EVALUATION OF THE STUDENTS' EXPECTATIONS FOR AN EDUCATIONAL INSTITUTION USING QUALITY FUNCTION DEPLOYMENT METHOD

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Abstract

In today's market environment where there is an intense competition, products that fully meet customer expectations must be produced for the survival and growth of the companies. Therefore, determining, analyzing and adapting customer expectations are critical problems. In recent years, one of the commonly and effectively used methods for the solution to this problem is Quality Function Deployment (QFD). As a customer-oriented method that reveals customer expectations, QFD provides planning/improvement of the process' by taking advantage of this information. In this study, QFD method is used in order to determine and analyze the expectations of the students enrolled in a language school. Firstly, related data concerning students' expectations were obtained. House of quality was created and evaluated, and as the result of this study, managers have been informed that teaching techniques applied by the teachers and equipment features of the school should be developed by taking new trends into account. In accordance with these results, managers were offered suggestions for the improvement of student's satisfaction. This study provides important tips for researchers and decision makers who work on QFD method and its applications in the field of education.

Keywords: Quality function deployment, students' expectations, voice of customer, quality, foreign language schools

INTRODUCTION

Today, variety of goods and services offered to customers in all areas increased due to globalization and technological developments. This situation leads to ascending customer expectations and continuous changes in these expectations. It can be said that the quality of the physical properties of a product is no longer a competitive advantage. Yet today's customers give importance to the physical characteristics of quality when buying a product as well as satisfaction of their expectations. It can be stated that, the ever-changing customer expectations have become a major force in directing the global market in every sector. Therefore companies should analyze changes in customer expectations in the market environment and must adapt to these changes in order to be preferred by the customers.

As in many business lines, service diversity is increasing day by day also in the education field. Hence determining students' needs and expectations and giving adequate service to meet these expectations is important for organizations that operate in this field. However, to produce information related to the students' expectations and to plan/develop educational services by taking advantage of this information is a very difficult problem. In the literature, Quality Function Deployment (QFD) method is used effectively in order to solve such problems (Chan and Wu, 2002; Aytaç and Deniz, 2005). QFD is a quality improvement methodology used in revealing expectations of customers that they are aware of and express; and/or they are not even aware of therefore cannot be expressed. QFD also has a key role in connecting these expectations with the specifications of the products (Mazur, 1997).

In this study, the problem of the determining expectations of students in a language school and improving the quality of the institution in relation to these expectations is solved by using QFD method. Firstly, the data related to student expectations and their importance levels were obtained by questionnaires. The QFD method was applied according to the obtained data and house of quality was constructed. The results were interpreted considering the house of quality and were shared with the managers. The study consists of four sections. The first section includes an introduction to the subject. Brief information regarding QFD method and its applications are given in the second section. In the third section, our QFD study which is carried out in a language training institution is presented and the house of quality is given. The last section consists of results and the recommendations relating to the results from the application.

QUALITY FUNCTION DEPLOYMENT (QFD) AND ITS APPLICATIONS

QFD is a method aimed at increasing the quality by identifying customer expectations and reflecting these expectations to the technical specifications of a product/service (Chen and Ko, 2008). The method was developed in the 1970s by YojiAkao and Shigeru Mizuno and has been

applied successfully in many areas up to the present (Jaiswal, 2012). Some of the successful QFD applications in the literature were classified according to their application areas and given in Table.1 (for further review, see: Chan and Wu, 2002; Aytaç and Deniz, 2005; Shahin, 2008).

Table 1. QFD studies in theliterature

Application areas	References
Logistics	Uğur, 2007; Tu et.al., 2010; HuangandYoshida, 2013
Automotive	Çabuk et.al., 2008
Banking/Insurance	González, Mueller and Mack, 2008; Doğu and Özgürel, 2008; Shimomura, Hara ve Arai, 2008
Tourism	Öter and Tütüncü, 2001; Tatar, 2007; Das and Mukherjee, 2008; IkizandMasoudi, 2008
Architecture	Gargione, 1999
Web design	KuoandChen, 2011
Education	Mazur, 1996; Aytaç, 2002; Chou, 2004; Savaş and Ay, 2005; Şaştım et.al., 2006; Boonyanuwat et.al., 2008; Singh, Groverand Kumar, 2008; Garibay, Gutiérrez and Figueroa, 2010; Sahayand Mehta, 2010; Hafeez and Mazouz, 2011; Ictenbas and Eryilmaz, 2011; Sirias, 2012; Qureshi et.al., 2012
Food	Arı, 2006; Suliyev, 2007; Park, Ham and Lee, 2012
Textile	NgandWang, 2007; Militaru et.al., 2014
Health	Camgöz-Akdağ et.al., 2013
Product design	Bergquist and Abeysekera, 1996; Zaim and Şevkli, 2002; Gonza´lez, Quesada and Bahill, 2003; Üçler, Vayvayand Çobanoğlu, 2006; Mahaptra and Mohanty, 2013; Zhang, YangandLiu, 2014

As it can be seen in Table.1, QFD is used in the solution of problems in so many different areas such as product design, banking, healthcare, textile etc. Also, it can be seen that QFD is used by many researchers in the field of education. While some of these studies used QFD method in evaluation of the quality of education (Chou, 2004; Singh, Grover and Kumar, 2008; Sahay and Mehta, 2010; Qureshi et.al., 2012) some of them used this method in evaluation of the course curriculums (Mazur, 1996; Aytaç, 2002; Şaştım et.al., 2006; Boonyanuwat et.al., 2008; Hafeez and Mazouz, 2011; Sirias, 2012). For more detailed review on applications of the method in the field of education, see (Aytaç and Deniz, 2005).

QFD is based on the philosophy of designing and evaluating the products by taking the expectations of the customers into account (Uğur, 2007). Customer expectations are primarily determined by using a variety of techniques. Then these expectations are associated with the product specifications with the help of the house of quality. Thereby customer expectations can be transmitted to the production process. At the end of QFD process, the products are evaluated considering customer expectations and useful information about development of

product quality is obtained. The process of QFD method basically consists of four steps (Leber, Polajnar and Buchmeister, 2000; Vurmaz, 2009): (i) Planning, (ii) Determination of the customer expectations, (iii) Creation of house of quality and (iv) Obtaining and interpreting the results. These steps are described below.

(i) Planning: The first step of the QFD process is planning. This step starts with the provision of organizational support. In order to do this, planning of financial resources that are necessary in the operation of QFD and scheduling must be done with the help of company management. Technical support must be provided by establishing a QFD team. QFD team consists of the members of associated sections such as marketing, design, quality, finance and production (Suliyev, 2007). Also, the product and target customers are determined at this stage. During the planning phase, it is an important issue to express target customers, the product and all decisions taken in a clear manner. Yet all topics planned at this stage will ensure a consensus for further subjects among the QFD team.

(ii) Determination of the customer expectations: Determination of the customer expectations is the most critical step of QFD. This step is referred as listening to the voice of the customer. Voice of the customer can be defined as all of the expressions that the customers use in order to indicate their expectations. While customers express some of these expectations clearly, they are not even aware of some of them. QFD team's mission is also to uncover these expectations. A variety of techniques such as Gemba analysis, focus group work, brainstorm meetings, survey technique, face-to-face interviews, market researches can be used in determining the expectations (Ronney, Olfe and Mazur, 2000; Olcay, 2007; Çabuk et.al., 2008; Koç, 2009). At this stage, in addition customers' importance values given to the aforementioned expectations are also determined. Importance values can be obtained directly from customers as well as by using techniques such as the analytic hierarchy process and conjoint analysis (Tuet.al., 2010; Prasad et.al., 2010; Karimi, Mozafari and Asli, 2012).

(iii) The creation of house of quality: House of quality is the basic tool used in the analysis phase of QFD method. House of Quality is a matrix in which customers' expectations are associated with technical requirements and this structure provides determination of how these expectations can be covered (Gauthier, Sodhi and Dewhurst, 2000). The common representation of house of quality is given in Figure.1 (Leary, Burvill and Weir, 2005; Jaiswal, 2012).

Figure.1. The common representation of house of quality
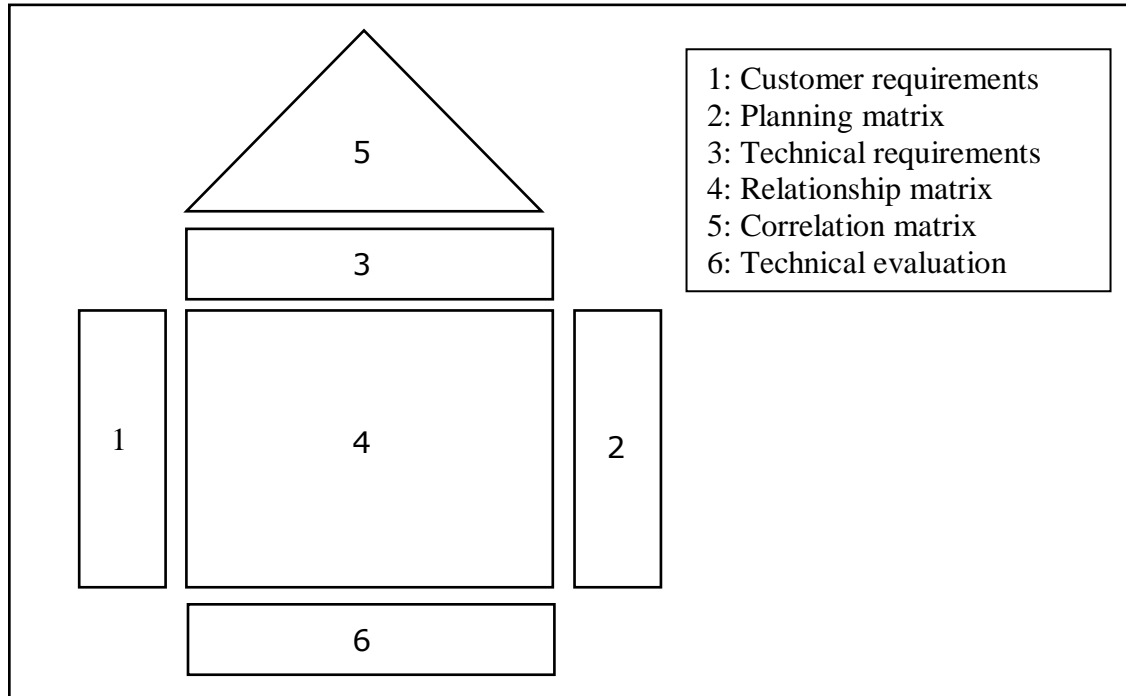
As seen in Figure.1, house of quality is a matrix which consists of several different sections. This five-step process is given below:

Step.1-The creation of customer expectations: The column located on the left of house of quality is the customer expectations section. In this section, there is a list of customer expectations revealed by the QFD team by using a variety of techniques (Savaş and Ay, 2005). If the number of customer expectations is high, reduction are usually made in accordance with the number of the expectations. There are two fundamental reasons for reduction of the number of expectations. First, some of the expectations generally have similar or identical meanings. The second is the removal of difficulties that may be encountered during determination of the importance level of expectations and technical requirements associated with them. If the number of expectations is high, these two cases will increase the amount of time that will be spent significantly and complicate the process. Therefore, if the number of customer expectations is high, it can be reduced by using a number of various appropriate techniques such as factor analysis, cluster analysis, principal components analysis, neural networks, affinity diagram (Grimsaeth, 2005). The similar or identical customer expectations are collected in the same group by using these techniques. Each group represents a determined expression referred to the groups. In this next section of QFD, group names are used as the expectations of customers.

Step.2-The creation of the technical requirements section: On the second floor of the house of quality, characteristics named as the technical requirements section takes place. Technical requirements show how customer expectations can be met in technical sense (Adhaye, 2013). This section of the house of quality is created by QFD team by converting expectations of the customers to the technical requirements. Therefore, all technical requirements described in this section must be associated with at least one expectation.

Step.3-The creation of the relationship matrix: Relationship matrix is located in the body of the house of quality. This matrix shows the relationship between customer expectations which are located on the left side of the house of quality and the technical requirements which are located on the second floor of the house of quality. Therefore in this step, the association of technical requirements and customer expectations and to what extent these requirements are effective in meeting these expectations are shown (Suliyev, 2007). This relationship between expectations and technical requirements are usually rated in the three levels as strong, middle and weak by the QFD team. To illustrate these relationships, symbols, points or letters are used (Arı, 2006). These scoring systems are given in Table.2.

Table.2.Scoring systems

Relationships	Americanscoring system	Symbol	Letter
Strong	9	⊙	G
Middle	3	○	M
Weak	1	△	V

Each cell does not have to be full in the relationship matrix. Aside from that, an expectation may be related to one or more technical requirement as well as a technical requirement may be related to one or more expectations. Blank rows and columns must be checked after setting up the relationship matrix. Blank rows indicate customer expectations which are not associated with any technical requirement; blank columns indicate requirements that do not affect any customer expectations. If there is a blank row, a new technical requirement which is related to the unsatisfied customer expectation must be added. If there is a blank column, the technical requirement must be re-examined and removed from the matrix if there is no association found after re-examination (Yıldız and Baran, 2011).

Technical significance and the normalized importance values for each technical requirement are calculated in the relationship matrix. These calculated values are placed in the last two rows of the relationship matrix. Technical significance is used to determine the technical

requirements of higher priority. These values are found by multiplying the degree of correlation showing the correlation between the expectations and the technical requirements and importance percent score. The normalized importance values are calculated for each important technical requirement after determining the technical significance. The technical requirements with high-normalized importance values will be given the first priority during development (Zaim and Şevkli, 2002).

Step.4- Creating correlation matrix: The correlation matrix illustrating the internal relationships among the technical requirements is located on the roof section of the house of quality. Each cell in this matrix shows the positive or negative correlation between two technical requirements. The cell indicating technical requirements with positive correlation is indicated by "+" sign and a negative correlation with "-" sign (González, Mueller, andMack, 2008). If there are technical requirements with negative correlation, the importance of these requirements will be checked. The technical requirements with negative correlation other than ones correlated with a significant expectation will be ignored the improvements are made in the important technical requirement.

Step.5-Creating the competition and planning matrix: Competition matrix demonstrates the difference between the products of the enterprise and the rival product(s) considering customer expectations. Thereby missing and superior aspects of the enterprise in the market are determined. These matrices are placed in the columns to the right of house of quality. In the evaluation scores 1-5 (1:worst, 5:best) are given for determining the degree of meeting customer expectations of the company's own products and rival products (Zaim and Şevkli, 2002).

Planning matrix is placed next to the competitive matrix on the right side of house of quality. This matrix consists of columns called (i) value of importance for the customer, (ii) target value, (iii) improvement rate, (iv) sales point (v) absolute weight. The value of importance that customer attaches to expectations is in the column of the importance value for a customer. A variety of techniques such as analytic hierarchy process and conjoint analysis can be used in the determination of this value as well as 1-10 points (1:trivial, 10:very important) or Likert-type scale (Tu et.al., 2010; Prasad et.al., 2010). The target value is the column indicating to what degree the company should develop according to its status in order to achieve the objectives. For rating, 1-5 points is used (1:worst, 5:best) and evaluated by the QFD team. Values for the improvement rate are calculated by dividing the points in the target value column by the points in the competitive matrix. The intended purpose of this evaluation is to see the difference

between the current state of the product and the target status and to determine the characteristics to be improved. Sales point is the column where an increase or decrease in the sales is evaluated if customer expectations are satisfied or not. Three scoring levels including "1", "1.2" and "1.5" are taken into consideration for the assessment of the sales point. These ratings are done by the QFD team. If it is expected that a meeting of an expectation have no effect on the sales the sales point is deemed to be "1", if a small amount of increase in sales is considered the sales point is deemed to be "1.2" and if much impact on the sales is considered, it is deemed to be "1.5". The absolute weight located in the last column of the house of quality are determined separately for each individual customer expectations listed in the left side of the house of quality. These values are calculated by multiplying importance value, improvement rate and sales point value (Ikiz and Masoudi, 2008). **(iv)** Obtaining and interpreting the results: Final house of quality is obtained by the creation and placement of each part of the house of quality. In the final step of the QFD process, results on the final house of quality are yielded and interpreted. These results provide useful and introductory information about technical requirements that need to be improved by considering customers' expectations. It also yields importance levels of customers' expectations and leads to determination of the situation in the market of competing products.

THE ANALYSIS OF THE STUDENTS' EXPECTATIONS OF AN EDUCATIONAL INSTITUTION USING QFD METHOD

In this study, ways of giving high-quality education in a language school was researched using QFD method. The institution did not want its name to be mentioned due to confidentiality policy. Therefore, the institution will be referred to as "X language school" for the latter part of this study. X language school offers language education at all levels with experienced staff and technical equipment. The management has an approach that aims to provide training at a grade that meets the expectations of the students and wants to increase the number of students. Therefore, school administrators are aware that the key point of this goal is the students and this goal can only be achieved by listening to their voices. Listening to the voice of the students and to learn their expectations is a difficult task. Therefore, in the study, QFD method, which is a method commonly used to listen to the voice of customers is selected to reach the target of the school management. Process carried out in this study is mentioned below.

Planning

English course is the most assertive training program with top number of students at X language school. Therefore, it was decided that students of this course should be taken into account for

the QFD study. Consequently, in this study, X language school's ways of delivering education of English in better quality and meeting the student expectations were investigated. A QFD team that includes a manager from the X language school, an experienced teacher of English courses and two students was created. Thereby both technical and management support have been provided for QFD study.

Determination of the students' expectations

In this study, student expectations have been identified with a brainstorm meeting which is organized by QFD team and included a group of 15 students enrolled in the English course. First of all, information about the objective of the study was given to students at this meeting. Then students were asked to express their opinions about their expectations from a language school. Meeting lasted about two hours. At the end of the process, specified expectations were determined and students were asked to check and confirm these expectations. After confirmation of all matters, 10 expectations were obtained. After determining the expectations, a survey was held in order to find out the importance values that are related to these matters and to what extent these were met by the school. For this purpose, a questionnaire consisting of two parts was developed. In the first part of the questionnaire, there were 10 questions with 5 Likert-type scale (1:not important, 5:very important) that provides the evaluation of student expectations. In the second part of the questionnaire, situation regarding to what extent the school meets the expectations (1:never satisfied, 5:fully met) was measured by using 5 Likert-type scale. The questionnaire was applied to 250 students of English classes. Due to incomplete filling, 21 questionnaires were eliminated and the data were obtained from 229 students. After testing the reliability of the data, Cronbach's alpha value was found 0.91. As this value is larger than 0.70, it can be said that obtained data is reliable (Özdamar, 1999; Yıldız, Ayhan and Erdoğmuş, 2009).

After the survey, arithmetic mean value was calculated by considering importance values that were given to every expectation and mean values were obtained for each expectation. Students' expectations and importance values are given in Table.3.

Establishment of house of quality

Final house of quality obtained in this study is given in Table.3. The steps in the creation of the final house of quality are as follows:

Step.1: Establishment of customer expectations section: Students' expectations that were obtained from brainstorm meetings have been placed in the first column where the customer's expectations are located.

Step.2: Establishment of technical requirements section: Student expectations were transformed into technical requirements by the QFD team. These technical requirements and related student expectations were given on the second floor of the house of quality.

Step.3: Establishment of the relationship matrix of students' expectations and technical requirements: The relationship between expectations and technical requirements were examined by the QFD team and the relationship matrix is formed. The symbols which is given in Table.2 was used in grading relationships. Moreover, importance values for technical requirements were determined and normalized importance values were calculated by considering these values. The relationship matrix is given in the body part of house of quality and importance values for requirements were given in the last two rows.

Step.4: Creating the correlation matrix between the technical requirements: The QFD team examined the relations of technical requirements and correlation matrix was placed on the roof of the house of quality in Table.3 (see next page).

Step.5: Creating the competition and planning matrix: In this step, a comparison is made between X language school and two competitor language schools. Competition matrix has been determined after a meeting with three teachers whom worked for other language schools and two students who also studied there. For this purpose, participants were asked to compare X language school with its competitors by considering student expectations in mind. The obtained data were given on "X lang. school (Today)", "Competitor A" and "Competitor B" columns on the house of quality in Table.3.

The values in the "Today" column show the expectation's degree of fulfillment by X language school. These values were determined by making use of the data obtained from the second part of the surveys which were applied to students. For this, average of the scores given to each grade of expectations for X language school were taken. Also in this step, the columns on the right side of house of quality which are called planning matrix including value of importance for the customers, target value, improvement rate, sales point, importance score and percent importance levels are determined. The results are given in the related column of the house of quality.

Table 3: House of Quality
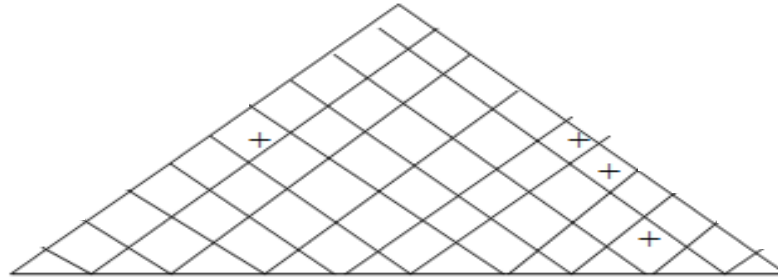
Students' expectations	Values of importance	Teaching Techniques	Time allocation	Communication Skills of the Management	Physical Environment	Social Features	Equipment Sufficiency	Exercises	Safety	Location	Acquirement of Practice	X lang.school (Today)	Competitor A	Competitor B	Target value	Improvement rate	Sales point	Importance score	% importance levels
Qualification of the Teaching Staff	4.57	⊙					O					4.60	3.20	3.20	5	1.09	1.5	7.47	14
Convenience of Lecture Hours	4.26		⊙									4.57	2.64	2.79	5	1.09	1.2	5.57	10
Management's Good Relationship with the Students	4.20			⊙								4.69	1.88	2.25	5	1.07	1.5	6.74	13
School View	3.83				⊙					O		4.88	3.75	2.75	5	1.02	1.2	4.69	9
Excessive Social Facilities	3.30		△			⊙						4.58	2.67	2.17	5	1.09	1	3.60	7
The Technical Support	3.81	O					⊙				△	4.58	1.83	2.17	5	1.09	1.5	6.23	12
Communication Among Students	4.11					O	⊙					4.50	4.5	4	5	1.11	1.2	5.47	10
School Security	3.86								⊙	O		4.50	2	2	5	1.11	1	4.28	8
Easy Access to the School	4.11		△							⊙		5	4	3	5	1	1.2	4.93	9
Given Homework	3.80					O					⊙	4.75	3	4	5	1.05	1	3.99	8
Technical importance value	Σ1111	**162**	**106**	**117**	**81**	**93**	**150**	**114**	**72**	**132**	**84**							52.97	100
Normalized technical importance value	**100**	**15**	**10**	**10**	**7**	**8**	**14**	**10**	**6**	**12**	**8**								

The first column of the planning matrix, values of importance for the customers, are the values for each of the expectations obtained in the survey. These values are listed in the second column of house of quality. The target value column is determined by the QFD team. X language school aims to provide highest quality education therefore the highest level "5" is selected. Improvement rate column is obtained by dividing the values in the target column by the value in the Today column. Sales point values were determined by the QFD team as a result of discussions on taking expectations and how a development on these expectations will affect the sales point. For example, as a result of the meeting, it can be stated that developing expectations of *"qualification of the teaching staff"* has an effect on preferring X language school. Therefore, sales point value is determined as 1.5 for this forecast. Importance score column is calculated by multiplying the values of importance and improvement rate and sales point value. The percentage importance levels column is calculated by dividing each importance score to the total importance score.

CONCLUSION AND RECOMMENDATIONS

In this study, we aimed to reveal students' expectations for a foreign language school and improve the service quality of the institution. QFD method was used for the realization of these objectives. First, the student expectations were determined and importance values were obtained with the help of the developed questionnaire. Then expectations were converted into technical requirements, competitive analysis was done and house of quality has been created. House of quality is given in Table.3.

When house of quality is examined, it is observed that the most important student expectation is the *"qualification of the teaching staff"* (importance score=7.47; percent importance=14). The second important expectation is *"management's good relationship with the students"*. *"The technical support"* is ranked third important point among student expectations. Therefore, these expectations with high importance should be given priority when developing students expectations and there needs to be focused on these expectations. Besides, expectations with low importance points are *"excessive social facilities"* and *"given homework"*. Other students' expectations can be interpreted in a similar manner according to the importance score and/or percent importance.

As mentioned previously, relationship matrix illustrating the relation between expectations and the technical requirements is located in the body of the house of quality. Relationship matrix helps to determine which technical requirements should be improved in order to meet student expectations. When this matrix is analyzed, there appears to be a strong correlation between technical requirements of *"teaching techniques"* and the most important

expectation *"qualification of the teaching staff"*. When the normalized importance value of *"teaching techniques"* is examined, it is seen that technical requirements (normalized importance=15) is the most important technical requirement. Also, there is a moderate correlation between the expectation of *"qualification of the teaching staff"* and *"equipment sufficiency"* technical requirement. It is observed that *"equipment sufficiency"* is the second most important technical requirement in the house of quality (normalized importance=14). Therefore, especially improvements on *"teaching techniques"* and *"equipment sufficiency"* will play an important role in the development of the institution's quality.

When correlation matrix on the roof section of the house of quality is examined, it can be observed that there is a positive correlation between technical requirements of (i) *"teaching techniques"* and *"equipment sufficiency"*, (ii) *"social features"* and *"acquirement of practice"*, (iii) *"equipment sufficiency"* and *"acquirement of practice"* and (iv) *"safety"* and *"location"*. So when the *"equipment sufficiency"* is developed, *"teaching techniques"* and *"acquirement of practice"* will also be affected positively from this development. Likewise, providing an improvement on the *"acquirement of practice"* will improve the *"social features"*. It can be argued that the improvements on *"location"* will provide a positive contribution to *"security"*. As all the correlations between technical requirements are positive in correlation matrix, there is no point of trade-off among requirements.

When the competitive matrix in the house of quality is examined, it occurs that X language school is superior than its competitors in terms of student expectations. For example, satisfaction degree of X language school for the *"qualification of the teaching staff"* is 4.60. The degree of satisfaction of both competitors for this expectation is the same as 3.20. So, the X language school is superior to Competitor A and Competitor B according to these expectations. Other cells in the competition matrix can be interpreted in a similar way taking into account each student's expectations.

The improvement rate column in the planning matrix located in the last four columns of house of quality is calculated by dividing the value in the target column by the value in the today column. This value shows what percentage of the institution's current performance will be upgraded. When the corresponding values are observed, it can be seen that *"communication among students"* and *"school security"* must be improved. Sales point values are determined by taking each of these expectations in meetings by the QFD team and as a result of discussions on how to make an impact on the sales point of the development. For example, developing expectations of *"qualification of the teaching staff"* has an effect on preferring X language school and sales point value is calculated as 1.5 for this forecast.

Based on the results obtained from the house of quality, it has been reported to the managers of X language school that their approach is correct and the quality of education is adequate. However, in order to improve the quality, managers have been informed that teaching techniques applied by the teachers and equipment features of the school should be developed by taking new trends into account. Consequently, this study will contribute to both academic researchers working on this topic and to managers and decision-makers who target improving quality in education. The limitation of this study is the application of QFD process in a specific educational institution. Therefore students' expectations and technical requirements were presented in accordance with this field.

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