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Strategy Research on Employment and Entrepreneurship Guidance Work from the Perspective of Internet of Things

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Abstract: The rapid growth of digital technologies and infrastructures—represented by the ever-expanding Internet of Things, big data, cloud computing, and artificial intelligence—has greatly promoted the vigorous development of the digital economy and injected new momentum into the high-quality growth of China's economy. In light of this, this paper aims to study the strategic frameworks of employment and entrepreneurship (EaE) guidance from the perspective of the Internet of Things. For entrepreneurship and employment guidance, this paper selects college students as the research subjects and uses indicators such as the market entrepreneurial environment and the comprehensive evaluation of IoT projects for data collection and analysis. Additionally, an MSSM algorithm is specifically designed for IoT technology, which can significantly enhance the accuracy of investigation and data processing. According to a questionnaire survey conducted among 176 college student entrepreneurial teams, our findings reveal that seizing the opportunities of the times is a critically important factor for the success of innovation and entrepreneurship (IaE), which strongly indicates the need for guidance strategies that are responsive to technological and market trends.

1. Introduction

The improvement of IaE policy has catalyzed the upsurge of entrepreneurship among Chinese college students, especially the continuous introduction of policies by the state to encourage college students to invest in the tide of IaE. From the investigation and research on the status quo of college students' IaE, it can be found that the current overall education of college students' IaE is not perfect. College students are rarely able to accept the systematic IaE education and training provided by the school, so it is difficult to form a relatively clear entrepreneurial goal, develop good entrepreneurial habits and possess outstanding entrepreneurial skills. Moreover, due to the constraints of current C&U, few college students have the opportunity to participate in high-level entrepreneurial skills competitions, so there are many problems in entrepreneurial practice. This leads to poor risk awareness, insufficient transformation ability, and lack of technological content in entrepreneurial

projects, which makes the transformation of entrepreneurship more difficult.

However, in this case, college students are rarely able to obtain entrepreneurial support from universities and local governments, which undoubtedly increases difficulties for them to start a business. Therefore, for various reasons, college students' own entrepreneurial quality is difficult to adapt to the current tide of IaE, and they cannot get enough help in the social environment, which brings great pressure to college students' IaE. Therefore, it is necessary to analyze the EaE of college students.

This paper mainly has the following two innovations: (1) The main body of this paper is college students, because college students are the main force of employment, and they account for a large part of entrepreneurs. (2) This paper will analyze the reasons for the problems of college students' IaE from the perspectives of college students themselves and their families, society and other entrepreneurial environments, in order to propose reference countermeasures from the root causes.

2. Related Work

There are many studies on employment entrepreneurship. Failla V et al. Aims to challenge conventional wisdom that entrepreneurship is a precarious career path[1]. The quality of entrepreneurship was discussed by Dong B Y et al. They analyzed the impact of the EaE courses of Henan University on the employment of students. They have an in-depth understanding of the current situation of college students' EaE courses, and discuss what approaches schools need to take to solve these problems [2]. Lynn et al. analyzed the returnees in China to discuss entrepreneurship and employment [3]. Mutalipov et al. discussed the situation of small enterprises and private enterprises, and put forward relevant suggestions to improve the employment of the population [4]. Shermukhamedov outlines the theoretical basis for the ability of small businesses to increase labor force participation and the impact of small businesses on the balance of labor supply and demand and increases in per capita income. He also outlines several proposals for stimulating small business participation in job creation [5]. Dutton K et al. aim to review the latest global management developments and point out the practical implications of cutting-edge research and case studies. They investigated whether higher education institutions were preparing graduates to become employees or entrepreneurs. As more jobs face increasing competition and the global economy relies on innovation for growth, it is important to provide opportunities and support for those with entrepreneurial ideas [6]. For the coordinated development of the Internet of Things, Jontz S and others believe that the technology of the Internet of Things should be used to make transformative changes to entrepreneurship and employment [7]. A theoretical framework for trust in IoT scenarios is defined by Bordel B et al., including a mathematical formalization and a discussion on the requirements for satisfying trusted provisioning solutions. The analysis of these needs shows that the blockchain technology fully meets these needs, so they also provide the first trust providing system based on the blockchain network. To evaluate the described solution, they also propose and perform experimental validation [8]. However, there is no analysis of EaE in the relevant research to find the background of joining the Internet of Things.

3. EaE from the Perspective of the Internet of Things

3.1 Status Quo of EaE

This paper believes that there are four factors affecting the employment of college students at present. To sum up, one is government factors, and the other is social factors, including factors such as enterprises, regions, employment environment and so on. The third is the factors of education in colleges and universities(C&U), and the fourth is the factors of college students themselves. The

following is a detailed description and analysis of the reasons for these four aspects, in order to find the countermeasures to promote the employment of college students [9-10].

In the second half of 2001, domestic scholars and experts began to pay attention to the employment of college students. At that time, China was about to join the World Trade Organization, and many experts and scholars began to think about the impact of the WTO on China's higher education reform, and thus touched on the discussion on the employment of college students. Of course, as a special group of college students, the employment problem of college students has become the focus of attention [11-12].

3.2 International Comparison of Employment Quality

Figure 1 Labor productivity and minimum wage levels in major countries (regions) in the world

From the perspective of international horizontal comparison, Figure 1 shows that there is still a big gap between China's employment quality and major countries (regions) in the world. Labor productivity is a key factor in promoting the quality of employment. According to the data of the World Labor Organization, the labor productivity of major countries (regions) in the world in 2019 calculated according to the purchasing power evaluation method in 2011, the first-ranked Luxembourg is six times that of China. Although the labor productivity levels of Hong Kong, China and Macau, China are relatively high, from the perspective of China as a whole, the labor productivity of other major developed countries is one to three times higher than that of China. The increase in labor productivity has further contributed to the growth of labor income and the reduction of working hours. The bar chart shows that the gap between China and the world's major countries in the minimum wage level is relatively large. According to data from the World Labour Organization, the gap between China and major countries in the world was as high as four to eight times in the 2018 minimum wage level calculated by purchasing power parity in 2017.

In addition, by comparing the working hours of major countries in the world, China has a longer working week, second only to Colombia and Turkey, but it was nearly 10 hours higher than the OECD average. The phenomenon of frequent overtime work leads to the deterioration of the work-life balance relationship of employed persons [13].

The level of human capital determines the employability of workers. In recent years, the years of education per capita in China have continued to increase, and the quality of laborers has risen significantly. However, from the previous theoretical review, it is found that human capital includes

education, training, health, migration and other factors, and empirical analysis also points out that years of education are not enough to fully explain individual differences in ability. Therefore, the author refers to the human capital index of the World Bank, and compares the human capital index of China and the world's major digital economies, the human capital indices for China, Singapore, Japan, Germany, the UK, the US and Australia are 0.67, 0.88, 0.84, 0.79, 0.78, 0.76 and 0.812, respectively. Among 157 countries, China's Human Capital Index score ranks 46th.

3.3 Multi-stage Service Semantic Matching Algorithm MSSM

The semantic-based service matching mainly calculates the matching degree of two services according to the semantic relationship between ontology concepts. At present, there are mainly two calculation methods, the concept-based logical relationship and the similarity function-based. The first is inference matching, which is done by determining the logical link between two ontology concepts, such as inheritance, containment, and equivalence. The latter is based on ontology concept tree parameters that influence ontology concept similarity, such as the path length of the two ontology ideas and the depth of the concept nodes. The factors considered and the functional form of construction is different in different literatures, and there is no unified definition [14-15].

(1) IoT service clustering management mechanism

$$E_{residual} = E_{initial} \times (1 - \frac{r}{n}) \tag{1}$$

Among them: $E_{residual}$ is the remaining energy threshold of the node in this round; $E_{initial}$ is the average value of the initial energy of each node; r is the current round; n is the pre-estimated total round.

$$T_{(n)} = \frac{P}{1 - P \times [r \bmod (\frac{1}{p})]} \tag{2}$$

Among them: p is the percentage of cluster heads in all nodes; r is the current round

(2) Decision tree multi-classification algorithm

1) Calculation of information gain

If the value of the sample attribute a divides the sample set T into $T_1, T_2, \ldots\ldots, T_m$, with a total of m subsets, the calculation formula of the information gain is:

$$gain(a) = \inf o(T) - \sum_{i=1}^{m} \frac{|T_1|}{|T|} \times \inf o(T_1) \tag{3}$$

Among them, $|T|$ is the number of samples in the data set, $|T_1|$ is the number of samples in the subset, and the calculation formula of $\inf o(T)$ is:

$$\inf o(T) = -\sum_{j=1}^{s} freq(C_j, T) \times \log_2(freq(C_j, T)) \tag{4}$$

Among them, $freq(C_j, T)$ is the frequency of class C_j of the sample data in T, and s is the number of classes of samples in T.

2) Calculation of information gain ratio

$$gainratio(a) = \frac{gain(a)}{split\inf(a)} \tag{5}$$

$split\inf(a)$ represents split information, that is, the potential information generated by dividing T into h parts. The calculation method is as follows:

$$split\inf(a) = -\sum_{i=1}^{h} \frac{|T_i|}{|T|} \times \log_2(\frac{|T_i|}{|T|}) \tag{6}$$

(3) Service QoE matching algorithm

1) Standardize

The parameter measurement kinds of QoE are primarily single-value type, multi-value type, and interval type, as we discussed in earlier chapters. Numerical and verbal descriptions are the two forms of metric values. A multi-valued type may be thought of as a collection of single-valued types, with the weighted average similarity calculated by adding the similarity of all single-valued parameters. As a result, we will only discuss the calculation techniques for single value and interval value types. Because each parameter's unit may vary, the execution time unit, for example, may be seconds or minutes. The initial step in standardization is to process these measurement value units consistently according to conversion rules, and then to apply various processing techniques to different types of measurement values. Assuming that each advertised service fits the requirements, each service has n parameters, plus one of the requested service's parameters, resulting in a (m+1)*n order matrix to be matched.

$$\begin{bmatrix} Q_{11} & \cdots & Q_{1n} \\ \vdots & \ddots & \vdots \\ Q_{(m+1)1} & \cdots & Q_{(m+1)n} \end{bmatrix} \tag{7}$$

For a single value type, the value can be directly calculated for the value. For textual descriptions, first convert the textual descriptions into numerical values. For example, availability qos has [unavailable, available], which can be represented by numbers [0,1]. The value range of security qos is [first-level security, second-level security, third-level security, fourth-level security, fifth-level security], which can be represented by [1, 2, 3, 4, 5]. For other cases that cannot be enumerated, it can be converted into a numerical type by defuzzification, and then normalized by the following formula.

$$p_{ij} = \begin{cases} \frac{Q_{ij} - Q_j^{\min}}{Q_j^{\max} - Q_j^{\min}}, (Q_j^{\max} - Q_j^{\min}) > \varepsilon \\ 1, (Q_j^{\max} - Q_j^{\min}) \le \varepsilon \end{cases} \tag{8}$$

Among them, $Q_j^{\max}$ represents the maximum value of the parameter measurement value of the jth item of QoE in the matrix, $Q_j^{\min}$ represents the minimum value of the parameter measurement value of the jth item of $Q_j^{\min}$ in the matrix.

$$UP_{ij}=\begin{cases}\dfrac{UQ_{ij}-UQ_j^{min}}{UQ_j^{max}-UQ_j^{min}}, UQ_j^{max}-UQ_j^{min}>\varepsilon\\ 1, UQ_j^{max}-UQ_j^{min}\le\varepsilon\end{cases} \tag{9}$$

$$LP_{ij}=\begin{cases}\dfrac{LQ_{ij}-LQ_j^{min}}{LQ_j^{max}-LQ_j^{min}}, LQ_j^{max}-LQ_j^{min}>\varepsilon\\ 1, LQ_j^{max}-LQ_j^{min}\le\varepsilon\end{cases} \tag{10}$$

UP_{ij} and LP_{ij} represent the upper and lower limits of the interval, respectively.

(4) Weighted summation of similarity of each parameter value of advertising service

$$QoESim(QA,QR)=\begin{bmatrix}SQ_{11} & \cdots & SQ_{1n}\\ \vdots & \ddots & \vdots\\ SQ_{(m+1)1} & \cdots & SQ_{(m+1)n}\end{bmatrix}*\begin{bmatrix}\lambda_1\\ \vdots\\ \lambda_n\end{bmatrix} \tag{11}$$

According to the threshold ψ_d, the weighted average of the similarity of each QoE parameter is screened out and the advertisement service is not less than ψ_d. These services are handed over to the service selection module for further personalized adaptation.

4. The Impact of the Internet of Things on Entrepreneurship and Employment

4.1 Investigation Implementation

The main purpose of this questionnaire is to understand the current situation and existing problems of college students' IaE practice. Therefore, the main contents of this questionnaire include the basic information of the respondents and the investigation of the status quo of IaE.

The basic information includes the age, gender, school situation, entrepreneurial time and team size of the respondents, and mainly to understand the age, gender distribution and team size distribution of current college students' entrepreneurs.

The subjects of this survey were the members of the entrepreneurial teams of college students who settled in the entrepreneurial practice bases of 16 C&U. A total of 196 questionnaires were distributed, 182 questionnaires were returned, and 176 valid questionnaires were obtained. The recovery rate of the questionnaire was 92.86%, and the effective rate of the questionnaire reached 96.70%.

4.2 Sample Descriptive Statistics

According to the questionnaire survey of basic information, we can clearly understand the distribution of the gender composition, team size and entrepreneurial time of the current college students' IaE team.

(1) The gender ratio of college students' IaE

In the statistical analysis of the gender of the respondents, it is found that boys are the main force of IaE of college students, accounting for 71% of the questionnaire, while the proportion of girls' entrepreneurship is only 29%.

(2) Time distribution of college students' IaE

In order to understand the time of college students' IaE, this survey is organized according to two questions: "How long have participated in IaE activities?" and "What is the current student status?" It is found that the IaE time of college students is mostly concentrated in half a year to a year, and most of them are college students who are close to graduation or college students who have graduated for one to two years.

The duration of IaE of college students is mostly distributed between half a year and a year. The number of new startups and startups of more than two years is relatively small, accounting for only 14.2% and 10.2%, which is less than 30% in total.

In addition, the survey on the entrepreneurial identity of college students found that only 13 of the surveyed entrepreneurial teams were college students who graduated more than 5 years ago, and most of the surveyed teams currently starting a business are college students who have graduated for one to two years, reaching 68. It can be seen that the main participants in the IaE activities of college students at present are the students who have just graduated.

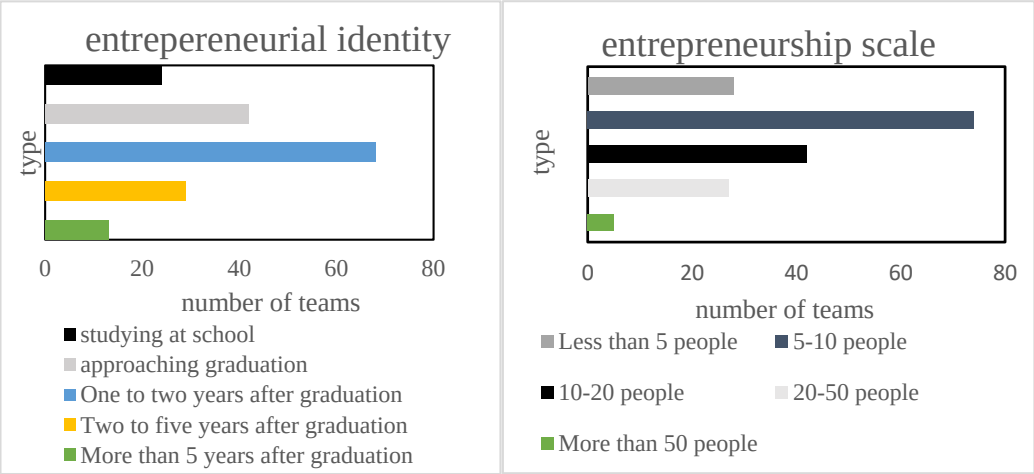

Figure 2 Situation of innovative and entrepreneurial teams

Figure 2 shows that the surveyed regional college students' entrepreneurial teams are generally small in size, concentrated in 5-10 people and 10-20 people, accounting for 42.05% and 23.86% respectively. However, there are fewer college students' startups with a team size of more than 20 people, accounting for only 18.18% in total. It can be seen that the small size of the team is an important feature of the IaE team of college students. The team building and scale expansion of college students in the process of entrepreneurship are often closely related to company operations, and they pay more attention to the actual performance of startup companies. In order to save costs during the start-up period, a small and exquisite entrepreneurial team is the first choice for many start-up college students to start a business.

(3) The direction of IaE of college students in the Internet of Things environment

In order to understand the main fields of IaE of college students, this questionnaire is organized for the question "What is the field of entrepreneurship are engaged in?" The data shows that 20.45% of college students choose software development, 38.07% of college students choose e-commerce, and 18.18% of college students will be engaged in traditional industries. In addition, 23.30% of college students will be engaged in other emerging industries such as cultural creativity and new media operations.

In the analysis of the collected results of the questionnaire survey, the proportion of startup companies in software development is relatively large, reaching 20.45%, and a total of 36 startup companies are mainly engaged in software development. Entrepreneurs of these start-up companies often have technical professional backgrounds in C&U and have certain professional knowledge, so

they will innovate and explore on PC-side software and mobile-side software. In addition, with the current launch of WeChat Mini Programs, many entrepreneurs focus on the development of mini programs in order to realize the timely transformation of entrepreneurial results with the help of existing platforms. Based on the above specific analysis, the current entrepreneurial direction of software entrepreneurship is relatively complex, including social networking, 020 new business model applications, life tools and small games.

(4) Opportunities in the era of "Internet of Things"

The development and improvement of the Internet of Things is an important reason for the promotion of IaE activities in the whole society, because the development of the Internet of Things promotes technological innovation, business transformation, and industry restructuring is the source of entrepreneurship. Therefore, the era of the Internet of Things is an important environmental background for college students to engage in IaE. The opportunity in this era is a very important factor for the success of IaE. The survey was conducted on the recognition of entrepreneurial teams on the impact of "Internet of Things" on entrepreneurial success. The data shows that entrepreneurial teams generally believe that the development of the "Internet of Things" era is very important to the current practice of IaE.

In the answer to the question "How do you think the impact of the 'Internet of Things' on college students' IaE?", 155 startup companies believe that the development of the Internet of Things is important for IaE practice. Only a small number of respondents thought the impact was average.

According to the questionnaire survey of 176 college students' entrepreneurial teams, the main entrepreneurial policies in Hangzhou currently mainly include fiscal and tax incentives, entrepreneurial incubation and special support funds, and entrepreneurial competitions.

5. Suggestions on EaE Guidance Work from the Perspective of the Internet of Things

5.1 Strengthening Employment Guidance to Provide Full Service for Graduates

In order to strengthen students' employment guidance and provide services for students, this work must be an important part of the school's daily management. It is necessary to strengthen the employment guidance and management of graduates, strive to open up the employment market, provide graduates with guidance and services in employment information, employment policies and other aspects, and promote the simultaneous and stable development of employment guidance, full-staff, specialization, and informatization.

5.2 Making Good Use of Financial Support Policies for Entrepreneurship

Most of the funding sources for college students' IaE come from their own investment, mostly family support. While promoting IaE activities, the country needs to pay attention to the current situation of college students' entrepreneurial capital difficulties, and provide multi-dimensional and multi-level entrepreneurial capital support policies. The purpose of higher education students is more to learn a skill, the form of family funding for entrepreneurship is much lower than that of undergraduate students, and the government's support for college students is not biased towards higher students. This makes higher students add more pressure and resistance in the entrepreneurial process.

5.3 Making Good Use of Policies to Drive Employment through Entrepreneurship

"Mass innovation, mass entrepreneurship" is an important strategic layout for the country to promote the innovation and development of the whole society and drive industrial upgrading with

innovation. However, in the tide of entrepreneurship, entrepreneurs can achieve success in entrepreneurship and promote social and economic development only if they have capital, technology and other elements. In order to promote the development of IaE, the state has issued a series of policies, including financial support, tax incentives, and rent reductions and exemptions. In response to the government's call, C&U has also formulated corresponding entrepreneurial policies and provided various software and hardware support for students' innovative activities.

6. Conclusions

Under the Internet+ environment, the direction of college students' IaE has undergone major changes, and Internet-based entrepreneurship or Internet-related entrepreneurial teams have increased significantly. Among them, software development, e-commerce and other creative entrepreneurship are the manifestations of higher students' innovation in the Internet environment. Industrial entrepreneurship has gradually applied Internet information technology and business models, reflecting the new development of IaE of college students in the Internet + environment. Self-quality and entrepreneurial environment are the main factors for the current difficulties faced by college students in IaE. The progress of college students' IaE requires college students to continuously improve their entrepreneurial quality. At the same time, it is necessary for the government, universities, social enterprises, and groups to cooperate in all aspects, coordinate the governance with the government as the center, and coordinate various resources to effectively allocate the IaE resources of college students.

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