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Application of QFD on Planning courses of Industrial Engineering

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***Abstract*—Courses are the link between teachers and students. The matching degree of the curriculum and the students' future development largely affects the future competitiveness of students and students' satisfaction with the school specialty. Based on industrial engineering specialty of Nanchang University, this article applies fishbone diagram to analyze the direction of students' future development, and uses questionnaire to collect students' preference of the future development, and analyzes the collecting data by AHP (analytical hierarchy process). Combining with the weight of the direction of future development and the importance of courses, we find a new combination of curriculum and a plan of rearrangement. By comparing the results with the existing curriculum program, we ultimately find a more scientific way to rearrange the curriculum.**

***Index Terms*—Industrial Engineering; Quality Function Deployment; the House of Quality; AHP**

I. INTRODUCTION

Industrial Engineering (short for IE) was established in United States in the 20th century. It is concerned with the way to raise manufacturing firm's production efficiency, products' quality and reduces the operation cost. In china, IE undergraduate courses' goal is to make undergraduate students owning engineering technology and management knowledge so that they can meet the modern manufacturing industry developments' needs, and be good at modern enterprise operation management. Students are required to grasp a good knowledge of Production System Design, Project Management, Quality Control and Reliability Project, Human Engineering and Work Design, Economic Analysis, Management Information System and so on. However, different works have diversity requirements for undergraduates and they vary from time to time.

As a discipline established overseas, it was very late when Chinese Universities have the Industrial Engineering specialty, 60% of them started to recruit the student after entering the 21st century. But IE and the recruited student's quantity actually are growing by leaps and bounds. Taking Nanchang University —where the authors study in for example, the number of IE specialty's students recruitment of grows from 50 people in 2006 to 80 in 2007, and finally reaches to 117 people in 2008. Along with employment prospect's favoring and social demand's increase, this specialty is chosen by more and more students.

For the social demand's unceasing change, as the same with some other disciplines established newly, to satisfy student's future development and to achieve social approval, the curricula of IE are improving unceasingly. Students used to mainly deal with engineering design, engineering mechanics, electronic technology, mechanism and other project knowledge for manufacturing work, now it has absorbed some disciplines from management and computer science such as Systems Engineering, Behavioral Science, Bata Base, which will thus satisfy service industry's demand well.

However, not only the demand of society should be involved in the consideration of curricula' establishment, but also the needs from students in school and the feedback of students at work. Thus, IE will enhance the student theoretical knowledge reserve, and improve students' satisfaction, strengthen students' competitive power in society as well. Since there are more and more students choose IE, but its curricula are not thorough, this article will deal with the problem of how to arrange IE's curricula to fully satisfy student's employment demand under the limitation of teacher resource.

Education is a service process between teachers and students. In some sense, the relationship between the teacher and the student is supply-demand, just as the enterprise and customer. What the teacher provides is the knowledge and the experience which can be regarded as product and will be the necessary skill of students in the future life. Although the form is different, in materially the two is consistent, teachers are the service provider and students are the service receiver. Based on the concept of service's grade, the education quality is also one kind of service's grade, which should also be valued from the sense of service receiver's need (i.e. embark to student need). Therefore, the Quality Function

Deployment (short for QFD) tool which is widely used in the business management is suitable here to solve the IE curriculum arrangement problem, and our goal lies in satisfying well the students' requirements.

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II. LITERATURE REVIEW

Curricula research has been done for a period of time, and a lot of domestic scholars have discussed on it. After researching on the previous literatures, we found that:

Xu Hongyi, Ouyang Mingde discussed the standards which can be used in assessment of the existing curriculum in "The Research of System of Industrial Engineering Curriculum", but their analysis are qualitative description and the arrangement is not accurate.

In “A Comparison Research on IE Undergraduates’ Specialized Course Plan in Domestic and Foreign University”, Gia Guozhu has carried on the comparison of domestic curriculum related to industrial engineering to foreign universities, has conclude each school’s superiorities and inferiorities. We can attain the development direction of domestic curricula from it.

Ma Jinshan, in the “The Optimization of System of Industrial Engineering Curricula” analyzed the current situation and the future development direction of Industrial Engineering, pointed out that technology and theory are equally important to students’ ability training, and gave relevant proposals of the teaching matters needing attention and guidance to graduation thesis. However, his research is also qualitative.

Xiong Wei, Gong Yu in “Teaching Design of University Courses based on QFD” analyzed the university curriculum, and developed the teaching quality function deployment model (TQFDM) with its own unique characteristics, which set a initial example for the later researchers. Whereas they merely concerned on the needs of students when they are in school, the situation when they face the employment is not included.

Ding Zhigao in his “Raised System Research of Undergraduate student in Pedagogical Colleges and Universities based on the QFD under New Class Standard” has conducted the analytical study of the pedagogical curricula, but this article's demand analysis involved was student's comprehensive quality development, simultaneously has not embraced students’ future demand when they leave school. And in Song Lili, Zhao Suhua’s “The Satisfaction Research for University Special Course Establishment based on QFD”, there is a same flaw.

Song Lili, Dou Chunyi in "The Application of QFD in the Assessment of the Curriculum in University" applied QFD to research the existing curricula and conduct accurate evaluation about the importance of existing curricula to the students’ ability training. But in their appraisal they had not considered the degree that these conforms to student's demand, therefore has weakened the conclusion’s usability to a certain extent.

These articles had their own methods to deal with the curricula, but they had not given the concrete quantitative method to provide the reference for the curricula establishment, which only made a qualitative analysis. Based on the previous researches, we found a new way to rearrange specialty curricula. This article took Industrial Engineering specialty of Nanchang University for example to introduce the method of rearranging curricula with QFD.

III. RSEARCH METHODOLOGY

A. Quality Function Deployment Technique and House of Quality (Quality House)

Quality function deployment (QFD) is a “method to transform user demands into design quality, to deploy the functions forming quality, and to deploy methods for achieving the design quality into subsystems and component parts, and ultimately to specific elements of the manufacturing process.” as described by Dr. Yoji Akao, who originally developed QFD in Japan in 1966,

QFD helps transform customer needs (the voice of the customer) into engineering characteristics (and appropriate test methods) for a product or service, prioritizing each product or service characteristic while simultaneously setting development targets for product or service. However, House of Quality (Quality House) is not QFD, it is a part of the Quality Function Deployment and it utilizes a planning matrix to relate what the customer wants to how a firm (that produces the products) is going to meet those wants, which is more quantitative and visualized by starting the binary matrix chart [1].

By quantitatively analyzing the degree of correlation between product features and customer wants, we find the key engineering features, increase cross functional integration within organizations, making the product design be more specific to reflect customers' desires and tastes, enhance customer satisfaction [2]. A general Quality of House can be seen in figure 1.

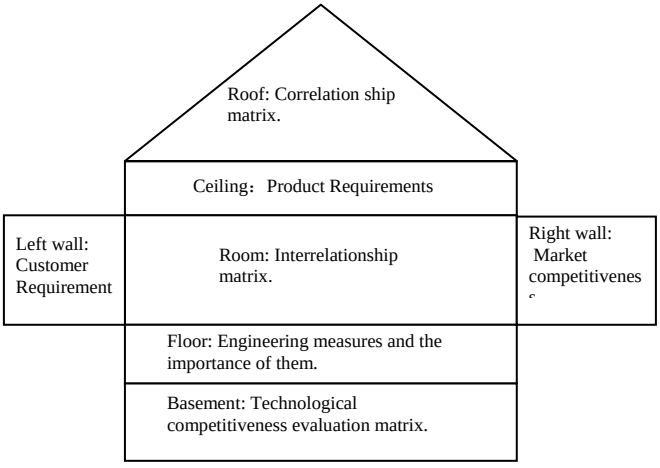

Figure 1. A general Quality House

In this paper, because the object of the analysis is the curricula, we make the following adjustments:

In the Quality House showed in Figure 2, the meaning of each sector are illustrated as follows:

a) Left wall: The directions of the students’ future development.

Students have different directions for the future. Generally, these requirements can be divided into some common kinds, which can reflect the most students’ preferences for the future. Based on the questionnaires

and brainstorm, we can use the fishbone diagram to analyze and classify, then choose the most typical cases.

First, investigate some graduates and teachers to searches the common jobs or directions for the graduates of one specialty, and then list them to inquire all of the undergraduates. Every respondent is required to choose a score for a certain direction or job, 5-1 marks represents different degree of desire, 5 marks means a lot, 4 marks means much, 3 marks represent some, and 2 marks means a little, and 1 means little. At last, list the mean score of every direction in descending order and the fronts of it are chosen. Furthermore, we can get the weight of each curriculum from the scoring based on AHP.

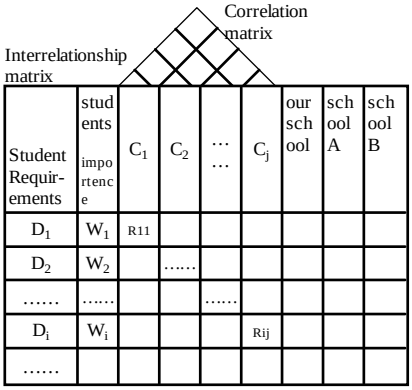

Figure 2. A House of Quality for curriculum arrangement

Note: D_i are the directions of the students' future development. W_i are the importance of students' future directions, C_j are the corresponding curricula, a_{ij} are the interrelationship between D_i *and* C_i

b) Ceiling: Curriculums.

When disposes the IE curricula, we should pay attention to satisfy the following three conditions: first, to be adapt to the future's job, students can attain the necessary knowledge form the IE disposed curricula; second, every curriculum is available, namely, such curriculum has been taught in some school previously and there are qualified teachers in the school to teach.; third, the required corresponding equipments a one curriculum are available.

c) Room: Relationship matrix between curriculum and requirements.

It is a $i \times j$ matrix, where i is the number of directions of the students' future development, and j is the number of curricula. R_{ij} is the value which describes the relativity degree between i direction and j curriculum.

We obtain the R_{ij} by investigating and visiting IE's graduates and teachers. They are a mean value from 0 to 100. The larger the value is, the more relativity, which is similar to the students' direction importance.

d) Roof: The correlation matrix of different curriculums

In the real implementation process, we must consider the correlation between curricula, such as the curriculum study period, the curriculum program and the teaching request, and stipulated that the contents introduced of each present curriculum, and the extent of introduction; the connection between different curricula plays a significant role in maintaining the whole curricula system a containing technical and the management one, for instance, in one of the Operations Research chapters the inventory theory will be introduced specially, but the Operation Management also have a chapter to explain the inventory control. Hence, the roof to express how does the course time and course content link.

e) Right wall: Competitive assessment

In common use, the right wall sector is competitiveness assessment which is applied to determine the weight of each D_i by comparing different schools' curricula configuration and the different future directions of students. The step is accomplished in the left wall sector as we didn't collected enough data of other similar schools. But with the brainstorm and investigations, the weight can also be obtained and effective, which can be a new idea in the House of Quality. Hence, we will not discuss this sector in the following sections.

f) Part of the basement: a output matrix the results of comparison

The basement of output matrix is the results of comparison between the teaching effectiveness before improving and the teaching effectiveness after improving, it need a long time to collected the relevant data after improvement program implementation. Due to the time limitation, house of quality was reduced in this article, which means to cancel the basement of output matrix. Though omit the right wall and part of the basement, it does not affect the final data analysis and final effectiveness of the program, they just play a supporting role in the whole house.

Above all, the established Quality House in QFD is used to transform accurately as far as possible students demand can satisfied through the teaching or the practice. The mission of curricula arrangement primarily is transforming the students' future demand into the teaching process. And based on the appraisal of students, we know which curriculum should be added and which curriculum should be dismissed or even pay a more important role.

B. AHP

Professor T.L. Saaty, at the University of Pittsburgh, put forward AHP (analytical hierarchy process) in 1973 [3]. AHP is a combination of qualitative analysis and quantitative analysis which is used to analyze the multi-objective and also is a multi-criteria powerful tool for large complex system [4]. Since the theory has been widely used in practical applications, it will not be introduced in this paper.

C. Fishbone diagram

Fishbone diagram are diagrams that show the causes of a certain event -- created by Kaoru Ishikawa (1990). Common uses of the fishbone diagram are product design and quality defect prevention, to identify potential factors causing an overall effect. Each cause or reason for imperfection is a source of variation. Causes are usually grouped into major categories to identify these sources of variation.

The most common method in finding the causes is brainstorm, it is a through group activity, gathering ideas from various angles wisdom, to identify problems all reasons or components of the meeting method

In this paper we use it in the investigation to find the most popular future direction preferences.

IV. MODEL DESCRIPTION

A. The current Curriculum configuration

The course system of the profession in Nanchang University is mainly made of three modules: the core curriculum, the discipline core course and the guiding elective course. Having did some actual survey and inquiring instructor, we composite the contents in class, the role that the related subjects play in the Industrial Engineering, the reasonable degree of the course arrangement. Since the setting of the discipline core course and the guiding elective course is restricted by credit and class hour, and some curricula are not related to the Economy and Management College. It needs many colleges to coordinate once we need to adjust, such as the Fundamental of Machine Making. In addition, this passage only analyses the requirement of graduates, not the requirements of the abilities needed in the university. So we don't analyze the core curriculum, we put the key point on the guiding elective course, which play an important role in selecting the student's own major and employment company. We also make complement and improvement on the shortcomings.

There are several guiding elective courses currently in IE specialty of Nanchang University, which are Engineering Economics, Production and Operations Management, Cost Analysis, Strategic Enterprise Management, Computer Graphics, Financial Management, Quality Management and so on. We may add more diversity courses to meet students' requirements or change some, this is determined by investigation.

B. Students' requirements and their importance

a) Students' requirements

First, focusing on students of industrial engineering, the students raised the possible directions of future development by using brainstorm. At the same time, we survey the graduated students to collect the corporate department and the research direction of industrial engineering graduate. Then we classified the data by the fishbone diagram, as show in Figure 3.

From figure 3, we found that the future development of the students can be divided into (D_i , $_i$=1,2…9): Quality Management and Control(QMC); Supply Chain Management(SCM); Management Information Systems(MIS); Industrial Engineering(IE); Human Factors Engineering(HFE); Work Study(WS); Production Planning Department(PPD); Cost Analysis Department(CAD); Logistics Control Department(LCD).

When determine the weight of the students' future direction，they will be filled with rows and columns to form 9×9 square in the questionnaire.

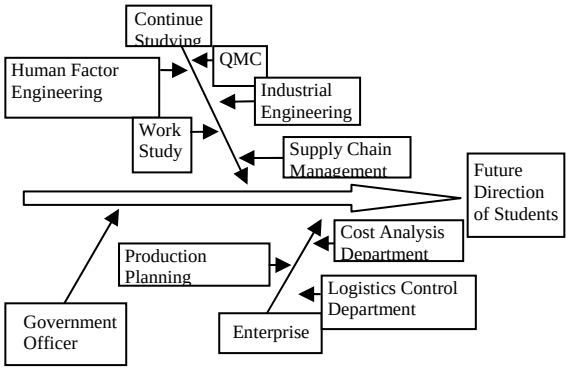

Figure 3. The fishbone diagram of students' future directions of development

Referring to the current curricula and other schools' practice, especially the investigation of the graduates, students can receive the corresponding knowledge from the following curricula for their future's development:

C_1 Engineering Economics, C_2 Production and Operations Management, C_3 Cost Analysis, C_4 Strategic Enterprise Management, C_5 Computer Graphics, C_6 Financial Management, C_7 Quality Management, C_8 Supply Chain and Logistics Management, C_9 is Computer Simulation Software, C_{10} Senior Office Software Application, C_{11} Interpersonal and Communication Skill.

They are all involved in the ceiling sector.

b) The importance of the students' requirement(Wi)

The judgment matrix is made a relatively improvement, because it changed the relative importance of the assignment which used to take only two values 0 and 1[5]. And now we determine the direction's different importance based on the AHP method.

First, evaluation will be arranged in an M×N square as follows:

$$A=\begin{pmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{pmatrix}$$

In which, a comparison matrix representatives, a_{ij} behalf of i-line students' future direction relative to the direction of the column j relative importance. The rows and columns of matrix are arranged in the same order, namely: Quality Management and Control(QMC), Supply Chain Management(SCM), Management Information Systems(MIS), Industrial Engineering(IE), Human Factors engineering(HFE), Work Study(WS), Production Planning Department(PPD), Cost Analysis Department(CAD), Logistics Control Department(LCD). Therefore, the matrix is a 9×9 square, with the following properties:

$$a_{ij}=1; a_{ij}=a_{ji}; a_{ij}=\frac{a_{ik}}{a_{jk}}, (i, j, k=1,2,3,\cdots n)$$

With comparison between two indicators to determine the size of the matrix element values: extremely important, strong important, obviously important,

somewhat important, equally important, namely to give 1, 3, 5, 7, 9; otherwise give 1, 1 / 3, 1 / 5, 1 / 7 and 1 / 9;

The second step, after the survey of industrial engineering students in School of Economics and Management of Nanchang University, preliminary data can be obtained by using the weighted average method to process it. Then we can draw the following comparison matrix：:

$$A=\begin{pmatrix} 1.00 & 2.45 & 3.50 & 1.21 & 1.31 & 1.95 & 1.83 & 2.03 & 1.71 \\ 0.41 & 1.00 & 2.84 & 1.44 & 1.34 & 1.70 & 2.56 & 2.54 & 3.40 \\ 0.29 & 0.35 & 1.00 & 1.07 & 1.36 & 1.03 & 2.01 & 2.23 & 1.83 \\ 0.83 & 0.69 & 0.93 & 1.00 & 2.82 & 3.83 & 4.22 & 3.76 & 4.67 \\ 0.76 & 0.75 & 0.74 & 0.35 & 1.00 & 1.86 & 2.22 & 2.21 & 3.20 \\ 0.51 & 0.59 & 0.97 & 0.30 & 0.54 & 1.00 & 2.71 & 2.42 & 2.74 \\ 0.55 & 0.39 & 0.50 & 0.24 & 0.45 & 0.37 & 1.00 & 1.70 & 2.33 \\ 0.49 & 0.39 & 0.45 & 0.27 & 0.45 & 0.41 & 0.59 & 1.00 & 2.72 \\ 0.58 & 0.30 & 0.55 & 0.21 & 0.31 & 0.36 & 0.43 & 0.37 & 1.00 \end{pmatrix}$$

The third step is to find elements of the geometric mean of each row, that is:

TABLE I. GEOMETRIC MEAN THE RESULTS

W_1'	W_2'	W_3'	W_4'	W_5'	W_6'	W_7'	W_8'	W_9'
1.77	1.64	1.03	1.96	1.18	0.98	0.64	0.58	0.4

Then we get vector$\overline{w}$:

$$\overline{w}=w_i^{'}=(1.77 \quad 1.64 \quad 1.03 \quad 1.96 \quad 1.18 \quad 0.98 \quad 0.64 \quad 0.58 \quad 0.41)^T$$

The fourth step, the resulting data is normalized by

$$w_i=\frac{\overline{w_i}}{\sum_{i=1}^{n}\overline{w_i}},(i=1,2,3,\cdots n)$$

we get:

TABLE II. NORMALIZATION OF DATA PROCESSING RESULTS

W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8	W_9
0.175	0.163	0.102	0.194	0.117	0.097	0.063	0.057	0.032

The percentage diagram of all future direction of development of students is in figure 4.

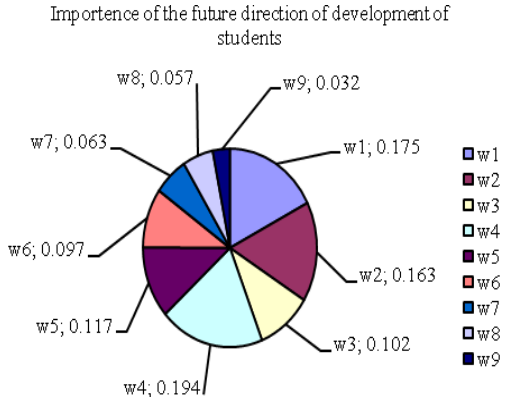

Figure 4. Schematic diagram of the percentage of the future direction of development of students

Then obtain the final importance of the future direction of development of students, the vector W_i:

$$W=(0.175 \quad 0.163 \quad 0.102 \quad 0.194 \quad 0.117 \quad 0.097 \quad 0.063 \quad 0.057 \quad 0.032)^T$$

The fifth step, solving the matrix *AW* and *NW*, in preparation of the judgment matrix, that is:

$$AW=\begin{pmatrix} 1.00 & 2.45 & 3.50 & 1.21 & 1.31 & 1.95 & 1.83 & 2.03 & 1.71 \\ 0.41 & 1.00 & 2.84 & 1.44 & 1.34 & 1.70 & 2.56 & 2.54 & 3.40 \\ 0.29 & 0.35 & 1.00 & 1.07 & 1.36 & 1.03 & 2.01 & 2.23 & 1.83 \\ 0.83 & 0.69 & 0.93 & 1.00 & 2.82 & 3.83 & 4.22 & 3.76 & 4.67 \\ 0.76 & 0.75 & 0.74 & 0.35 & 1.00 & 1.86 & 2.22 & 2.21 & 3.20 \\ 0.51 & 0.59 & 0.97 & 0.30 & 0.54 & 1.00 & 2.71 & 2.42 & 2.74 \\ 0.55 & 0.39 & 0.50 & 0.24 & 0.45 & 0.37 & 1.00 & 1.70 & 2.33 \\ 0.49 & 0.39 & 0.45 & 0.27 & 0.45 & 0.41 & 0.59 & 1.00 & 2.72 \\ 0.58 & 0.30 & 0.55 & 0.21 & 0.31 & 0.36 & 0.43 & 0.37 & 1.00 \end{pmatrix}\begin{pmatrix} 0.175 \\ 0.163 \\ 0.102 \\ 0.194 \\ 0.117 \\ 0.097 \\ 0.063 \\ 0.057 \\ 0.032 \end{pmatrix}=\begin{pmatrix} 1.794 \\ 1.540 \\ 1.989 \\ 1.878 \\ 1.064 \\ 0.899 \\ 0.580 \\ 0.521 \\ 0.399 \end{pmatrix}$$

$$NW=(1.575 \quad 1.467 \quad 1.080 \quad 1.746 \quad 1.053 \quad 0.873 \quad 0.567 \quad 0.513 \quad 0.288)^T$$

According to the formula

$$\lambda_{\max}=\sum_{i=1}^{n}\frac{AW_i}{NW_i},$$

we can find the maximum characteristic root :

$$\lambda_{\max}=10.5$$

According to the formula, $CI=\frac{\lambda_{\max}-n}{n-1}$ derived *CI*, which is:

$$CI=0.196 .$$

According to the formula , and when n = 9, then the *RI* = 1.45, obtained *CR*, namely:

$$CR=\frac{CI}{RI}=\frac{0.196}{1.45}=0.135$$

C. Interrelationship Matrix

The student development directions are the data in row and the related special courses name are treated as the line data, to each curriculum carries on grading the correlation ship with each development direction's correspondingly. If the score is higher, it applies that the degree of correlation is higher. The investigation objects are the Nanchang University industrial engineering graduates and the former years' graduates, we adopted the spot the questionnaire survey to the graduating student, and the network questionnaire investigation to the former years graduates. Participates in the investigation have already completed the related curricula's study, and had a detailed knowledge of the curricula's content, so the data's validity was ensured.

The mean results are show in Table III:

TABLE III. THE MEAN SORES OF R_{IJ}

	Existing Courses							Supplementary Courses			
IR	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}
D_1	27	69	44	28	12	13	94	87	79	56	31
D_2	36	74	55	35	43	26	64	90	34	42	24
D_3	28	47	22	22	12	52	37	79	33	23	36
D_4	86	56	67	15	56	48	86	77	90	46	43
D_5	35	44	46	10	86	30	57	24	88	14	37
D_6	23	40	33	12	34	13	32	20	78	23	58

IR	Existing Courses							Supplementary Courses			
D_7	33	89	67	22	33	37	66	58	43	79	77
D_8	59	91	88	21	28	62	79	31	40	85	86
D_9	40	94	75	19	67	41	42	88	89	88	93

V. Rearrangement Processing

Based on the above preparation, we can obtain the processing of data of house of quality. According to the previous house of quality presentation on the definition of variables, and combine with the previous fishbone diagram analysis, questionnaire and AHP determined by the weight of the students' future direction as the left wall, we find the house of quality in the following table IV.

TABLE IV. The Quality House Data Processing Table

		Existing Courses							Supplementary Courses			
IR	W_i	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}
D_1	0.175	27	69	44	28	12	13	94	87	79	56	31
D_2	0.163	36	74	55	35	43	26	64	90	34	42	24
D_3	0.102	28	47	22	22	12	52	37	79	33	23	36
D_4	0.194	86	56	67	15	56	48	86	77	90	46	43
D_5	0.117	35	44	46	10	86	30	57	24	88	14	37
D_6	0.097	23	40	33	12	34	13	32	20	78	23	58
D_7	0.063	33	89	67	22	33	37	66	58	43	79	77
D_8	0.057	59	91	88	21	28	62	79	31	40	85	86
D_9	0.032	40	94	75	19	67	41	42	88	89	88	93
AI		43.2	62.6	52.1	21.3	40.4	33.1	67.1	65.9	65.9	44.4	44.0

The Absolute Importance between the symbols and the future direction of students on the table are as in table V.

TABLE V. Symbols And The Future Direction Of Students Data mapping Table

C_x	1	2	3	4	5	6	7	8	9	10	11
AI	43.2	62.6	52.1	21.3	40.4	33.1	67.1	65.9	65.9	44.4	44

From the above table, we can find the ratings of courses according to the importance: C_7, C_8, C_9, C_2, C_3, C_{10}, C_{11}, C_1, C_5, C_6, C_4.

Hence, Industrial Engineering specialty of Nanchang University in future construction should the construct the following courses with proper priority, Quality Management and Control, Supply Chain Management, Production and Operations Management, Cost Analysis.

And add the following courses: Computer Simulation Software, Senior Office Software Applications, Interpersonal and Communication Skill.

VI. Results And Discussion

From the rearrangement plan, we found that along with science's and technology's progress, and computer's popularization, the computer auxiliary simulation software's influences on IE already could not be neglected, the reasonable computer processing model will simplify greatly the question step and work load, enables industrial engineer to concentrate on question discovery and analysis aspect.

Although in the current curriculum, we already have Office software, a basic curriculum, but according to the schoolmate's investigation which already graduated, these primary curricula are unable to satisfy in the work by far the demand, therefore the second course absolutely has obtained the high score in the investigation. The interpersonal exchange and the communication skill have a high expectation, which is beyond our initial anticipation, because this curriculum had the very big capriciousness and the individual difference, at first it was not in the curriculum plan, but along with thorough investigation of the graduation students, it is discovered that not only in advanced studies but also in real work, the effective communication is the foundation for improvements, thus it is reasonable to add the such a course in the curriculum plan .

This article is based on the survey related to Industrial Engineering specialty of Nanchang University, applies brainstorming, fishbone diagram, analytic hierarchy process and Quality of Housing which are important quantitative and qualitative methods of Industrial Engineering. First determines the effective courses among the curriculum and the direction of students' future development, then combines with the ratings of relevant courses collected from the students of industrial engineering in the survey, and processes the data finally, sets up the course content and future direction matrix, we obtain the relative importance of courses, which can be used as reference for the courses selection. This model focuses on the influence of curriculum on the direction of students' future development, highlights the positive role of students in the rearrangement of curriculum, it also conforms to human-oriented principle, the basic principle of industrial engineering.

In analyzing the data of Quality of Housing, we omit the right wall and part of the basement, which may influence the role of the house of quality to a certain

extent, but the whole process and the model are credible. If the conditions are permitted, we can do further study to obtain more comprehensive results. This way of evaluation can not only be used before the assessment, but also be applied after the assessment. It provides a creative way for the university to evaluate the curriculum. And it also can be applied to other area which related to the education.

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