliminate them; for data with missing values and incomplete data, if it is difficult to obtain relevant information from other similar samples, this study will eliminate them. If relevant information can be obtained from other related samples, this study will be supplemented. On the other hand, in order to facilitate the

research, this study structurally transforms the data and forms a student information table of 3345*15 after processing, as shown in Table 1:

Table 1. Converted Student Information Integration Table

Student's No.	Graduation destination	Salary	Average score point	...
2009050245	Receiving higher education	-	25%-50%	...
2009050246	Foreign-funded enterprises/private enterprises	5000	25%-50%	...
...

Source: This is compiled by the author according to the collected materials.

3.4. Descriptive Statistics

Next, this study will provide a general analysis of the situation of the School of Management and the School of Economics in A University. The quality of employment includes the graduation destination and salary level. The situation is shown in Table 2.

Table 2. Statistics on graduate employment quality categories

Employment quality	Category	Sample size	Percentage (%)
Graduation destination	Government agencies/institutions, state-owned enterprises	1219	36.44%
	Foreign-funded enterprises and private enterprises	1054	31.51%
	Receiving higher education	863	25.80%
	Freelance	209	6.25%
Salary level	High	382	16.80%
	Middle	1501	66.04%
	Low	390	17.16%

In terms of graduation destination, 36.4% of graduates of School of Management and School of Economics in A University hold positions in government agencies/institutions and state-owned enterprises; 31.5% of graduates work in foreign-funded enterprises and private enterprises; 25.8% of graduates choose to receive higher education; 6.2% of graduates choose to freelance. Graduates who are employed within the "institutional system" are more than those who are employed outside the "institutional system", indicating that students are more likely to be employed within the "institution". In addition, more than one-quarter of the graduates choose to receive higher education, which indicates that graduates of the

School of Management and the School of Economics in A University are in urgent need of higher quality education through receiving higher education, which is in line with the general rule of upward mobility of talents. In terms of the salary level, the salary level of the School of Management and the School of Economics in A

University is distributed in an olive form. Among the three levels, the number with the highest salary level is the least, which is in line with the general law and reasonable distribution. The descriptive statistics of the factors influencing the employment quality in this study are shown in Table 3.

Table 3. Factors affecting graduates' employment quality

Influencing factor	Category	Sample size	Percentage
Performance ranking	The top 25%	841	25.1%
	25%~50%	823	24.6%
	50%~75%	828	24.8%
	the last 75%	853	25.5%
The highest level scholarship	Scholarship at national level	179	16.80%
	Scholar at school level	1804	66.04%
	No	1362	17.16%
Scores in CET-4 and CET-6	550 or more in CET-6	617	18.4%
	Passing CET-6	2154	64.4%
	Passing CET-4	477	14.3%
	No passing	97	2.9%
Minor/double degree	Yes	223	6.7%
	No	3122	93.3%
Student cadres	Yes	794	23.7%
	No	2551	76.3%
Participation in innovative and entrepreneurial activities	Yes	1300	38.9%
	No	2045	61.1%
Type of internship units	Government agencies	258	7.7%
	State-owned enterprises	781	23.3%
	Foreign-funded enterprises	656	19.6%
	Private enterprises	1650	49.3%
Internship days	1-31 day(s)	604	18.0%
	32-61 days	1757	52.5%
	62-90 days	600	17.9%
	>90 days	384	11.6%
Location of residential registration	City	1829	54.7%
	County town	844	25.2%
	Rural areas	672	20.1%
Political status	Communist Party member	890	26.6%
	Non-Party member	2455	73.4%
Family financial situation	Difficult	913	27.3%
	Not difficult	2432	72.7%
Gender	Male	1079	32.3%
	Female	2266	67.7%
School	The School of Management	1907	57.0%
	The School of Economics	1438	43.0%

From the descriptive statistical analysis, the graduates from the School of Management and the School of Economics in A University have the following characteristics: the students have a good English level, the willingness to choose a minor/double degree is not strong, and the proportion of student cadres is not high. The proportion of participating in innovative and entrepreneurial activities is not high, the type of internship unit has a certain correlation with the type of graduation destination, and the number of internship days in the enterprise is 2-3 months.

The largest number of students from the city, more than one-quarter of the students from financially disadvantaged families, and the proportion of members of the Communist Party of China are not high; from the gender statistics, the ratio of male to female is about 1:2, which is in line with the characteristics of the liberal arts schools.

3.5. Feature Selection Test

The graduate information dataset has many sources and complex data. The feature selection can effectively eliminate the redundant or irrelevant features of the graduate information data, reduce the number of attributes, reduce the data complexity, and thus improve the accuracy of the model, and lay the foundation for the mechanism of the subsequent research on the influencing factors. The complete data flow and feature selection results of this study are shown in Figures 2, Table 4 and 5.

It can be seen that in the graduation destination feature selection flow, since the individual category in the minor/double degree is too large, the importance index of the internship days is less than 0.95, so it is judged to be unimportant.

Therefore, the factors influencing the students' graduation destination through the feature selection algorithm include performance ranking, the highest level of scholarship, scores of CET-4 or CET-6, student cadres, participation in

innovative and entrepreneurial activities, type of internship unit, location of residential registration, political status, family financial situation, gender, school.

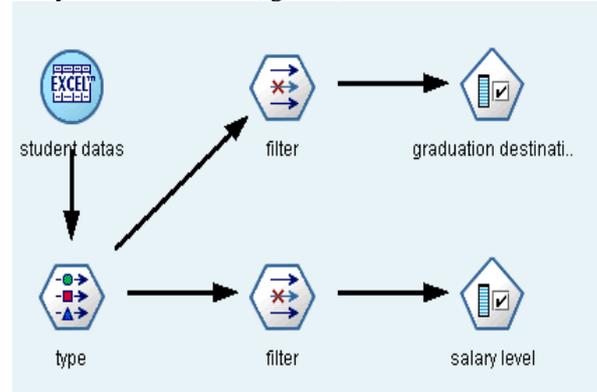


Figure 2. Feature selection process

Table 4. Graduation destination feature selection

Rank	Field	Types	significance	Value
1	Performance ranking	Set	significant	1.0
2	Type of internship units	Set	significant	1.0
3	Family financial situation	Markers	significant	1.0
4	School	Markers	significant	1.0
5	Participation in innovative and entrepreneurial activities	Markers	significant	1.0
6	Scores in CET-4 and CET-6	Set	significant	1.0
7	The highest level scholarship	Set	significant	1.0
8	Location of residential registration	Set	significant	1.0
9	Political status	Markers	significant	1.0
10	Student cadres	Markers	significant	1.0
11	Gender	Markers	significant	0.996
12	Internship days	Set	insignificant	0.664
13	Minor/double degree	Markers	None	None

Table 5. Salary level feature selection

Rank	Field	Types	significance	Value
1	Type of internship units	Set	significant	1.0
2	Scores in CET-4 and CET-6	Set	significant	1.0
3	The highest level scholarship	Set	significant	1.0
4	Political status	Markers	significant	1.0
5	Internship days	Set	significant	1.0
6	Family financial situation	Markers	significant	1.0
7	Location of residential registration	Set	significant	1.0
8	Gender	Markers	significant	1.0
9	Participation in innovative and entrepreneurial activities	Markers	insignificant	0.809
10	School	Markers	insignificant	0.659

Rank	Field	Types	significance	Value
1	Type of internship units	Set	significant	1.0
2	Scores in CET-4 and CET-6	Set	significant	1.0
3	The highest level scholarship	Set	significant	1.0
4	Political status	Markers	significant	1.0
5	Internship days	Set	significant	1.0
6	Family financial situation	Markers	significant	1.0
11	Performance ranking	Set	insignificant	0.653
12	Student cadres	Markers	insignificant	0.066
13	Minor/double degree	Markers	None	None

4. ANALYSIS ON THE INFLUENCING FACTORS OF EMPLOYMENT QUALITY

Through the feature selection test, factors that have a significant impact on the employment quality have been obtained. On this basis, it is necessary to further explore the extent of the impact of various factors on employment quality. Given that the employment quality and its influencing factors are multi-categorical variables (more than two variable categories), multiple logistic regression is

needed for analysis. Multiple logistic regression models can be implemented on Clementine 12.0. The graduation destination and the salary level are taken as the output variables, a multivariate logistic regression model is established to obtain a multivariate logistic regression. Due to the limitation of the layout, this study does not discuss the specific operation of the multiple logistic regression model, but organizes the results into a table. The summary of the impact of various factors on employment quality is shown in Table 6.

Table 6. Summary of the impact of various factors on employment quality

Influencing factors	Employment quality	Impact
Performance ranking	Graduation destination	Students with higher performance have higher probability of receiving higher education
	Salary level	No impact
The highest level of scholarship	Graduation destination	Students who receive a school-level scholarship are highly likely to be employed in government agencies/institutions and state-owned enterprises
		Students who receive national scholarships are highly likely to receive higher education
	Salary level	Students who win the national award have a high probability of obtaining high salary and medium salary
		Students who receive a school-level scholarship have a high probability of getting a high salary, but have a low probability of getting a medium salary
Scores of CET-4. CET-6	Graduation destination	Students with a score of 550 or above in CET-6 are the most likely to choose to receive higher education
		Students who pass CET-6 and CET-4 are the most likely to be employed in government agencies/institutions and state-owned enterprises
	Salary level	Students with high grades of CET-6 and CET-4 have a high probability of getting a high salary
Student cards	Graduation destination	Students who have served as student cadres are more likely to choose employment than to pursue higher education
	Salary level	No impact
Participation in innovative and entrepreneurial activities	Graduation destination	Students who participate in innovative and entrepreneurial activities are highly likely to receive higher education or go to foreign-invested enterprises and private enterprises
	Salary level	No impact
Type of intership units	Graduation	Internship unit is highly correlated with the graduation destination, which

	destination	can clearly distinguish the different graduation destinations
	Salary level	The ranking of the salaries obtained in various types of internships from high to low is foreign-funded companies, government agencies/institutions, private enterprises, and state-owned enterprises
Internship days	Graduation destination	No impact
	Salary level	Students who have had an internship for more than one month in a company have a higher probability of achieving a higher or medium salary than a student within one month of the internship
Location of residential registration	Graduation destination	Students from township/rural areas have a high probability of choosing to work in a foreign-funded enterprise or a private enterprise
	Salary level	Students from urban areas have a higher probability of getting a higher salary than those from township/rural areas
Political status	Graduation destination	Party-member students are more likely to be employed by government agencies/institutions and state-owned enterprises
	Salary level	Party-member students have low probability of obtaining high salary and medium salary
Situation of family finance	Graduation destination	Students who are not in a financially difficult family have a high probability of receiving higher education Students who are in a financially difficult family have higher probability of employment in foreign-funded enterprises and private enterprises
	Salary level	Students who are not in a financially difficult family have a high probability of receiving higher salary
Gender	Graduation destination	Female graduates are more likely to be employed by government agencies/institutions and state-owned enterprises Male graduates are more likely to be employed by foreign-funded enterprises and private enterprises
	Salary level	Male graduates have a higher probability of getting a higher salary than female graduates
School	Graduation destination	Graduates from the School of Management are more likely to be employed Graduates from the School of Economics are more likely to be freelance
	Salary level	No impact

As for the graduation destination, through analysis and induction of Table 4, this study summarizes the mechanism of action of each influencing factor on employment quality as follows:

- (1) The influence of various factors on the employment quality and the direction of action is different;
- (2) Knowledge acquired through school education invests students with rich human capital and high education, who are highly likely to be employed in government agencies/institutions/state-owned enterprises with higher probability of higher salary.
- (3) The skills formed by extracurricular practice have higher probability of students' employment with rich human capital;
- (4) Students with rich social capital are enrolled in higher education, who have a higher probability of obtaining employment in government agencies/institutions/state-owned enterprises, and have higher salaries;
- (5) Personal factors and school factors have an impact on the quality of employment.

5. MECHANISM ANALYSIS

Based on the above data mining results, this study attempts to explore the mechanism of human capital, social capital, personal factors, and school factors on the employment quality of college students, and the following rules are found:

First, there are substitution effects in various factors of human capital and social capital. [6] If students have more human capital, their social capital is relatively lacking; if students have more social capital, the opposite is true.

Second, there are differences in the employment quality, which is the result of distribution after the competition. Although college students have both human capital and social capital, their employment quality is often determined by the relative advantage of their capital rather than the absolute stock. Therefore, the more obvious the students' human capital advantage, the higher the probability of their choosing the graduation destination outside the system, that is, the higher their probability of receiving higher

education and being employed in foreign-funded enterprises and private enterprises, and the higher the probability of obtaining high salary. The more obvious the students' social capital advantage, the higher the probability of graduation destination in working within the system, that is, the higher the probability of being employed in government agencies/institutions and state-owned enterprises, and the lower salary they will receive. If students' human capital and social capital advantages are not obvious, and they are highly likely to be freelancers (including entrepreneurial and unemployed students). Too much endowment of students' personal resources will reduce their entrepreneurial possibilities. Survival entrepreneurship is the passive choice of individuals with limited knowledge resource endowments.

Third, students who are not in a financially difficult family tend to have more human capital and social capital, and the probability that they will obtain a higher salary and medium salary is higher than that of students with financial difficulties, resulting in the intergenerational transfer of capital.

6. POLICY SUGGESTIONS

Based on the above data mining results, this study attempts to explore the mechanism of human capital, social capital, personal factors, and school factors on the employment quality of college students, and the following rules are found:

6.1. Suggestions to the State Departments

(1) Building a fair and transparent employment environment

The study found that employers prefer graduates with certain residential registration or gender. The reason may also be that the employer has discrimination in the process of recruitment in addition to the fact that the position is more suitable for graduates with a certain residential registration or gender. Therefore, the state departments should pay attention to discrimination in the recruitment process and build a fair and transparent employment environment.

(2) Improving innovation and entrepreneurship encouragement policies

More and more graduates choose to start their own businesses. The relevant national departments need to improve the innovation and entrepreneurship encouragement policies so as to provide convenience for graduates to innovate and start businesses, solve the problems of individual employment and development, and ease employment pressure.

6.2. Suggestions to Universities

(1) Improving the construction of information technology in colleges and universities

Each department of the university has some data of students, but lacks integration, and some material data is only in paper version, which is not conducive to preservation and subsequent data analysis. As an important position for knowledge production, colleges and universities should vigorously strengthen the construction of information technology, make the data stored in various departments connected, truly mobilize the data, discover the relevant laws of students through big data, and carry out education and teaching reform.

(2) Strengthening the construction of the teaching staff

Teachers are the key to accelerating education reform and development, improving the quality of education and teaching and the students' employment quality. How to make excellent talents "get in, stay stable, and stay long" is a problem for colleges and universities to consider and solve.

(3) Integrating more practice links into teaching

The skills developed through practice play an important role in employment quality. Therefore, colleges and universities need to integrate more practice links in teaching, and pay attention to the school-enterprise cooperation and the construction of the practice base at the same time, so that students' practical ability and hands-on ability can be systematically improved.

(4) Establishing and improving the system of innovation and entrepreneurship in colleges and universities

China is at a critical stage of development and transformation, and innovation and entrepreneurship are receiving more and more attention. It can be seen from the research that students who have participated in innovation and entrepreneurship activities are more likely to receive higher education or be employed in foreign-funded enterprises and private enterprises. Therefore, colleges and universities need to establish and improve the system of innovation and entrepreneurship in colleges and universities, so that students' ability to innovate and start business can be systematically exercised and improved.

6.3. Suggestions to Teachers

(1) Paying attention to the needs of students, teaching students following their aptitude

For teachers, it is necessary to pay attention to the characteristics of different students, improve students' capital accumulation through teaching, improve teaching methods, and promote students' growth.

(2) Strengthening the practical elements and innovative elements of the classroom

Internship units and innovative entrepreneurial activities have an important impact on the students' graduation destination. Therefore, teachers can integrate more practical elements and innovative elements into the classroom, improve students' practical ability and

innovative ability in classroom learning, and lay a solid foundation for their future development.

(3) Strengthening English teaching

It can be seen from the influencing factors of employment quality that the internship units and the scores of CET-4 and CET-6 have an important influence on the students' salary level. Therefore, teachers should integrate more English elements into classroom teaching, improve students' English proficiency, and lay a solid English foundation for their future development.

6.4. Suggestions to Students

(1) Targeted improving their overall quality

The quality of employment has corresponding requirements for students' human capital and social capital. Therefore, on the one hand, students should pay attention to their academic performance and school performance during the learning process. On the other hand, students should have a full understanding of their own human capital and social capital, and choose the right direction based on their own conditions.

(2) Emphasis on the practice of exercise of innovative ability

It can be seen from the factors affecting the employment quality that internship units and innovation and entrepreneurial activities have an important impact on the students' graduation destination. Therefore, students should pay attention to the practice of exercise of innovative ability, and lay a solid foundation for their future development.

(3) Emphasis on the choice of internship units

The internship units have a great impact on the students' employment quality. Therefore, students should pay attention to the choice of internship units, try to choose the same internship unit as their favorite type, and familiarize themselves with the work process, accumulate experience during the internship, and lay a solid foundation for follow-up education, employment and entrepreneurship.

7. CONCLUSION

Through the analysis above, the main conclusions of this study are as follows:

First, from the point of view of graduation orientation, the influencing factors include grade ranking, the highest level of scholarship, scores of CET-4 and CET-6, student cadres, participation in innovation and entrepreneurship activities, type of internship unit, location, political status, family economic situation, gender and college, but participation in minor / double degree and the number of days of internship has no significant effect on graduation. And from the perspective of salary grade, the most influential factors include the scholarship level, scores of CET-4 and CET-6, type of internship, number of internship days, location,

political status, family economic status and gender but participation in minor / double degrees, participation in innovation and entrepreneurship activities, grade ranking and student cadres has no significant effect.

Second, in terms of the mechanism of action, each factor has different effects on Employment Quality and its direction of action. Students rich in the human capital of knowledge acquired through school education more in higher education, employment in government agencies/institutions/state-owned enterprises, and high compensation rates High; Students rich in the human capital of Skills formed through extracurricular practices have a high probability of employment; Students with rich social capital are more likely to go to school, and are employed in government agencies/institutions/state-owned enterprises, and have a higher probability of receiving high pay; personal factors and school factors have an impact on Employment Quality.

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