Innovation and entrepreneurship model of higher vocational college students based on probability theory statistics

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Abstract

In order to understand the current achievements of vocational students' entrepreneurship, the author creates a model of university students' innovativeness and entrepreneurship. This study analyzes the quality requirements of stakeholders, such as schools and students, for higher education innovation and entrepreneurship education based on research and practical results obtained in Finland and abroad. With the help of probability theory statistics, the relevant indicators are classified, the innovation and entrepreneurship system of vocational educational institutions is built, and the evaluation standards for each indicator are presented. Based on this, the weight of each index is determined and the innovation and entrepreneurship education model of vocational colleges is built. Through the analysis of index scores and total scores at all levels of X Vocational and Technical College and J Vocational College, the total score for innovation and entrepreneurship education at X Vocational College is 3.307 and the total score for innovation and entrepreneurship is 3.307. The education of the J vocational and technical college is 2.743, so the applicability of the model is good.

Keywords: Probability theory statistics; Innovation and entrepreneurship; Business model

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1 Introduction

As for existing research, the academic circle often defines the entrepreneurial practice of ability to college as the core ability to act around entrepreneurial activities in the process of entrepreneurship. Entrepreneurship practices related to the knowledge, skills, abilities, characteristics or motivations that entrepreneurs should possess while carrying out entrepreneurial activities, as available in Figure 1 [1]. So far, scholars agree on the role and influence of entrepreneurial practice ability in the whole entrepreneurial practice, but have not reached a consensus on its constituent factors, impact categories and evaluation indicators. While researching the entrepreneurial practice's ability to greater students, the academic circle attaches something important to screening and analysis of a wide range of entrepreneurship in order to clearly define the characteristics influencing the entrepreneurial exercise's ability of students. The core of entrepreneurial activities is a kind of entrepreneurship, and vocational students are key human resources for entrepreneurship, they play an irreplaceable role in innovation and promote economic growth [2]. Focused on cultivating entrepreneurial competence, we are paying more attention to cultivating the spiritual connotation of self-realization and service from entrepreneurs and improving the quality of entrepreneurship. Research and design by the physical education of entrepreneurial exercise ability to perform based on the performance of entrepreneurial competence, it will promote the focus and continuous improvement of the entrepreneurial exercise ability of vocational students. Entrepreneurship requires a variety of qualities and abilities, and entrepreneurship education cannot be achieved by one or two courses alone, but should be integrated into the whole process of talent training [3]. No matter what kind of entrepreneurial form and activity, entrepreneurs need to combine professional knowledge with innovative thinking and personal quality. Higher vocational colleges need to systematically sort out the composition characteristics of higher vocational students' entrepreneurial competence, conduct a comprehensive survey on different types and projects of entrepreneurship, form a successful case base, and analyze the competency required by vocational students to engage in entrepreneurial activities, the entrepreneurial practice ability should be evaluated in a more practical, detailed and targeted way [4].

Figure 1. Entrepreneurial model

Dong, B. Y. et al. guided colleges and universities to improve the quality of employment and entrepreneurship of college students through current policy changes and analyzed the impact of Henan University's status and entrepreneurship course. All formats, of course, of course, of course resources and ultimately scale, use a process of combining theory and empirical research, including the current state of entrepreneurship and higher education, in-depth analysis of improved
entrepreneurship and student employment. Entrepreneurship and working and discussing how the school process should be used to solve the problem [5]. Duong C et al. The aim is to provide a conceptual framework that can be used to empirically investigate and discover the mechanisms of attention deficit disorder (ADHD) symptoms that affect students' entrepreneurship. Study patterns for 2,218 students in 14 universities in Vietnam. The study concluded that although ADHD symptoms did not directly affect students' perceived viability and entrepreneurship, psychiatric symptoms had a greater impact and significance on the development of the entrepreneur's self-efficacy and perceived reading. In addition, entrepreneurial self-efficacy and expectations have reached mediators of the connection between ADHD symptoms and entrepreneurial intentions. Both perceived desirability and perceived feasibility often tell about the effect of entrepreneurial self-efficacy on entrepreneurial intentions. The results are key insights for policy makers and universities on how to promote the willingness of university students, especially young people, to become entrepreneurs [6]. Sanchez-Torres, J. A. et al. is to investigate some relationships between entrepreneurial attitudes, school environment, entrepreneurial culture and entrepreneurial education to promote entrepreneurship among students. A sample of 3005 questionnaires answered by students from 10 Colombian universities was collected and analyzed using quadratic Equation Modeling Modeling (PLS-SEM). The results showed that the students' awareness of business culture and the more education they receive, the better their attitude towards entrepreneurship. At the same time, it is stated that people's culture has a positive effect on the school environment and the school environment has a positive effect on entrepreneurship education [7].

2 Methods

The understanding and systematic analysis of the complexity of data to some extent increases the way of thinking about data analysis, promote diverse thinking in data analysis. Different fields of inquiry and interdisciplinary analysis continue to expand the scale of current scientific research, further innovate data analysis methods [8]. In the process of analyzing and applying a large amount of data information, probability theory and mathematical statistics can find the main investigation direction of the required data in a short time. There are two application methods of probability theory and mathematical statistics in big data analysis, which are tomographic analysis method and Monte Carlo method. The method of tomographic analysis mainly means that when people study a certain uncertain factor, these factors will influence each other in the application due to its constant change. Qualitative factors can be distinguished according to levels, since uncertain factors at each level include multiple factors, the overall structure of a complex problem will be similar to the multi-level structure [9-10]. In order to solve these problems effectively, the analytical layer structure process method can be applied, in the process of applying the analytical layer structure, it is necessary to divide it into four steps and establish the corresponding mathematical model. The first thing to do is to sort out the different elements of the problem, and since these elements are hierarchical, the overall structure of the problem can therefore be classified as a hierarchy, with elements at higher levels needing to be applied as criteria for elements at the next level. The rating scale is used to improve the application effect of lower elements to higher elements. At the same time, establish a relevant decision matrix and correctly calculate the importance of each element in the problem. After the principle of the analytical hierarchy process, the questionnaire sets the importance of the test index for innovation and entrepreneurship performance in vocational schools as "1,2,2..., 5", etc., the higher the cost of values, the most important [11]. After retrieving the questionnaire, the importance of each index rating of the 12 experts is analyzed and the average number of values is determined (our decimal place has promised). If the ratio of values is indicator 1:2a, the meaning of indicator 2 to indicator 1 is the inverse of one (1/a). According to this, a comparative evaluation matrix (ie "index weight resource allocation table") was developed and the Eigenroot method was used for concrete results
The study takes first-stage indicators as an example to assess the matrix and calculate the ranking of first-stage indicators, the process is available in Table 1.

<table>
<thead>
<tr>
<th>Evaluation of Innovation and Entrepreneurship Education</th>
<th>Environmental assessment</th>
<th>Investment evaluation</th>
<th>Process evaluation</th>
<th>The results of evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental assessment</td>
<td>1.000</td>
<td>1.076</td>
<td>1.058</td>
<td>1.060</td>
</tr>
<tr>
<td>Investment evaluation</td>
<td>0.930</td>
<td>1.000</td>
<td>0.984</td>
<td>0.985</td>
</tr>
<tr>
<td>Process evaluation</td>
<td>0.945</td>
<td>1.017</td>
<td>1.000</td>
<td>1.002</td>
</tr>
<tr>
<td>The results of evaluation</td>
<td>0.944</td>
<td>1.015</td>
<td>0.998</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Step 1: Use the product root method to calculate the geometric mean ($\tilde{W}_i$) of each row of the judgment matrix:

$$\tilde{W} = \left( \prod_{j=1}^{n} a_{ij} \right)^{\frac{1}{n}} \quad i, j = 1,2,...,n$$

(1)

In equation (1), $a_{ij}$ represents the meaning of line i and column j in the original order matrix, n represents the indicators, $\tilde{W}_i$ represents the geometric definition of anyone on the original order matrix:

$$\tilde{W} = \begin{pmatrix} 1.0479 \\ 0.9743 \\ 0.9905 \\ 0.9889 \end{pmatrix}$$

(2)

Step 2: Normalize the geometric means everybody gets the feature vector:

$$W_i = \frac{\tilde{W}_i}{\sum_{j=1}^{n} \tilde{W}_j} \quad i, j = 1,2,...,n$$

(3)

In equation (3), $W_i$ represents the weight of the ith index. n stands for the indicators and $\tilde{W}_i$ for the geometric mean of the ith in a row of the original order matrix [14]. From calculating the weighting coefficient of the first-stage index was mentioned underway:

$$W = \begin{pmatrix} 0.2619 \\ 0.2435 \\ 0.2475 \\ 0.2471 \end{pmatrix}$$

(4)

Step 3: Calculate the highest eigenvalue $\lambda_{max}$ of the judge's matrix:
In equation (5), \( a_{ij} \) represents the main row between me and column \( j \) in the original jury matrix, \( n \) represents the indicators, \( W_i \) the weight of the ith indicator, and \( \lambda_{max} \) represents the highest eigenvalue of the judge matrix [15]. Thus, the more eigenvalue can be considered as: \( \lambda_{max} = 4.000 \).

Step 4: Calculate the same index \( ci \) and the consistency ratio \( CR \), the pattern is underway:

\[
CI = \frac{\lambda_{max} - n}{n-1}
\]  

(6)

When \( n=2 \), the successful inverse matrix of order 2 is always the same, so no consistency is needed. If \( n \) is greater than 2, let \( CR \) be the consistency of the matrix. \( CR = CI/RI \). The price of RI can be found in Table 2 [16]. Supreme Court: \( CI=0.0000 \) is \( n=4 \), \( RI=0.90 \); \( CR=0.0000 \), \( CR<0.1 \), so first-stage index evaluation matrix and consistency as per requirements.

<table>
<thead>
<tr>
<th>betweenness</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>RI</td>
<td>0</td>
<td>0</td>
<td>0.58</td>
<td>0.9</td>
<td>1.12</td>
<td>1.24</td>
<td>1.32</td>
<td>1.41</td>
<td>1.45</td>
<td>1.49</td>
</tr>
</tbody>
</table>

The specific formula of comprehensive evaluation is as follows:

\[
Y = \sum_{i=1}^{28} X_i \times W_i
\]  

(7)

Where \( Y \) is the score, \( X_i \) is the tail of the ith indicator of the third stage of a school, \( W_i \) is the comprehensive weight of the ith index at three levels, and the specific price is available in Figure 2.

![Figure 2. Weight of each indicator of the first-level indicator](image)

Given A system and denoting two events as \( A \) and \( B \), the formula can be expressed as:
\[ p(A/B) = \frac{p(A, B)}{p(B)} = \frac{p(B/A)p(A)}{p(B)} \propto p(B/A)p(A) \]

(8)

Where \( p(A/B) \) is called the posterior probability of Event A, \( p(B/A) \) is the consequence (conditional probability), \( p(A) \) is the previous consequence of the A, \( p(B) \) is the marginal probability of Event B, equation 8 shows the independent variable of \( p(A/B) \) is \( p(A) \) and nothing \( p(B) \). In single model identification, the posterior probability of parameter \( \theta \) is usually expressed as follows.

\[ p(\theta/D) = \frac{p(D/\theta)p(\theta)}{\int_p p(D/\theta)p(\theta)d\theta} \propto p(D/\theta)p(\theta) \]

(9)

Where, \( p(\theta) \) is the prior distribution of the parameter \( \theta \) to be fixed; The output response \( D, p(D/\theta) \) of the field test is the conditional probability distribution given at \( \theta \), usually called the likelihood function.

In a given stochastic system model group \( M \), for the parameter variable \( \theta \) in the model and the output response \( D \) of the field test, the prior probability of \( M_i \) and conditional probability of obtaining test results of each system model are \( p(\theta/M_i) \) and \( p(D/M_i, \theta) \), respectively [17]. Then under the given output response, the posterior probability of parameter variable vector \( \theta (\theta = (\delta_1, \ldots, \delta_n), n \) is the number of modified parameters) is:

\[ p(\theta/D, M_i) = \frac{p(\theta/M_i)p(D/M_i, \theta)}{\int_p p(D/M_i, \theta)p(\theta/M_i)d\theta} = \frac{p(\theta/M_i)p(D/M_i, \theta)}{p(D/M_i)} \propto p(\theta/M_i)p(D/M_i, \theta) \]

(10)

Among them, the prior probability \( p(\theta/M_i) = \prod_{i=1}^{n} p(\delta_i/M_i) \) adopts uniform and unbiased generalized prior distribution. Based on data \( D \), the posterior probability of parameter vector \( \theta \) of the given model group \( M \) is obtained as follows:

\[ p(\theta/D, M) = \sum_{i=1}^{n} \frac{p(\theta/M_i)p(D/M_i, \theta)}{p(D/M)} p(M_i/M) \]

(11)

Where, the denominator \( p(D/M) \) in Equation 11 is the marginal probability distribution of the output response. For a given group \( M \) of random models, this is a definite integral constant [18]. It represents the sum of conditional probabilities of all models in the model group to get response results, which can be obtained through the full probability formula:

\[ p(D/M) = \sum_{i=1}^{n} \int_{\theta} [p(D/M_i, \theta)p(\theta/M_i)d\theta]p(M_i/M) \]

(12)

3 Results and Analysis

In the test, it was concluded that the evaluation system and evaluation of vocational schools' innovation and entrepreneurship education implemented by the authors is directly applied to the evaluation of the quality of innovation and entrepreneurship performance of regional vocational
educational institutions. Based on the results, the state of construction and the existing innovation and entrepreneurship education of vocational schools will be investigated, the weak content of the innovation process and entrepreneurship education will be shared, and concrete measures will be formulated to increase its relevance. On the other hand, it also defines the importance of improving the innovation and entrepreneurship performance of vocational educational institutions under the weight of each index. In addition, it can also be used for the effects of innovation and entrepreneurship science in the main or comparative evaluation of the university's innovation and entrepreneurship education in the same different areas [19]. After the screening process, data will be obtained and the data will be analysed and sorted using the innovation and entrepreneurship model of vocational students, and ultimately personal data such as index values and comprehensive scores will receive every level of Berufs- und Fachschule X and Berufs- und Fachschule J. As is available in Table 3 and Table 4.

### Table 3. Data analysis results (first-level index)

<table>
<thead>
<tr>
<th>The target layer</th>
<th>The comprehensive score</th>
<th>Level indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>J Higher Vocational College</td>
<td>2.743</td>
<td>2.875</td>
</tr>
</tbody>
</table>

### Table 4. Data analysis results (second-level index)

<table>
<thead>
<tr>
<th>The secondary indicators</th>
<th>The target layer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X Higher Vocational college</td>
</tr>
<tr>
<td></td>
<td>J Higher Vocational College</td>
</tr>
<tr>
<td>C1</td>
<td>3.433</td>
</tr>
<tr>
<td>C2</td>
<td>4.010</td>
</tr>
<tr>
<td>C3</td>
<td>2.400</td>
</tr>
<tr>
<td>I1</td>
<td>3.505</td>
</tr>
<tr>
<td>I2</td>
<td>3.217</td>
</tr>
<tr>
<td>I3</td>
<td>3.524</td>
</tr>
<tr>
<td>P1</td>
<td>3.073</td>
</tr>
<tr>
<td>P2</td>
<td>3.331</td>
</tr>
<tr>
<td>P3</td>
<td>3.871</td>
</tr>
<tr>
<td>P1*</td>
<td>2.902</td>
</tr>
<tr>
<td>P2*</td>
<td>2.941</td>
</tr>
</tbody>
</table>

The total scores for innovation and entrepreneurship performance in Vocational and Technical Institution X are 3.307, suggesting that all use of innovation and entrepreneurship education in Vocational and Science X is close to the "general" level. The sources, contributions and processes of innovation and entrepreneurship education are at the "medium level" and the researchers of innovation and entrepreneurship education are at the "medium level" of the first stage indicators. For other indicators, in some studies, the second support environment is at the "general" level, the school uses a "safe" level environment, and the university's entrepreneurship at the "worst" level. In particular, the funding of innovation and entrepreneurship education in this school is close to "average", the transfer level of innovation and entrepreneurship technology services is "poor", and the distribution system of entrepreneurship funding needs to be improved. In addition, the municipality also supports the university's innovation and entrepreneurship education, the establishment of internal financial management institutions for innovation and entrepreneurship education at the university certainly meets the university's needs, and the development of innovative and entrepreneurship education is very complete. The total results of innovation and entrepreneurship education at J University of Applied Sciences are 2,743, which suggests that the overall implementation effect of innovation and entrepreneurship education at J University of Applied
Sciences is close to the "general" level and is still struggling for improvement. Measured by the indicators of the first stage, the environment and investments in innovation and entrepreneurship education are close to the "average" level, the science of innovation and entrepreneurship is "average" and the result of innovation and entrepreneurship education is close to "average", "bad" level. Regarding the key indicators of the second stage, financial funding in these evaluations is less, their income distribution to companies is still insufficient, the situation between changing innovations and entrepreneurship technology services is "bad" and the state's innovation and entrepreneurship education is a "relatively encouraging" level [20]. When evaluating investments, the development of innovation and entrepreneurship teachers is close to the "general" level, the current situation is "bad" and the growth of platforms is close to the "good" level. In particular, the share of innovation and entrepreneurship teachers and full-time guidance teachers in schools is generally low, and the share of other entrepreneurship mentors and teachers with entrepreneurial experience should be improved. The number and scope of the innovation and entrepreneurship foundations and the number of activities related to them certainly correspond to the school's innovation and entrepreneurship education, and the practice of the teaching foundation is "average" open to teachers and students.

4 Conclusion

In the process of ending, there is a big gap between university-company collaborative innovation and entrepreneurship education in vocational schools and traditional theoretical education and education. To change the index of the first traditional scoring method, it's better to change a mindset to evaluate collaborative innovation school-enterprise and entrepreneurship performance in vocational schools. Simplify the valuation process. Research and practice on the structure using the entrepreneurial practice skills of vocational students, it is conducive to theoretical research and research of entrepreneurial practice skills among vocational students, and the research, with its performance and lessons to be useful for universities to enhance the performance of vocational students, and the research, with its performance and lessons to be useful for universities to enhance the performance of vocational students entrepreneurial practice skills.

References