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APPLICATION OF THE QUALITY FUNCTION DEPLOYMENT AS A TOOL FOR IMPROVING QUALITY AND COST-EFFECTIVENESS IN UNIVERSITIES

In a global scope, many countries give big efforts to capture universal specifications by strengthening their cooperations in the field of education with other countries in order to develop a global position on the international level just like in many areas. However, it is considered that raising the quality of education at the international level of these countries are known to be a long way they should take. Therefore, in this study, the Quality Function Deployment as a systematic quality improvement tool addressing the education system in its entirety is discussed and it is intended to contribute to improving the quality of education in terms of its importance to countries. This study is based on the demands of the course students carried out at universities and reveals the quality of the education services. According to this target, the Quality Function Deployment method is utilized to determine whether there is an education service pointed out by the needs and expectations of students or not and also the policies that should be followed by the universities is discussed.

Key words: education, quality, qualitative indicators, educational services, quality function deployment, quality of education, universities.

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Сапа функциясының таралуын университеттерде сапаны жақсарту және экономикалық тиімділікті арттыру құралы ретінде қолдану

Жаһандық ауқымда көптеген дамушы елдер, дамыған елдер сияқты халықаралық деңгейде жаһандық позициясын қалыптастыру мақсатында басқа дамушы елдермен білім беру саласындағы ынтымақтастықты нығайта отырып, әмбебап спецификацияларға ие болу үшін үлкен күш жұмсап жатыр. Алайда, бұл елдердің халықаралық деңгейде білім беру сапасының көрсеткіштерімен салыстырғанда, бұл бағытта үлкен әрі ұзын жол жүру керек екені анық. Осыған байланысты, осы зерттеу барысында білім беру жүйесіне толықтай қатысы бар әрі жүйелі сапаны жақсарту құралы ретінде сапа функциясының таралуы әдісі зерттеледі. Сонымен қатар, бұл зерттеу жұмысы университеттерде студенттердің талап-тілектеріне негізделген білім беру қызметтерінің сапасын көтеру жолдарын көрсетеді. Осы мақсатқа сәйкес студенттердің қажеттіліктеріне жауап беретін білім беру қызметінің бар-жоғын анықтау үшін сапа функциясының таралуы әдісін қолдану жолдары көрсетіледі. Сондай-ақ университеттерде сапаны жақсартуға қатысты жүргізілетін саясаттар талқыланады.

Түйін сөздер: білім беру, сапа, сапалық көрсеткіштер, білім беру қызметтері, сапа функциясының таралуы, білім сапасы, университеттер.

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Применение развертывания функции качества как инструмент повышения качества и экономической эффективности в университетах

В глобальном масштабе многие страны прилагают большие усилия для сбора универсальных спецификаций путем укрепления их сотрудничества в области образования с другими странами в целях развития глобальной позиции на международном уровне, как и во многих областях. Вместе с тем считается, что повышение качества образования на международном уровне этих стран, как известно, является долгим шагом, который они должны сделать. Поэтому в этом исследовании обсуждается внедрение функции качества как систематического инструмента повышения качества, охватывающего всю систему образования, и оно призвано способствовать повышению качества образования с точки зрения его важности для стран. Это исследование основано на требованиях студентов курса, проводимых в университетах, и показывает качество образовательных услуг. Согласно этой цели, метод развертывания функции качества используется для определения того, существует ли образовательная служба, на которую указывают потребности и ожидания учащихся или нет, а также политики, которые должны соблюдаться университетами.

Ключевые слова: образование, качество, качественные показатели, образовательные услуги, развертывание функции качества, качество образования, университеты.

Introduction

Today, improving the education quality and upgrading the education sector as in all sectors come to open emerge as one of the most important problems. Therefore, countries are strengthening their effort to capture the universal measure of cooperation in the field of education as well as to develop field position on the international level. But, it is known, that a way to upgrade the education quality in terms of educational quality indicators need to be taken into consideration. In this respect, Quality Function Deployment (QFD) is recommended as the quality improvement tool addressed to the education system in its entirety, based on the students' demands and the training courses carried out at universities to improve the quality of educational service. In this context, the concept of service at universities and the service considering demands and needs of students are considered redesign.

Therefore, we can say that the main focus of this work is to identify whether there is a service concept on students wishes and needs, students who are in position of customers and according to the result to debate on policies followed by the universities using the QFD method.

Theoretical part

We can meet various definitions of quality when we examine literature related to quality issues. Therefore, it is impossible to give a definition of quality, everyone would agree in general. The qual-

ity is due to perform a variety of multi-dimensional definition of it. Quality professionals worldwide and is considered to be important names of the pioneers in this field defined in many different ways. For example: W.E. Deming addressed the issue from the point of view of quality and customer as «continuously meet the customer's current and future needs» [1]; quality according to J.M. Juran, «The target is to use suitability and a systematic approach to the quest for perfection» [2]; According to P. Crosby, the quality «...not elegance, is in compliance with the requirements» [3]; For Feigenbaum, the quality is «Engineering aimed at meeting customer needs in the most economical possible levels, manufacturing, quality is a combination of continuity and marketing features» [4], while Zeithaml and his friends commented the quality as «Consumer, the customer service area of a product or excellence as a whole, service or evaluation on the supremacy» [5]. As can be seen from definitions today it has gained importance in the customer's perspective of quality. In the light of these descriptions the quality can be defined as «the customers' wants and needs, starting from the design phase and fully meet regularly and to produce products or services in the most economical way».

It is the most effective tool to achieve social justice and equality of opportunity to improve the education community's creative power and efficiency, providing an opportunity to improve the capabilities of the individual [6]. The quality of education is a value appreciation on education. In other words, the quality of educational services is defined as a philos-

ophy adopted the continuous improvement culture of all working staff in the educational institution, trying to get the perfect elegance of the highest quality in all educational studies [7]. The quality of the education includes service offered by recognition as well as the achieved results. Here, the main target of educational institutions both the input and output of the service process is to provide qualified labor to the satisfaction of students and the community. And the gain of skilled labor in society depends on the offered quality of the service [6]. So, the main point should be focused on the importance of the service area is student and student satisfaction. Thus, in many areas of ongoing quality concept has become an important factor in the competition of «quality is customers' want» because the format to be defined since the university takes into account more and future students in already in the position of customers' service status came in. Thus, students would serve as training and higher education that offers to satisfy the demands and needs are to be met, that the wishes and needs must go. Satisfaction here is closely related to quality education and quality of service [6].

Various definitions were given by different authors and scholars on the QFD method. For example: [8] QFD defined it as «the product which customers want to buy or the products they want to continue buying or service design, to focus on the ability of the company for the production and marketing; and it is a planning and communication method for coordinating these capabilities». Akao, who finds this concept [9], explains the QFD as «the quality of design that transforms the basic quality assurance point of customer, is demands of customers aimed to provide satisfaction to be used in the design targets and manufacturing phase development method». Guint and Praize [10], while referring to the impact of the effective use of QFD describe it as «the logical system defining the things what customers want, listen to their wishes carefully and to face the best way to available resources». From this definition QFD can be seen, the input in order to enhance competitiveness and create the needs of customer requests, the process is a flexible and easy to understand. The main objective of this process is to satisfy the customer. When we look at the historical development, Dr. Yoji Akao has made the fundamentals of QFD in the field of chemistry and based on the work of the Quality Assurance by Dr. Shigeru Mizuno. The first design approach has been presented as QFD by Akao in Japan in 1966 [11]. At first, theoretical study of QFD, Mizuno and Furukawa in 1972 with the participation of «Mitsubishi Heavy» was put into practice in the Kobe shipyard.

QFD regarded as the first book about this work in 1994 by Glenn Mazur «QFD: The Customer – Approach to Quality Planning and Deployment» has been translated into English. Another method, occurred in QFD was implemented by the business services of Ohfujii, Noda and Ogino companies in 1981 [12]. In Turkey, it was implemented by Arçelik application for dishwashers in 1994 [13].

In the literature, a large number of applications can be based for their different characteristics in different areas are QFD model. These models are created, not intended to be applied one to one of any model. One of the QFD application model based on them, depending on the characteristics of the area being redefined matrix presented in this model, some of the matrix by removing or changes can be made adding new matrix model [14]. Therefore, only the underlying structure of the Quality House matrix which formed the main structure of QFD process is given in university implementation.

The essential elements of House of Quality used in this application and processing steps are given in the following. The general structure of House of Quality is presented in Figure 1 [15]:

- Customer Voice (WHATs): Customer voice, also referred to as WHATs is the starting point of QFD process. The customer demands and requirements determined by a variety of methods previously carried out in market research are listed in this part of House of Quality. The reason of considering it as the most important steps of QFD process is that the step is to provide input into the process.

- Technical Requirements (HOWs): One kind of the section where the customer's voice is compiled is performed in this section, where the voice of inner processes is taken into consideration. This section is also called technical language or inner voice of business.

- Planning Matrix (Evaluation on Competition of Customer Requests): The Quality department is located on the right side of the House and is a tool that helps customers prioritize requests QFD team. This matrix contains numeric data associated with each customer request. This section includes such information as point of sale evaluation and improvement rates.

- Relationship Matrix: This section shows relationship between technical requirements and customer's voice from the perspective of QFD team. Relations are given in three ways as weak, medium and strong.

- Correlation Matrix (ROOF): This section studies the effects of technical requirements to each another. The target of this matrix is to deter-

mine whether there are positive and negative affect between identified technical requirements.

– Benchmark Technical Evaluations (Evaluation of Technical Requirements on Competition and Goals): With the help of this section we can make the decision on technical features to which attention should be given priority or specifications in data scanning. In addition to it some benchmarking, evaluations and targets for technical requirements are also included in this section.

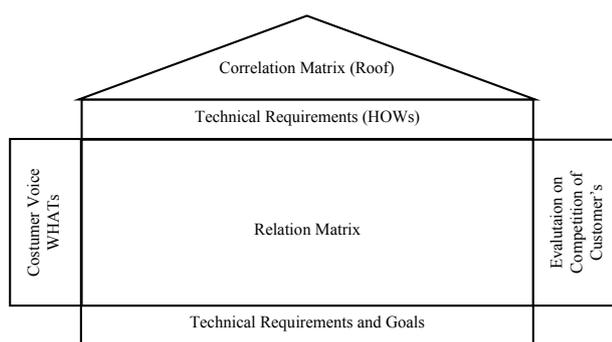


Figure 1 – House of Quality

Experimental part

This study aims to contribute to education system by taking QFD, which is a systematic quality improvement tool in addressing the integrity of great importance to improve the quality of education for universities. According to this target, we tried to determine whether there is a service approach for understanding the needs and expectations of Akhmet Yassawi International Kazakh-Turkish University (AYU) students using QFD method. Here benefiting QFD matrix, the requests and needs of students will be used in designing the educational services and improving the training services quality. In this framework the main hypothesis of our work in the design of educational services and in improving the quality of training services QFD will provide beneficial results.

For competitive evaluation the area where the university is located in rectangle also includes Mukhtar Auezov South Kazakhstan State University (MAU) the Faculty of Social Sciences.

The content captures the establishment of the house of quality in education study, creation of planning matrix and other matrix classes in training process. And the curriculum were excluded from the content. In other words, the student wishes and needs, also technical requirements of the university

have been identified researching the student requests and the way of their satisfaction with an effective topics.

It is a matter of protecting the quality of university education in the world constantly up to date. So, when university education giving people opportunities and benefits is taken into account, it is natural that there is a serious competition among universities. One of the foremost element being able to stand out in the said competition is again the quality. Since this quality concept have come to consider as «quality is customers' wishes», students who were defined as buyers or customers of universities service position of the format more cases. In order to achieve the quality requirements of the students in the case of university education and technical requirements to fulfill them thoroughly to know the factors that influence the formation of student satisfaction with etmektedir.dolayı great importance at this point it is very important and necessary. For these reasons and the work done in this field, this method emphasizes the importance of the work done too much usage.

This study was used as the basis QFD method. Firstly, the literature was scanned and issues were included in the study according to QFD. Students also request to identify their needs and making use of focus groups in the light of the data obtained from the literature in order to collect them, students have been identified needs and desires collected under 13 titles on education and training services they receive from the university (see. Table 1). A questionnaire was formed to determine these requests and requirements to those who are studying in the Faculty of Social Sciences 224 students were applied.

Griffin and Hauser [8] state that the voice of the customer focus group studies the rest is just the starting point and a homogeneous market segments of interviews with 20-30 people, was approximately 90-95% of all customers' quality requirements related to the product or service in the minds. Hence, the focus group study process in this study was applied to the students of Social Sciences Faculty. Both parts of the 1st, 2nd, 3rd and 4th in class, 1 female and 1 male, for students from each class, four to a total of 16 students (separate each class) focus groups (4 students in each focus group: 2 male and 2 female) were performed. Each focus group interviews lasted 20-25 minutes. Then the students identified needs and desires are transferred to a questionnaire. 5s for each request and needs identified in this survey based on a Likert scale (1-strongly disagree to agree 5 of them strongly disagree) were asked to give scores. However, the same wants and needs than the

traditional grading system 5s note was requested. Each request is prioritized in the light of this information according to the needs and average.

The first step of House of Quality is listening to customer. Listening to customer is one of the main steps in QFD period. Voice of customer is one of the main phases of the rest of the QFD process. There are several methods of listening to customer voice and to determine their needs. Overall, methods proposed and used to listen to customer voice or customer requests and determine their needs are counted as surveys, focus groups, individual interviews, customer panels to follow when using the product, gemba visits, field studies, confidential customer applications, feedback, complaints, sales records [15]. However, these methods alone is not sufficient for getting customer requirements information, combined several methods can give better and efficient results. This is used in determining student needs and works during the study are presented in Table 1 customer requirements section

(see. Table 1). Looking at this table, as a result of gemba and focus groups, the needs of students is determined, gathered under 13 headings of education and training services they receive from higher education.

This section will discuss the creation of a general planning scheme. Overall, the customer needs generated by the QFD team after being placed in the appropriate portion of the proceeds to the creation of house of quality planning scheme. The planning scheme involves competitive evaluations, they are producing similar products, or offers similar services for competing businesses products or services that customers considering to relate to the products or services of their business [14]. Here it is also located in the upper part of the overview in Table 1 of the planning scheme (see. Table 1). Table 1 retrospect planning scheme of: customer needs and the needs of raw level, competitive comparison, targets, progress rate, score of sale point and sections such strategic importance degree. Here:

Table 1 – Planning Scheme

№	Student Needs	Degree of Raw Importance	Comparison of Competition			Targets	Advancement Rates	Point of Sale / Score	Strategic Values Degrees	
			University	Opponent 1	Opponent 2				Absolute	Proportional
1	Students must be experts in the field	11,3	3	3	4	5	1,67	1,5	28,31	13,61
2	Students must provide notification back	10,5	3	4	5	4	1,34	1,5	21,11	10,15
3	Students should attend the course themselves	8,4	4	5	4	5	1,25	1,25	13,13	6,32
4	Lessons must be practical	10,6	4	5	3	5	1,25	1,5	19,88	9,56
5	Elective courses should be given	11,5	3	5	4	5	1,67	1,5	28,81	13,85
6	The number of students should be reduced	5,2	3	4	3	4	1,34	1	6,97	3,35
7	Lessons should be in preparation for graduate and doctorate	6,7	2	4	3	4	2,00	1,25	16,75	8,05
8	Classical evaluation should be fulfilled	5,2	3	4	5	5	1,67	1,25	10,86	5,22
9	Evaluation should be based on performance	6,7	2	4	4	4	2,00	1,25	16,75	8,05
10	Periodic checks should be provided	7,8	3	5	5	5	1,67	1,25	16,28	7,83
11	Libraries should be rich in all sizes	9,2	3	4	4	4	1,34	1,5	18,49	8,89
12	Modern tools should be provided	3,9	4	3	5	5	1,25	1	4,88	2,35
13	Adequate resources must be provided	4,3	3	4	3	4	1,34	1	5,76	2,77

– Raw Value Degree: in order to meet the needs for customers, that shows the priority. Because all the customer needs is a particular importance and need to be met. Different methods can be applied in the prioritization of customer needs. The most widely used are some methods: the methods of asking the absolute value degree, depending on its value ranking method 1, 2, 3 ... can be listed as sorting method and analytic hierarchy process method [14]. In this study, according to value degree of given customer needs is shown in column of raw value degree (see. Table 1).

– Competitive Comparison: evaluation of the company by customers and competitors offers the opportunity to benchmark the business [16]. General survey method is used to perform competitive comparison. Survey methods are used generally in 5 scale. In this scale 5 – strictly meeting the needs of case; 3 – met in middle level, 1 is certainly not met [17]. Competitive comparison survey in the competitive comparison chapter results are presented in Table 1 (see. Table 1).

– Objectives: In this chapter, the strategic objectives content of competitive comparison is to make progress that can be made by customers and improved competitiveness will be determined. Identified strategic objectives, the evaluation of the competitors must be done using the same scale (Chen and Wu, 2002b: 29). These basic objectives of this study is shown in the target column of Table 1 (see. Table 1).

– Score of Sale Point: Selling point scores will be calculated to determine what level of sales activity will be reflected in the progress of these [14]. If it is considered that improvement do not reflect sales activities this value is set as 1; if it is considered to be reflected in the medium to 1.25 this value and if the thought would be an impact on the high level is set at 1.5 this value and Table 1 selling point is available in the points section (see. Table 1).

– Progress Rate: This rate presents whether existing performance of business should be increased or not in order to achieve its strategic objectives or to what extent it should be improved, if it is necessary [16]. Progress ratio is calculated by dividing the strategic goals of the university and the student needs to meet the level of progress rate in Table 1 is given on the column (see. Table 1).

– Strategic Value Rating: Strategic absolute value degree is got by multiplying progression rate, the

selling point score and raw value [11]. The proportional value degree is calculated by dividing the sum of each customer's needs to the total value degree and multiplied by 100 [9]. These values are presented in Table 1, the strategic significance of the section (see. Table 1).

After the student needs come to open, their needs also have to be converted to technical specifications and requirements in order to meet them. Technical requirements will be determined by the QFD team considering all identified customer needs [15]. Technical requirements and their placement are presented in Table 2, the upper part (see. Table 2).

Relationship matrix is placed in the centre of House of Quality and shows which technical requirements will meet the what needs of customers [10]. The relationship between customer needs and technical requirements and the impact of this relationship can be given in levels as high (5), medium (3) and low (1). After that, the technical value degrees are calculated by multiplying the sum of the importance degrees of the columns in one of the technical requirements of each of their relationship points, proportional to their customer needs corresponding to the line that will be. These values are shown in Table 2 (see. Table 2).

Quality house technical correlations section is also named as the Roof matrix, drawn in shape of the house roof [14]. Correlation matrix indicates the correlations of technical requirements with each other. These correlations can be positive or negative. They can be shown with symbols: A positive correlation can be indicated as Y symbol, while a negative correlation is marked with symbol as X, and the lack of correlation is left empty [14]. Examples are shown in Figure 2. The correlation matrix for Quality House Roof (see. Figure 2).

In this final phase House of Quality, the company's products or services related to the technical performance compared with similar products or services of competitors, namely competitive analysis is conducted by making technical evaluations. According to this the target values are determined considering the company's competitors' products or services [17]. We try to reach those goals specified at the design phase [10]. Thereby producing the final phase of Quality House QFD process is completed. Technical evaluations, targets and the final version of Quality House is presented in Figure 2 (see. Figure 2).

Table 2 – Technical Requirements and Relationship Matrix

Students Needs	Technical requirements												
	The views and Findings/ Results be shared	Branches must enter should be included in speciality subjects	Views and Findings/ Results should be shared	Pre-preparation	Lessons should be practical	Formation of new areas	Density should be reduced	Programs must be for Masters and Doctorates	General considerations	Task control evaluation analysis	Supplying Library with new sources	New equipments	Alternative sources should be investigated
Students must be experts in the field	13,61	5		5									
Students must provide notification back	10,15		5				1						
Students should attend the course themselves	6,32	3		5			5						
Lessons must be practical	9,56		1		5		3						
Elective courses should be given	13,85	1				5		3					
The number of students should be reduced	3,35						5						
Lessons should be in preparation for graduate and doctorate	8,05						3	5					
Classical evaluation should be fulfilled	5,22								5	3			
Evaluation should be based on performance	8,05								3	5			
Periodic checks should be provided	7,83								3	3			
Libraries should be rich in all sizes	8,89							1			5		3
Modern equipments should be supplied	2,35											5	1
Adequate resources must be provided	2,77							1			3		5
Technical Severity Ratings	Absolute	100,9	60,3	99,7	47,8	69,3	111,3	93,5	73,7	79,4	52,8	11,8	42,9
	Proportional	12,00	7,15	11,82	5,67	8,22	13,20	11,09	8,74	9,41	6,26	1,40	5,21

Conclusions and recommendations

When the formed matrix is evaluated, firstly importance compared to each of dimensions of customer's voice should be viewed in order of importance. These dimensions were shown in Table 1. This in 1st line looking at the example in Table 1 «should be experts in the field of academic» needs to have 11.3 points high priority, 3 by students is competitive benchmarking, while the opponent is seen and detected in 3 and 4 percentage points degrees, respectively. Therefore, if this is the selling point to score 1.5 points and strategic objectives need to ensure a better perception of the company's

competitors have been selected as the 5th. But normal progression rate is calculated as 1.67 to achieve this goal and for ensuring required customer satisfaction calculate.

When we look at the degree calculated proportional value, this value is shown to focus on the very high compared to the relative importance of other needs ildupuda needs the form of 13.61%, and to ensure the overall student satisfaction in the business of it. Similarly the needs shown in 5th line of «elective subjects should be given», it is seen that the the need to have a significance of 11.5 points have value degree, in competitive benchmarking is 3, and opponent is perceived as 5 and 4.

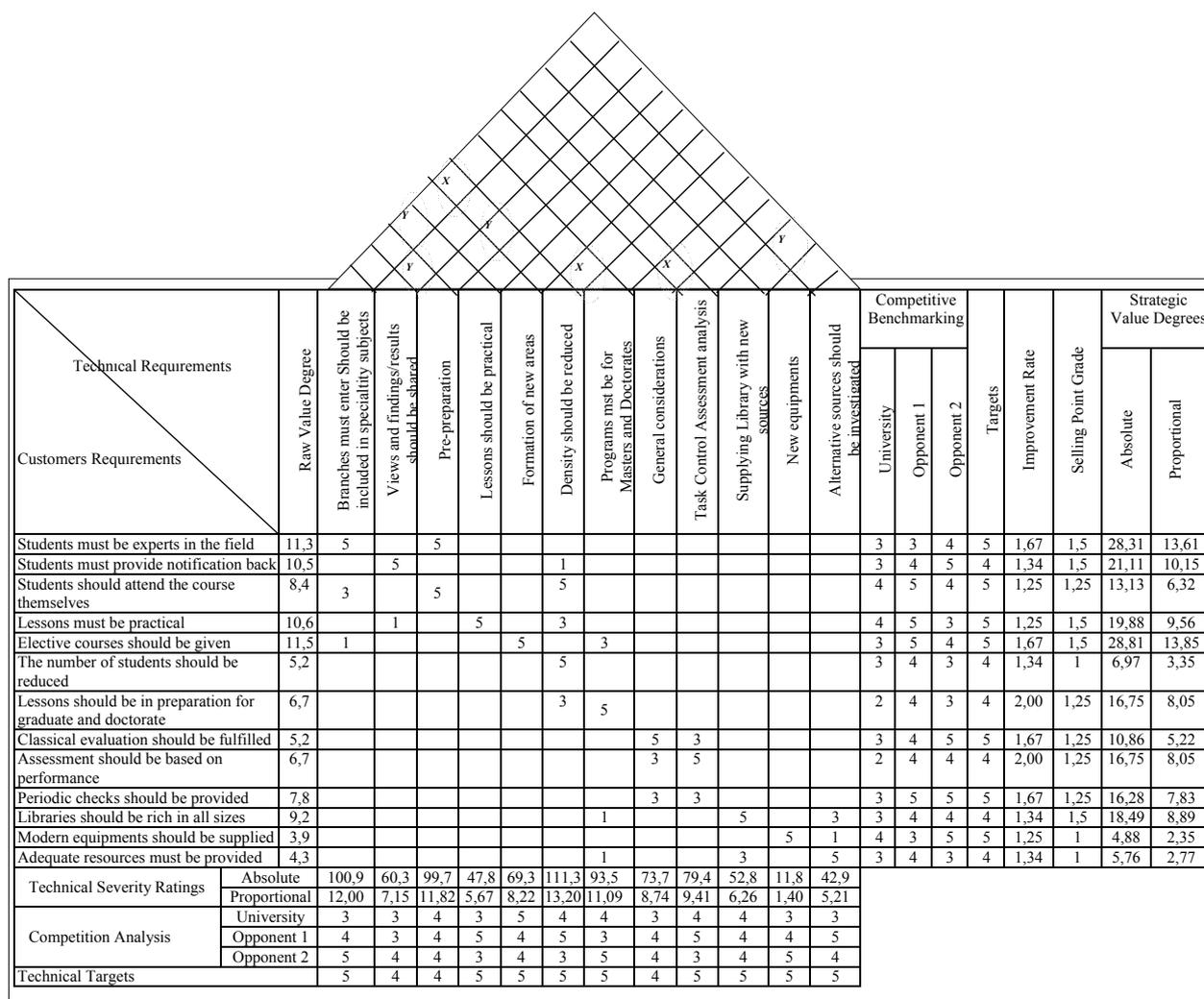


Figure 2 – Final Version of Established House of Quality

Because of these the selling point of this requirement has been chosen as 5 points for detecting at least as good as competitors and strategic goals of the company is 1.5 percentage points. When we pay attention to proportional value degree it is seen that this value is the highest compared to the relative importance of other needs that may arise in 13.85% and it is clear that it is one of the students needs to be mostly emphasized to ensure the overall student satisfaction in the business.

When we look at created House of Quality roof matrix, so at correlation matrix, between the going of faculty members to speciality classes and density reduction; between the density reduction and having to master's and doctoral programs, the general evaluation and homework follow-up evaluation is staying X, i.e. between going of negative correlation to speciality lessons of teaching staff and giving prac-

tical lessons, between views and sharing of determination of making the preparation, between reducing the density by making the preparations and also with the provision of new resources to the library to investigate the alternative resources the symbol Y is seen as positive correlations.

However, if we look at the technical evaluations of the most important critical point of House of Quality it is seen there is technical needs which have high proportional value with 13,20% of «reducing the density» and is determined as five technical target is behind compared to competitors.

Technical requirements as «entering the teaching staff with %12,00% to speciality lesson, with %11,82% the «preliminary» and 11,09% should be according to «program for master's and doctorate» are following it. Here, we can say that university management and technical requirements to the source distribution of

this order and the time when it is necessary to pay attention to the situation of the competitors. Because these are the most important elements that need to be improved to increase the satisfaction of students.

In conclusion, in this study, as mentioned at the beginning of it, we have tried to show the quality elements using QFD, one of quality improvement ways according to the perspectives of students, who are one of educational service costumers.

Universities can put their differences through QFD and it may take a superior state its competitors in the rapidly evolving competitive environment.

Students' demands and priorities can be identified through the results we have got in the ending process of House of Quality which is determined as one of the important phases of QFD; these currents can be restructured according to the stated wishes and needs. This will lead to a sfigure increase and a significant increase in total student satisfaction. However, in keeping the area of quality improving work more narrowly only students were taken into consideration in practice as costumers for mostly focusing on costumers voices and given the place to quality requirements to higher education overall.

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