

Evaluation Mechanism of Innovation and Entrepreneurship Capability Based on QFD Capability Analysis Method

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Abstract: E-commerce is a subject set up with the development of times and based on the international business transaction mode in the universities. These decades, China has vigorously implemented a package of incentive policies for students to involve in employment in attempt to drive the industry innovation. For the purpose of improving the culture efficiency of students' e-commerce innovation and entrepreneurship, this paper aims to conceive an analytic model for this filed with the QFD as a capacity analysis method, and four elements of startups as capacity evaluation indices.

Keywords: e-commerce, innovation and entrepreneurship, QFD capability analysis

1 Introduction

In recent years, with the rapid development of Internet, the number of Internet users in China has been growing at an amazing speed every year. E-commerce has developed rapidly in China^[1,2]. The dramatic development in the field of information technology has led to the transformation of the world economy industry. The e-commerce industry has gradually become an indispensable transaction model from the "pilot" at the outset. E-commerce features accessibility and data integration. If China intends to stabilize its international position in the e-commerce industry, it is essential to cultivate a body of cutting-edge e-commerce talents to improve the real value of domestic e-commerce industry^[3]. Given the innovative features of e-commerce industry, most universities show more concern for cultivating their students' start-ups when carrying out e-commerce programs so as to intrigue students' passions to initiate a good trend of "start-ups for employment"^[4]. However, students must be cultured on the basis of principles, a special competence analysis model should be used by universities to conceive a prospect of startups that students should have as an explicit goal to improve the cultivation quality in this respect^[5].

For universities who target at talent cultivation, one of the important ways students' competencies to innovate and start up a business got improved is to devise and construct a skilled analytic method based on the premise that students' competencies for innovation and entrepreneurship are definite, thus to timely test students about their startups from the professional

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and objective perspectives^[6]. In this way, students' skills in a certain field will be improved for the purpose of improving startup performance^[7]. In this paper, QFD model is introduced as the main clue to construct a recurring analysis model on the premise of analyzing which indices affect the innovation and entrepreneurship of students majored in e-commerce discipline^[8].

2 Brief analysis of indices for evaluating e-commerce students' skills in start-ups

2.1 Domain knownow

Although the entrepreneurship pertains to a kind of activities based on industrial innovation, the subject for evaluating the competencies of students majored in e-commerce to innovate and start up a business directs to students themselves^[3, 9]. The competence analysis fuses professional knowledge about e-commerce with actual evaluation values. In particular, e-commerce is an emerging discipline set up based on the Internet and computer technology^[10]. Only when students have professional and proficient e-commerce knowledge can they march the first pace toward start-ups^[11]. If students want to develop their own skills at the innovation and entrepreneurship with the help of the teachers in universities, they should also start with consolidating their expertise and "cultural heritage" in the start-ups. The professional knowledge in E-commerce innovation and entrepreneurship are divided into two major parts^[12]. One is the technology component, which is in turn classified into network application, application development, big data management and system construction and maintenance. This part works in concert with the "e-commerce" characteristics. When a student is skillful at this area, one will be able to save most of the time cost while starting up the business^[13]. The other is the comprehensive business part, where the cultural content that students should master is complex, for example, e-commerce introduction, e-commerce laws, Internet marketing, logistics supply chain, etc., so that students are qualified for initiating "business" activities^[14].

2.2 Innovative spirits

Entrepreneurship is the first element which builds up students' career awareness, while it is just the part that universities should strive to develop^[15, 16]. Entrepreneurship includes two factors, one is career awareness, that is, whether students have the intention to carry out or understand entrepreneurial activities. This part is also known as Entrepreneurial Initiative^[17]. The other is the entrepreneurship basics. This part represents basic ideas of entrepreneurship, channels required for entrepreneurship, resources and so on, namely, it belongs to the "clarity" level of students' consciousness^[18].

2.3 Integrative entrepreneurship competence

Integrative entrepreneurship competence refers to a series of regulatory and communication capabilities such as team management, human resources management, interpersonal relationships, public relation regulation, crisis relation adjustment^[19]. It is an integrative competence that students must have when carrying out works in the future. Analysts can use it as a core analysis option when analyzing the e-commerce majored students' skills to innovate and start up the business^[20].

2.4 Entrepreneurial experience class

Entrepreneurial experience class actually refers to the simulation games students involved in campus. Entrepreneurial experience does not have the actual profitability attribute, but during the time when students involve, they basically carry out the activities based on the formal entrepreneurial process^[21, 22]. Therefore, in evaluating students' competencies in the regard, the students' scores of virtual entrepreneurship experience can also be used as the main evaluation content, for example, some business proposals, business management, project operations, foreign negotiations and other content can be written into indicators for analyzing students' competencies to innovate and start up the business. The map of evaluation indicators affecting e-commerce students' competencies of innovation and start-ups is shown in Fig. 1.

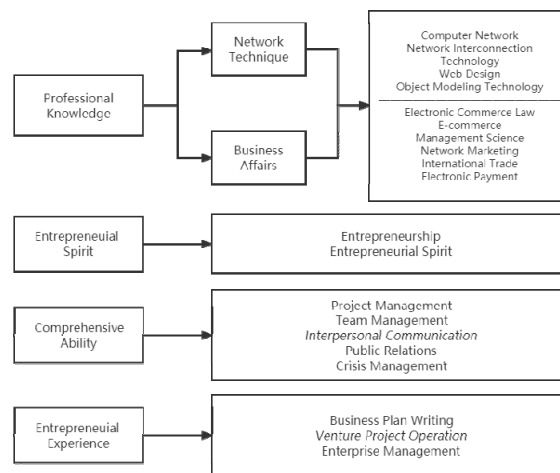


Fig. 1. Evaluation index map of innovative and entrepreneurial ability of electronic business students

3 Construction of QFD-based Competency Model for e-commerce majored students' skills in both innovation and start-ups

3.1 Description of QFD model concept

The QFD model is a quality-driven approach that focuses on the demands of consumers for the purpose of improving its own industries in the development phase with evaluation indicators affecting customer changes in the market^[23, 24]. The advantage of this model is that it enables to adjust parameters and basic functions of evolutionary product based on customers' macroscopic requirements for the product quality and modality, as a product optimization activity with customer demand as starting point. It features that the quality optimization process can be ended up before the product appears on the market rather than improving the quality according to market feedback launched in the market^[25, 26]. Therefore, the QFD model has a pre-production stop-loss advantage in time, while the analytic model based on reference indicators can also effectively improve the veracity of the integrative competence analysis on the

products, make the commitment to product quality at the level of infinite market demands, thereby maximizing the competitive advantage in the market^[27]. The competencies of students' innovation and entrepreneurship in e-commerce major can also be regarded as the cultivation of "commodities". Therefore, the competent analysis "before launching on the market" is the best way for universities to effectively adjust the product quality^[28].

3.2 Fusion setting of QFD model and student start-up competency evaluation indices

Here takes the analysis of students' competencies in e-commerce as major goal, e-commerce expertise students should have is set to CR_i; the relative importance of competency to entrepreneurial activities of students in the future is set to W; based on the above settings, we can assume W_i represents the degree of importance of the competency ⁱ[29]. We can derive estimates of single competency without regard to numerical weights of competency. EC_j represents the students' evaluation index of students' practical innovation and entrepreneurship; X_j represents the actual value obtained by calculation. J represents the option of indices corresponding to the numerical values; R denotes the relationship matrix between student competency and evaluation index; P is used to indicate the autocorrelation matrix of evaluation index. Then it follows that when we want to analyze the degree of association between Kth EC and Jth EC, P_{kj} can be used to express it. H represents the relative importance of student innovation and start-up competency evaluation indices to student competency assessment, which has long-term observational attribute. We can interpret it in such a way that H represents the actual ratio of quality improvement to "product" specification quality when universities improve students' competencies based on analysis results. C_i represents the output value of the competency analysis model, namely, the estimates of students' competencies to innovate and start up the business in e-commerce^[30]. The analytical model for students' innovation and entrepreneurship competencies based on the QFD is shown in Fig. 2.

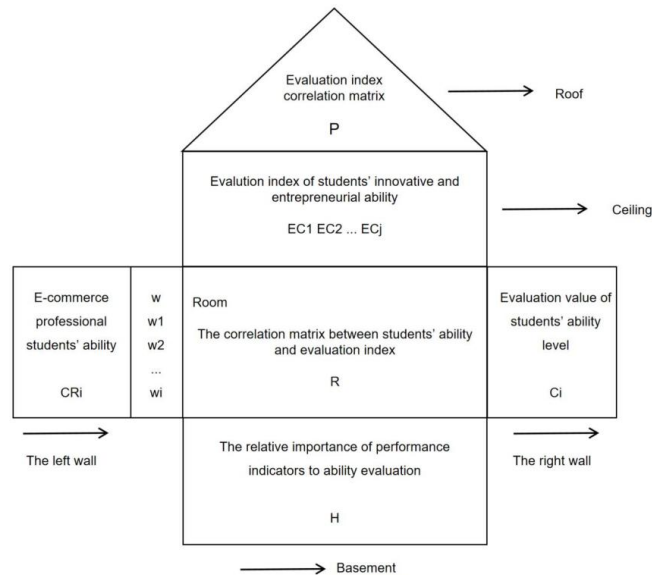


Fig. 2. Analysis model of innovative entrepreneurial ability of electric business students based on QFD

3.3 Data collection

The data collection is subjected to the will of university. In general, classes or departments are taken as a unit to evaluate the integrative competency of students in e-commerce major with students' final scores as reference sources, and evaluations on students' classroom performance given by teachers responsible for entrepreneurship and e-commerce curriculum as reference points. When the staffs from universities can confirm the data source, students' integrative competency can be evaluated with QFD model. Specifically, expert investigation method can be chosen to ensure the credibility of selected data results by enhancing the subjectivity of investigation. After the above method and data sources are determined, the universities can adopt the "four-level scale" as the scoring standard of the correlation. The numerical distribution can be set as "9, 3, 1, 0", which represent the strong and weak correlation, i.e. "9" is strongest, "0" is weakest. After the experts mark the scores, the final correlation value should be calculated by average value.

3.4 Competency analysis procedure

3.4.1 Standardization of data

Students' final grades in this subject are usually taken as the data source. As the final scores tend to show different orders of magnitude, a certain operation error will occur if data is unprocessed and used directly. Therefore, when the number of subjects in competency analysis is huge, the analyst can standardize data by the formula as follows:

$$x_j = \begin{cases} \frac{l_j^{\max} - l_j}{l_j^{\max} - l_j^{\min}} \\ \frac{l_j - l_j^{\min}}{l_j^{\max} - l_j^{\min}} \end{cases} \quad (1)$$

3.4.2 Calculating relative importance of competency analysis options to competency analysis

Among different evaluation indicators, the response to student's competency also shows different phenomenon. Therefore, it is important to determine the importance of different options in the process of competency analysis. In this regard, experts can evaluate the relative importance of students' competency analysis by the following formula after establishing the correlation matrix based on the above indicators:

$$v_j^i = \sum_{j=1}^m \sum_{k=1}^m r_{ik} p_{kj} \quad (2)$$

Where, v_{ij} represents the importance degree of indicator j relative to competency evaluation i . The formula can have further variants as follows, which directly calculate the importance of each indicator:

$$h_j^i = \frac{v_j^i}{\sum_{j=1}^m v_j^i} \quad (3)$$

3.4.3 Analysis of students' competencies

In general, after standardized data and relative importance values are available, the last loop of competency analysis can be carried out by analyst based on the formula. However, it should be noted that, in order to facilitate the professional work of e-commerce, our staff can make the final calculation results be treated as a percentage by the formula as follows:

$$C_i = 100 \times \sum_{j=1}^m h_j^i x_j \quad (4)$$

4 Conclusion

The QFD Capability Analysis Method offer a more comprehensive consideration of factors influencing innovation and entrepreneurship capability. It may outperform existing mechanisms by incorporating a wider range of variables, ensuring a more holistic evaluation. The utilization of QFD suggests a quantitative approach to capability analysis. This quantitative precision can provide a more accurate and objective assessment compared to qualitative methods employed by some existing frameworks. The proposed mechanism may be designed to be adaptable to the dynamic nature of the e-commerce industry. This adaptability can be crucial in capturing and assessing the rapidly evolving trends and technologies within the e-commerce ecosystem.

5 Findings

This paper proposed evaluation mechanism based on the QFD Capability Analysis Method stands out through its comprehensive, quantitative and adaptable nature, offering a unique perspective tailored to the specific challenges and dynamics of the e-commerce industry. This can significantly contribute to advancing the field of e-commerce innovation and entrepreneurship. This paper makes an exploratory initial study on the analytical model for students' competency to innovate and start up a business in the e-commerce industry with the QFD model as the main clue. We hope that the analytical model constructed in this paper can play a supporting role for some relevant universities in the analysis of students' innovation and start-up competencies.

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