

PROCESS IMPROVEMENT: AN APPLICATION AT GAZIOSMANPAŞA UNIVERSITY

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Abstract: The importance society, which well analyzes its past and wants its future with the better living standards, gives to quality increased as much as the importance it gives to education that a business provides a competitive advantage is very closely related to at what degree the scientific methods are applied in it, because these scientific methods emerged from the specialists' analyzing the concept quality and the ways of increasing quality coming into their faces as a result of their discussing on the customer expectations over years. In many businesses producing goods and services, in order to reach the competitive conditions, although it is seen that process improvement techniques similar to this are utilized, it is a disputable issue at what level the applicability of this information taught in high education institutes is. In this study, it is aimed that it is seen that the statistical process improvement techniques, mentioned in the theory, are easily applicable at the application point and that its results will serve the increase of quality, even if at the long term. In the study, examining the basic statistical process control techniques with a group consisting of the students of Faculty of Economic and Administrative Sciences, Gaziosmanpaşa University, the processes, where it is seen that there are some deficiencies, were discussed via the technique of brain storming and, for the processes selected, constituting the fishbone diagrams, the sub-causes were descended. Then, the main process enabling to improve was selected. This process was examined by means of workflow charts and it was studied what will be able to do about improvement and the new flow schemes were drawn. Thanks to this, it became possible to take the quality under control, provide high quality, increase productivity, increase customer satisfaction, and reduce time loss.

Keywords: Statistical Proses Control, Process Improvement, Quality

Introduction

Today, the developing international competition and approach of business and management have urged the institutes to search for perfection. The main esprit of new approach is that it does not regard to anything as occurred and disappeared and accepts everything in the state of occurring. As a result of this search, one of the points reached is also Total Quality Management (TQM) ((Özdemir, 2002: 253).)

TQM approach, instead of result oriented management like classical management approaches, prefers a process and result oriented management. In turn, the controls to be done reveal a state as sorting the defects out and increasing costs. If the result is not only kept under control but also processes, as a result, predicting and preventing the defects faced will be under consideration (Milli Eğitim Bakanlığı, 2007: 21).

TQM approach becomes widespread every passing days and it is recently discussed to implement it in the educational institutes. As in manufacturing businesses, universities have also the inputs, processes, outputs and customers. Universities, due to the conditions introduced by competition, in the direction of the satisfaction, desires, and expectations the internal and external customers, are obliged to increase qualities of the inputs, outputs, and processes (Serin and Aytakin, 2009: 83).

Approach of continuous development, the main philosophy of TQM, constitutes the core of "Developing Process Performance and Process Management. Today, "quality, cost, and speed" are the main elements determining that organizations compete in the national and international areas. This situation inherently forces the institutes to rapidly change and continuously modify their processes. If we adapt this logic to education, instead of supervising the success of education in the last stage of education, in an educational institute, it will be necessary to control (in the more correct expression, to manage) each process that will affect the achievement of student such as (Milli Eğitim Bakanlığı, 2007: 77-78)

- Management,
- Selection and education of human resource,
- Preparation of educational environment,
- Course tools and equipment
- Educational programs

- Education activities
- Counselling services
- Measurement and Assessment etc.

This will bring the possibility to see the deficiencies, if available, and take action in the management before the graduation of student.

Determining, defining, and having, and continuously monitoring the business processes of an organization can be defined as “process management”. However, the point that is important is: If process management incorporates “improvement”, it cannot be called “process management” (Karapinar, 2006: 88)

In education, TQM means meeting the needs and expectations of the internal and external customers i.e. Students, teachers, school employees, guardians, society, and public and private organizations. These expectations are that the internal customers are proud of the education and activities carried out in the school, while the external customers enjoy from the aspect of that the students and graduates gain the behaviors in the desired qualities (Kwan, 1996: 25).

While the educational business provide quality, they have to use the resources effectively without wasting and, in this context, to limit the costs. Measurement of quality has importance as much as forming the conditions of quality. About defining and measuring the quality of products, statistical methods of quality controls were developed. In the businesses producing products, defining and measuring the quality of products can easily materialize, depending on the quantitative criteria and methods. However, due to the idiosyncratic features of service, it becomes difficult to measure it in terms of product (Eleren, 2007: 4-5).

In the study, for the process of educational service in the university to be managed well, beginning from selecting the process to be improved, it was examined what should be done on the name of becoming high quality of output and sustainability of this quality. The main techniques used in the management of processes are brain storming, fishbone diagram, and other process flowcharts. With these techniques, taking under control the changes in the service formation, it is targeted to provide the compatibility of service with the previously determined quality standards, to minimize the defects and cost resulted from this, to provide time saving, and to increase the competitive power, bringing the new and useful skills in the business.

In selecting Gaziosmanpaşa University, established in 1992, as implementation region of the study of process improvement, the aim of contributing the continuation of the success it shows increasingly until today also plays role in the following years. In this improvement study, it was decided that the main techniques of statistical quality control were the most convenient method that can be used in data collecting and measuring.

The identifications conducted in the study are considered to make guidance for the post graduate studies that will be carried out after that. With this study, it is considered that the deficiencies about the quality of education and service in Gaziosmanpaşa University will be noted and it will be a light about improving it.

The Instruments and Methods of Process Improvement

The main aim in developing process performance, reducing the operation steps, with the expression of Bill Gates, is to realize to produce service in the light speed and, eliminating the defects in the operation on the process basis, to reach to zero defect. In this approach, processes are continuously questioned and defined; the variability is measured; whether or not the variability is normal is identified; and, if necessary, applying the corrective operations, the process is developed. Thus, making dominant a process oriented approach, not result oriented, on the system, realizing managerial approach of a zero defect production becomes possible (Milli Eğitim Bakanlığı, 2007: 21).

In total quality management, instruments of statistical process control, one of the instruments used to problem solving and continuous improvement, analyze the abilities of the processes and machinery. The main instruments, utilized in statistical process control, are widely known as seven quality instruments. Especially, in determining and solving the problems that do or will emerge in the application process, and forming the necessary data, it can be said that they are very useful. Statistical methods were designed to facilitate smoothly uncovering the data and provide these data to be evaluated with a systematic approach (Gümüsoğlu, 2000: 139).

Main Statistical Methods

In this section, main seven instruments, emphasized with by Ishikawa, among the instruments and methods of quality improvement, and technique of brain storming are mentioned. These techniques are divided into three categories according to those used in problem defining and problem analyzing.

Table 1. Graphical Techniques Used in Problem Solving

Techniques of Problem Defining	Techniques of problem defining and analyzing	Techniques of Problem Analyzing
Grouping data	Pareto analysis	Histogram
Brain Storming	Cause-Effect Scheme	Distribution Diagram
Control Table		Control Chart

Resource: Bozkurt, 1998: 173

Cause-Effect Diagram (Fishbone Diagram) (Ishikawa Diagram)

Recognition of diagram as an analysis method, its becoming widespread, and adaptation to the activities of quality circle had been thanks to Professor Kaoru Ishikawa. Therefore, the method, known in the literature as Ishikawa diagram and fishbone diagram, due to its shape, is an important instruments the quality circles have used to detect and monitor the causes of quality problems. The points, on which the members of circle generally study related to each factor, are (Şimşek, 2004: 279-280):

- The quality levels of materials, defect rates, and their effects on the production works, elements that should be corrected in the supply works;
- The scopes of documents related to method, their clearance degrees, their sufficiency levels;
- The problems in the use of machinery and equipment and the possibilities to be able to improve;
- Whether or not it is possible to supervise oneself; if available, the way of improving this, identification of the acceptable defects and necessary correction rates; and the time and possibilities that should be provided for labor force;
- The productivity insufficiencies and defects resulted from labor force; elimination of the needs such as education and innovation to be able to continuously improve the quality;
- Fishbone diagram should be used to detect the possible main causes, to relate and put in order the interactions, and to analysis the existing problems (Genel Kurmay Başkanlığı, 1999: 6-1).

Brain Storming

Brain storming was first developed and applied by Greeks. In those ages, brain storming is known as "heuristics". In 1940s, Dr. Alex Osborn, used brain storming in advertisement, his own job. Later, the technique has been begun to be used for the industrial aims (Bozkurt, 1998: 174).

Brain storming is a method serving to detect the problem and solution of problem. It aims to uncover the remained hidden views and think of differently. Everybody participates in brain storming The problems are put in order. The person wanting to speak about these suggests his/her views in order. For brain storming to be able to apply successfully, it is necessary for the problem to be understandable, to avoid the repetition in the solution of problem, and not to be entered the detail while examining the problem (Doğan, 2002: 51).

During brain storming (Doğan, 2002: 51-52),

- The thoughts verbalized cannot be criticized.
- At the beginning stage, any discussion cannot be made related to any thought.
- It is not worried due to the thoughts verbalized.
- Everybody listens to each other carefully.
- Conflicion environment cannot be formed.
- Each thought is written onto paper or blackboard. While being written, the name of opinion's owner is not written.
- Everybody is obliged to talk at least one time.

The difficulties Faced in Applying the Instruments and Methods of Process Improvement

In application of total quality management, some difficulties are faced.

Table 2. Application Difficulties of Total Quality Management

Difficulties Resulted from the Management	Lack of Quality Policies and their Aims
	Deficiency of Coordination
	Data Insufficiency
	That quality cannot be thought of a function of management
	That the management makes an assessment according to the amount of product produced; that quality responsibility cannot be thought of at the business level
Human –Education Difficulties	Participation in the seminars about quality and deficiency of reading
	Educational deficiency about the basic statistical methods
	Not being able to apply the new procedures on quality
	Not being able to be understood the concept and policy of quality
	Not being able to sufficiently utilize from the motivational methods
	High employee turnover rates
	Giving responsibility to those having inadequate educational level
Technological and Economic Difficulties	Insufficiency of the material, equipment, and the other facilities used in quality control and development
	Insufficiency in applying industrial methodology and measurements
Difficulties Resulted from the External Factors	The effect of government policy on producing high quality product
	The delayed and disconnected relationships between TSE, MPM, DPT, university and industry
	Unconscious consumer and shortsightedness
	Low quality in raw material and industry

Resource : Efil, 1995: 47-48

Application

In order to prove the applicability of the theoretical information in the studies of process improvement, in this section of study, an application study has been carried out. Application study in the Faculty of Economic and Administrative Science (FEAS), Gaziosmanpaşa University (GOU). The procedure of data collecting was predominantly in the Department of Health, Culture, and Sports (DHCS). In this section, information has been given about GOU and DHCS and, reporting that from which stages are passed until arriving the subject of process flows belonging to DHC, flow charts have been discussed.

Importance of the Study

Nowadays, an intensive competition is experienced in the global market. In this competition, raising the students having quality that can meet the expectations of business world is increasingly gaining importance. If the educational system fails in providing the qualified graduates (outputs), either businesses will pay for the price of this unsuccessfulness, sending billions for education, or society, bearing poor quality goods and services (Yıldız and Ardiç, 1999: 73). In view of this, the importance given to education by society analyzing well its past and wanting to shape its future with the better living standards has also increased as much as the importance given to quality by it.

The fact that high education institutes are not profit-oriented does not mean that they cannot also be managed with business management rules like economic businesses. Just as in the other businesses, also in businesses, professionalism and forming a good infrastructure became obligatory, because that a business provides a competitive advantage depends on its presenting good products and services as well as its being managed by means of the scientific methods (Karapınar, 2006: 171).

In this study, in high education institute, the applicability of the thought to increase the quality by improving process was shown.

The Aim of the Study

The aim of application study is to encourage for the individuals to carry out their jobs with a continuously increasing quality and, teaching the techniques they can use in this direction, to help them maintain the flow in the most efficient way. In many businesses producing the goods and services, although it is seen that improvement techniques and, etc. were utilized, in high education institutes, it is a discussable issue that the applicability this information they taught is at what level. With this study, in the university having the educational process following the primary education, it is aimed

- to increase the student satisfaction, providing improvement in the processes the students desired;
- to reveal the effect of Statistical Process Control Techniques on quality improvement process;
- to enable employees to recognize their processes, making the process maps, where they can see that the works reach them, passing from which stages
- to identify and eliminate the undue activities leading time loss by analyzing work processes;
- to enable employees to realize their works in a TQM based order; and
- to provide to be seen that some techniques applied in theory are also readily applicable at the application and that its results will provide benefit even if in long period.

Material and Method of Study

While the theoretical data of study are formed, the various domestic and foreign authors and internet resources were utilized. The application data were first begun to be formed in a meeting held with the students of GOU. The other data were obtained from DHCS. In the scope of quality improvement process, due to the fact that the methods of quality improvement are numerous and comprehensive, the study was limited with Techniques of Statistical Process Control (SPS). In examination process, first of all, brain storming was made with the student group and then, the subjects selected for improvement in brain storming are divided into their causes by means of fishbone diagram. With work flowchart, the current flow of process was examined and the solution suggestions toward the improvement of process were developed. Lastly, the new flowcharts containing suggestions were formed. For drawing of fishbone diagrams, RFFlow Program was used, while for drawing of flowcharts, Microsoft Office Visio 2007 Program (Yılmaz, 2011).

Results

Simple Process Development Model

Step 1: Forming the suitable team

The suitable team was determined by the team leader. Some interviews were carried out with a group of 8 people, which consist of the students of the senior students of department of economics, also including the students representative as well as a group of 10 people consisting of the students of business management and economics club. After the suitable day and hour for interview was determined by the team leader, the students were informed about the subject of thesis and the study that will be carried together in the direction of Power Point presentation prepared. Giving information lasted about 45 minutes. During presentation, the short and brief information was given about the approach to problem solving, sorts of problems, how to be the process of problem solving, old and new quality definitions, PUKÖ cycle, quality circle, how to be able to the effective teamwork, brain storming, and 7 main techniques of statistical process control. After informing, the stage of brain storming was passed and this stage also lasted about 1 hour. During brain storming, the students expressed the various ideas they want to be exchanged or improved without remaining any press. As a result of brain storming performed, about the first three headings receiving the highest vote in voting, the diagrams of fishbone were formed. In turn, a single process was selected for improvement. The meeting lasted about three hours and it was finished by agreeing on again meeting, if necessary.

Step 2: Selection of Process and Determination of Target of Process Development

As the scope of the process to be improved, Faculty of Economics and Administrative Science was selected. Together with the team, formed in this direction, the technique of brain storming was applied and the problem of “Lengthiness of Process to Take Permission for Social Activities”. The technique of brain stormed realized was shown below stage by stage.

In the first stage of the technique of brain storming carried out with a group of 8 people from the students of department of economics and business management and a committee of 10 people from the students of club of business management and economics, the following headings emerged.

- a) That classroom size is large and that the equipment in class is insufficient
- b) That the cleanness of school is inadequate
- c) That the working salons of faculty is small
- d) That canteens are insufficient both as food and as area
- e) The rough behaviors exhibited by the research assistants against the students
- f) The lengthiness and difficulty of the process to take permission for social activities
- g) Insufficiency of professional seminar
- h) Insufficiency of technical travel
- i) That summer school continues at only Faculty of Economics and Administrative Science
- j) Insufficiency of academics
- k) In the periods of enrollment, due to the fact that the approvals of supervisor and deliveries of bank receipt correspond to vocation periods, to be obliged to arrive earlier to the school
- l) That academic members cannot see the pictures of students in the student information system
- m) That the computers in computer labs are broken
- n) Deficiency of bank to sit down in front of the faculty building
- o) Lack of garbage can in front of the faculty building
- p) Lack of activity area for the different sportive branches
- q) Insufficiency of coverage area of wireless internet

In the second stage, voting was passed and the students had right to vote for each heading. As a result of voting, the vote each heading has is:

Table 3. The distribution of votes taken in the second stage

<u>Headings</u>	<u>Votes</u>
a) That classroom size is large and that the equipment in class is insufficient	13
b) That the cleanness of school is inadequate	9
c) That the working salons of faculty is small	1
d) That canteens are insufficient both as food and as area	12
e) The rough behaviors exhibited by the research assistants against the students	18
f) The lengthiness and difficulty of the process to take permission for social activities	7
g) Insufficiency of professional seminar	6
h) Insufficiency of technical travel	2
i) That summer school continues at only Faculty of Economics and Administrative Science	18
j) Insufficiency of academics	13
k) In the periods of enrollment, due to the fact that the approvals of supervisor and deliveries of bank receipt correspond to vocation periods, to be obliged to arrive earlier to the school	10
l) That academic members cannot see the pictures of students in the student information system	1
m) That the computers in computer labs are broken	5
n) Deficiency of bank to sit down in front of the faculty building	14
o) Lack of garbage can in front of the faculty	11
p) Lack of activity area for the different sportive branches	10
q) Insufficiency of coverage area of wireless internet	3

In the third stage, each student has the right to use only one vote for each heading.

Table 4. Distribution of votes received in the third stage

Headings	Votes
a) That classroom size is large and that the equipment in class is insufficient	1
b) That the cleanness of school is inadequate	0
c) That the working salons of faculty is small	0
d) That canteens are insufficient both as food and as area	1
e) The rough behaviors exhibited by the research assistants against the students	4
f) The lengthiness and difficulty of the process to take permission for social activities	2
g) Insufficiency of professional seminar	0
h) Insufficiency of technical travel	0
i) That summer school continues at only Faculty of Economics and Administrative Science	9
j) Insufficiency of academics	0
k) In the periods of enrollment, due to the fact that the approvals of supervisor and deliveries of bank receipt correspond to vocation periods, to be obliged to arrive earlier to the school	1
l) That academic members cannot see the pictures of students in the student information system	0
m) That the computers in computer labs are broken	0
n) Deficiency of bank to sit down in front of the faculty building	0
o) Lack of garbage can in front of the faculty	0
p) Lack of activity area for the different sportive branches	0
q) Insufficiency of coverage area of wireless internet	0

As a result of brain storming, 3 problems arouse. These are:

- 1) That summer school continues in only Faculty of Economics and Administrative Science
- 2) The rough behaviors exhibited by the research assistants against the students
- 3) The lengthiness and difficulty of the process to take permission for social activities

Although the students of Club of Business Management And Economics said that they did not suffer from the issue taking place in the third place, the other students said that they suffered from it. As the cause of that the club students did not complain about it, the opinion that the clubs cooperating with academic supervisor can take permission more easily.

Step 3: Identifying the Causes of Inadequcy

In the third stage, for the first three headings selected for improvement by means of brain storming, the fishbone diagram was drawn together with the team. Thanks to this, identifying the main reasons was aimed. While the fishbone diagram was used, the main reasons vary according to the sort of problem. The main reasons that will constitute in this problem were classified as Administration, Human, and Method.

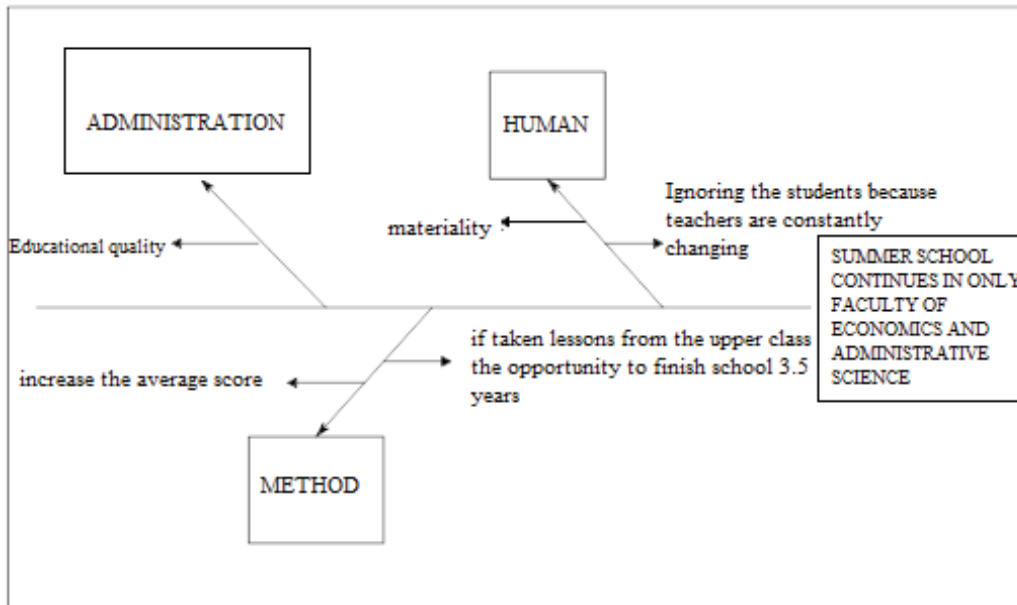


Figure 1. Fishbone Diagram of that summer school continues in only Faculty of Economics and Administrative Science:

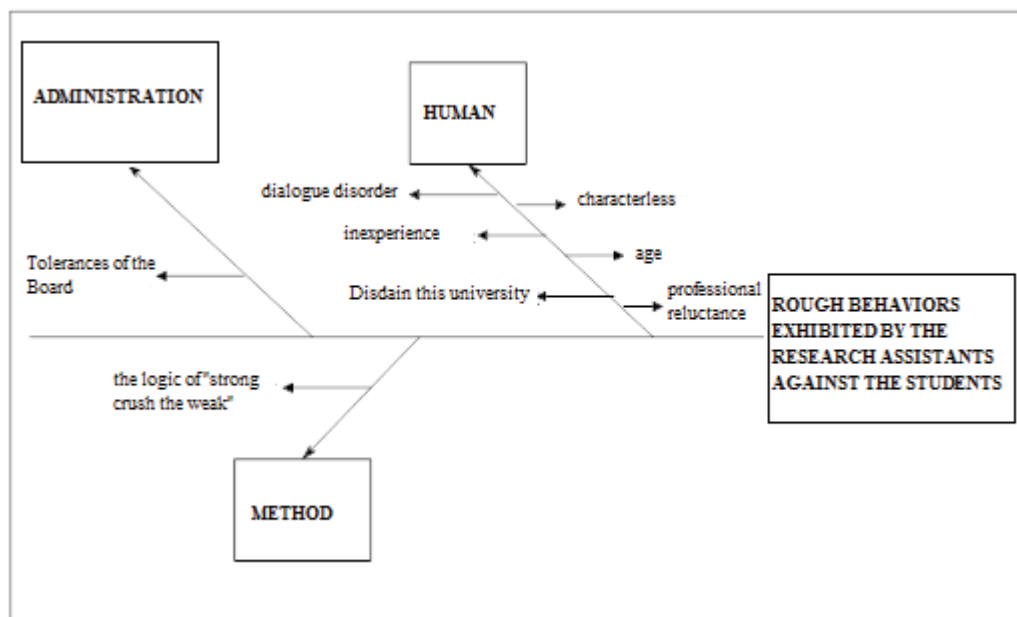


Figure 2. Fishbone Diagram of the rough behaviors exhibited by the research assistants against the students

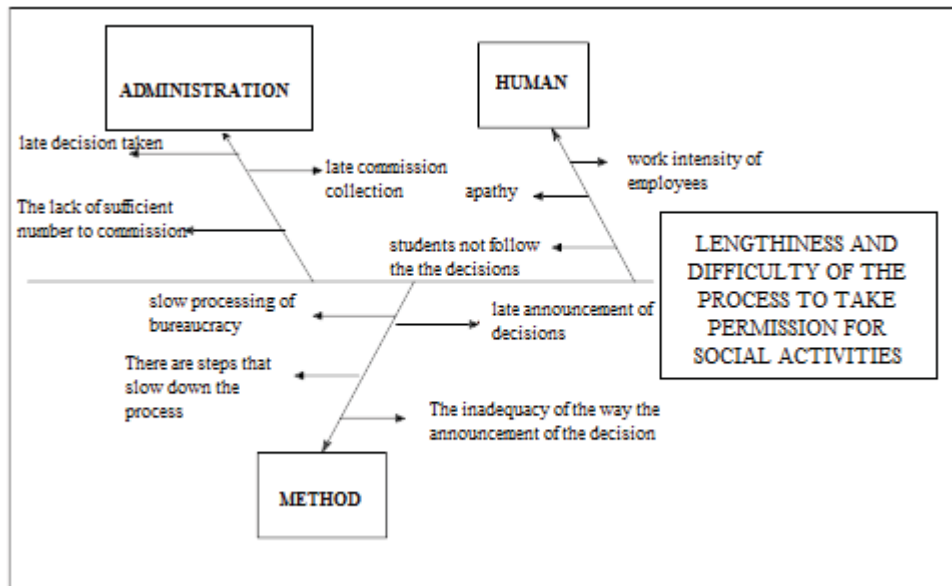


Figure 3. Fishbone Diagram of the lengthiness and difficulty of the process to take permission for social activities

It is seen that from the diagram drawn, two processes i.e. the headings of “Elimination of Summer School” and “the rough behaviors exhibited by the research assistants against the students” will not be the subject of application in this thesis study. The reason for this is that the rough behaviors of research assistants is a problem of organizational behavior and that its improvement only becomes possible with long termed educational studies and institutional culture. That the issue of summer school is a legal issue and that it is in the scope of school administration show that these are out of the scope of application study. When these three problems are examined, the problem that is appropriate for carrying out the study of process improvement was determined as “the lengthiness and difficulty of the process to take permission for social activities”

As will be seen from Figure 3, in the process “the lengthiness and difficulty of the process to take permission for social activities”, while the causes resulted from management were determined as that the people in enough number cannot meet for committee, that committee cannot be met in time, and that the decisions are made late, the causes resulted from human emerged as indifference of process employees, busy works, and delay of works. In addition to this, that the students, as individuals, do not follow the conclusion that will turn out from commission was also shown as one of the reasons that will extend the process. Finally, the causes resulted from the method were specified as that bureaucracy slowly runs, that there are some steps making the process slower, that the way of announcing the decision to the students are not enough, and that the announcement to the students are reported

Step 4: Forming the flowchart of the process selected

In this step, the data were sought from the website and the flowcharts of some sample universities were examined. Later, it was interviewed with Head of Department of Culture and Sports, Gaziosmanpaşa University, and the people he directed to and the sample processes were compared to the processes applied in Gaziosmanpaşa University. However, it was seen that the although process steps in Gaziosmanpaşa University are carried out in similar way to the other universities, they do not have a flowchart, on which the process steps can be followed. It was understood that the flowcharts that will be drawn in the application in this direction will not only improve the process but also a document will emerge that will provide a benefit to Department of Health, Culture, and Sports. As a result of interviews, the flowchart of one sample processes, applied in of GOU, were drawn. Although DHCS is intertwined with many processes, the reason for selecting the only one processes is that they are the processes closely concerning the students and that they complain about them.

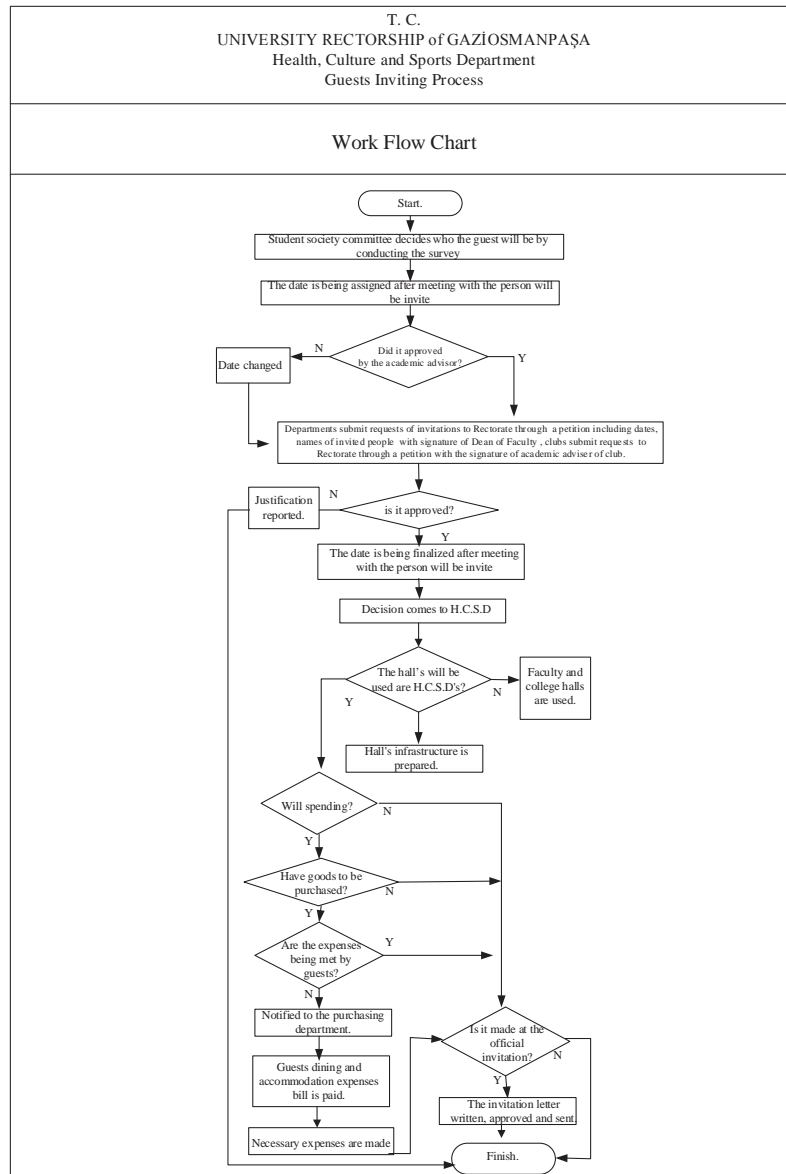


Figure 4. Work Flowchart of the Process for Guest Inviting

Step 5: Simplification of the process and making modifications

When three flowcharts are investigated drawn above, reducing some operation steps that may cause the permission decisions to turn out late in guest inviting, the way of process simplification was gone. These operation steps reduced were generally the most approved decisions. Besides this, in the new formed flowcharts, the staff, who serves in these steps, and the relevant legislation and regulations were given place. This will also give information regarding to who performs which task, when new staff was recruited in the relevant unit and, provided that any disagreement occurs about the decisions made, it will enable the relevant legislations and rules to be easily reached.

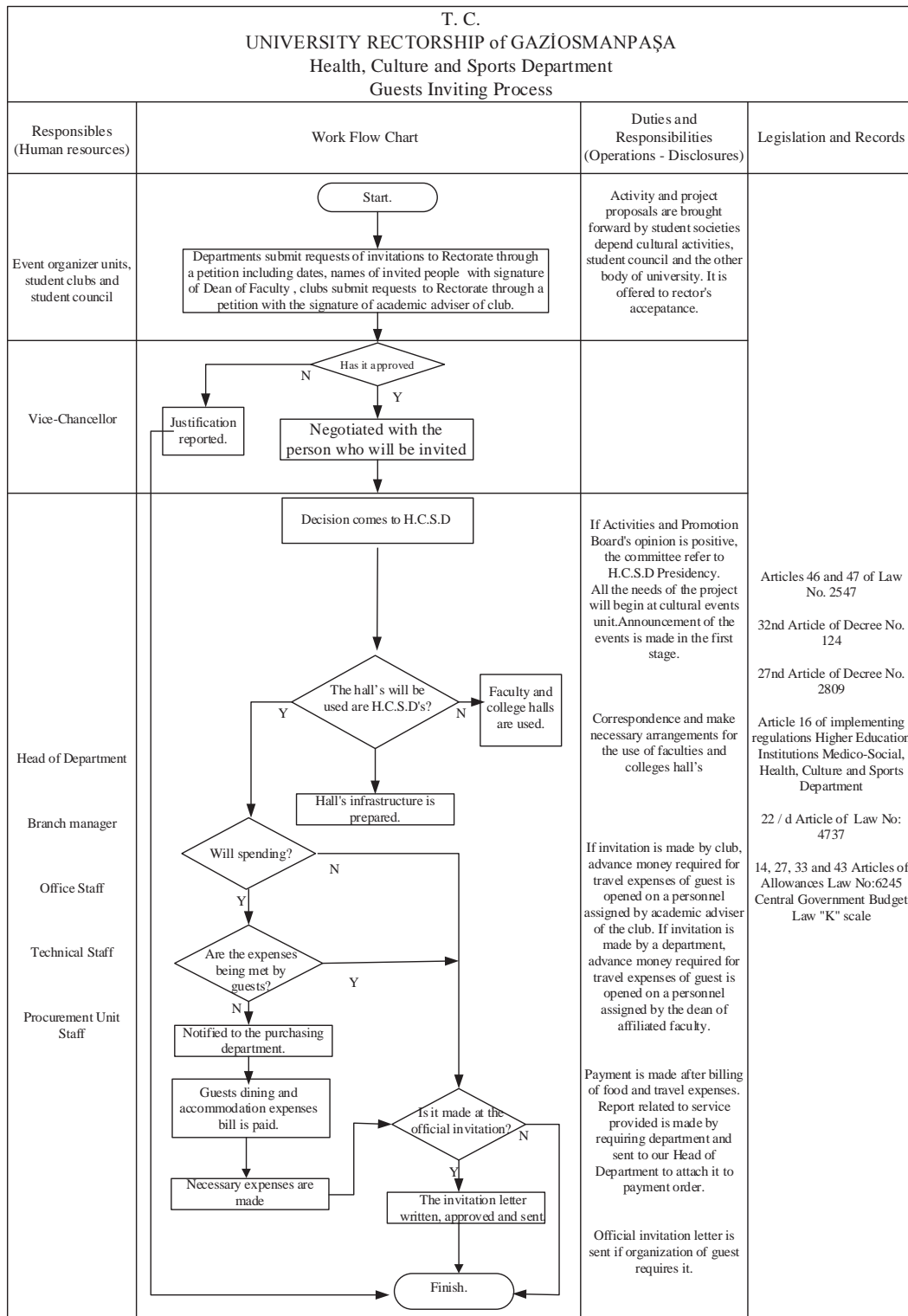


Figure 5. Work Flowchart of the Process For Guest Inviting after Improvement

Conclusion and Suggestions

Statistical Process Control consists of techniques many employees, whatever whose educational level are, who provide the process control in a simple expression and, with its underlying real aim, to make improvement, can apply to the work process in the businesses, whether they produce goods or services. In this study, of main 7 main statistical process control techniques, using the fishbone diagram and flowcharts as well as brain storming, the process selected was analyzed and suggestions were presented toward improving them.

At the beginning stage of study carried out, although the issue of improvement are considered to be performed on the subject concerning the students of Faculty of Economics and Administrative Sciences, the direction of the study turned into the issue concerning all students of GOU, because Department of Health, Culture, and Sports is an institute supporting the club activities of all faculties and vocational high schools in GOU. This, an improvement made in DHCS processes will affect all of the students. Moreover, it not only affects the students but also it will also an easiness for the employees of DHCS and enable their works to improve more systematically. Since DGCS is an institute subjecting to GOU, for the exact consciousness of quality, which is in interest area of Total Quality Management, to place, the participation of all employees in the institute will become provided.

The study of process improvement passed through the following stages.

After the team consisting of the students selected was informed about the subject, the subjects they wanted to be improved by means of brain storming were put in order and, with a voting system of 3 rounds, the three headings receiving the most votes were determined.

For the three headings determined, again together with the team, fishbone diagrams were drawn and the sub-problems causing these three headings to become a problem were examined.

After fishbone diagrams were examined, the first one of the first two headings were understood to be a subject on the legislation and school regulation and it was seen that exchanging it would not be in these subject of thesis. It was also seen that the other heading is a problem of organizational behavior and improving it was possible with educational studies taking long time, which is in the initiative of university administration.

The remaining third subject was determined as the application subject of thesis study and, for the course that is currently going on to understand better, the interviews were made with both students and head of DHCS and the other employees directed by him. As a result of interviews, it was seen that "Process For Guest Inviting", which affect the students, were also carried out in DHCS as in the other universities, but flowcharts are of sin qua none of process improvement are not present within institute. Again, in the interviews, in this study, it was talked about that forming flowcharts are useful to the institute and, with the support of head of DHCS, the necessary information was easily reached. Firstly, for DHCS, the flowcharts of this work process were drawn. Later, GOU flows were compared with flows of another university, taken as a basis, as a result of web searches and the new flowcharts, where optimum effectiveness will be provided. In these flowcharts, just as operational steps take place, the staff, who is responsible for these steps, and that these tasks were also carried out in the scope of which regulations can be clearly seen. In the new flowcharts drawn, reducing the undue bureaucracy and accelerating the process, reducing the extra operational steps, were provided so that this also became a result the students making brain storming exactly wanted. In the process of the students' taking permission for the social activities, for the time to wait for the decision to be shortened, it is also considered that announcing the permission announcement through web address of university will facilitate the follow of decision by the students and it is a simpler way in terms of administration to report to whom may concern.

The study carried out has of course an importance in terms of process improvement; however, this is not seen enough. For GOU to be able sign the bigger successes in the sharp competitive environment, it is necessary for the studies like this study to increase and to be supported by the academics and administration; because quality improvement is a state requiring continuity and concerning all the employees in the institute.

References

- Akın, B. ve Öztürk, E., (2005), “İstatistik Proses Kontrol Tekniklerinin Bilgisayar Ortamında Uygulanması”, *Marmara Üniversitesi, İ.İ.B.F., Ekonometri Bölümü, Sakarya Üniversitesi, Gebze Meslek Yüksekokulu*
- Al-Turki, U. ve Andijani, A., (1997), “Quality Control Practices in Saudi Arabia: Survey Result”, *Production Planning & Control, Volume 8, Issue 8, Pages 726 - 730*
- Aslan, T., (2007), *Toplam Kalite Yönetimi: Kamu Alanındaki Uygulamaların Değerlendirilmesi*, yayınlanmamış yüksek lisans tezi, Kahramanmaraş Sütçü İmam Üniversitesi, Sosyal Bilimleri Enstitüsü, İşletme Anabilim Dalı
- Bengisu, M., (2007), “Yüksek Eğitimde Toplam Kalite Yönetimi”, *Journal Of Yaşar University, 2(7), 739-749*
- Bircan, H. ve Gedik, H., (2003), “Tekstil Sektöründe İstatistiksel Proses Kontrol Teknikleri Uygulaması Üzerine Bir Deneme”, *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi, Cilt 4, Sayı 2*
- Bozkurt, R., (1998), *Kalite İyileştirme Araç ve Yöntemleri*, Milli Produktivite Merkezi Yayınları, No:630, Ankara
- Cheng, P.C.-H., Dawson, S. D., (1998), “A Study of Statistical Process Control: Practice, Problems and Training Needs”, *Total Quality Management & Business Excellence, Volume 9, Issue 1 February, Pages 3 - 20*
- Corbett, C.J. ve Pan J., (2002), “Evaluating Environmental Performance Using Statistical Process Control Techniques”, *European Journal of Operational Research 139, 68-83*
- Deros, B. M., Rahman, M. N., Ismail, A. R., Yee, L. W. ve Zain, R.M., (2010), “Application of Statistical Process Control Technique for Evaluating Machine Capability: A Case Study”, *AIJSTPME 3(1): 15-22, King Mongkut's University of Technology North Bangkok Press, Bangkok, Thailand*
- Doğan, E., (2002), *Eğitimde Toplam Kalite Yönetimi*, Academyplus Yayınevi, Ankara
- Efil, İ., (1995), *Toplam Kalite Yönetimi ve Toplam Kaliteye Ulaşmada Önemli Bir Araç İSO 9000 Kalite Güvencesi Sistemi*, Uludağ Üniversitesi Basımevi, Bursa
- Eleren, A., (2007), “Eğitim Başarısının Artırılmasında Süreç Geliştirme Yöntemlerinin Kullanılması ve Bir Uygulama”, *Afyon Kocatepe Üniversitesi, İ.İ.B.F. Dergisi (C.IX, S II, 2007)*
- Elevli, S., ve Behdioğlu, S., (2006), “İstatistiksel Proses Kontrolü Teknikleri İle Kömür Kalitesindeki Değişkenliğin Belirlenmesi”, *Madencilik, Cilt 45, Sayı 3, Sayfa 19-26, Eylül 2006 Vol.45, No.3, Pp 19-26, September 2006*
- Erişim: “Etkin Süreç Yönetimi ve İSO 9001:2000”, 12.01.2011. Standart Bm Trada Belgelendirme A.Ş. (www.ormanendustri.net/wp-content/uploads/.../etkin_sarec_yonetimi.pdf)
- Eroğlu, C., (2006), *Süreç İyileştirme ve Bir Uygulama*, yayınlanmamış yüksek lisans tezi, Marmara Üniversitesi, Sosyal Bilimler Enstitüsü, İşletme Anabilim Dalı, Uluslararası Kalite Yönetimi Bilim Dalı, İstanbul
- Fuhrmeister, E., (1996), “Statistical Process Control Application on Customer Order Forecasting Techniques at a Dairy Company”, *Production Scheduler, Dairy Company, Bachelor of Science, Chemical Engineering University of Colorado*
- Gencil, U. (2001), “Yükseköğretim Hizmetlerinde Toplam Kalite Yönetimi ve Akreditasyon”, *Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, Cilt 3, Sayı 3, ss. 164-213.*
- Genel Kurmay Başkanlığı, Deniz Kuvvetleri Komutanlığı, APGE Başkanları, (1999), *Temel Süreç Geliştirme El Kitabı*, Dz. K. K. Kh. Basımevi, Ankara
- Gümüšoğlu, Ş., (2000), *İstatistiksel Kalite Kontrolü ve Toplam Kalite Yönetimi Araçları*, Beta Basım Yayım Dağıtım A.Ş., İstanbul
- Joelianto, E. ve Kadarusman L., (2010), “Industrial Control Quality Improvement Using Statistical Process Control: Tennessee Eastman Process Simulation Case”, *Internetworking Indonesia Journal, Vol.2/No.1*
- Imai, M., (1999), *Kaizen, Japonya'nın Rekabetteki Başarısının Anahtarı*, Kalder Yayınları, No:21, İstanbul
- Karapınar, S., (2006), *İş Akışı Analizi Yoluyla Bir Hastane İşletmesinde Süreç İyileştirme Çalışması*, yayınlanmamış yüksek lisans tezi, Gazi Üniversitesi, Sosyal Bilimler Enstitüsü, İşletme Anabilim Dalı, Hastane İşletmeciliği Bilim Dalı, Ankara
- Kayaalp, İ. D. ve Erdoğan M. Ç., (2009), “Konfeksiyon İşletmesinde Dikiş Hatalarının İstatistiksel Proses Kontrol Yöntemlerini Kullanarak Azaltılması”, *Tekstil ve Konfeksiyon 2/2009*
- Kwan, P.Y.K. (1996), “Application of Total Quality Management in Education: Retrospect and Prospect”, *Division of Commerce, City University of Hong Kong, Hong Kong*
- Laosiritaworn, W. ve Bunjongjit, T., (2010), “Visual Basic Application for Statistical Process Control: A Case of Metal Frame for Actuator Production Process”, *Proceedings of the International Multi Conference of Engineers and Computer Scientists, Vol III, March17-19, Hong-Kong*
- Madan, A.K. ve Mishra, R.S., (2011), “Application of Statistical Process Control for Quality Management in Technical Education”, *Global Journal of Finance and Management, ISSN 0975 - 6477 Volume 3, Number 1, pp. 25-33*
- Milli Eğitim Bakanlığı, Personel Genel Müdürlüğü, (2007), *Eğitimde Kalite Ödülü El Kitabı*, Ankara

- Mohammed, M. A., (2004), "Using Statistical Process Control to Improve the Quality of Health Care", *Qual Saf Health Care* 13:243–245. Doi: 10.1136/Qshc.011650
- Özcan, S., (2003), "İstatistiksel Proses Kontrol Tekniklerinden Pareto Analizi ve Çimento Sanayiinde Bir Uygulama", *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi*, Cilt 2, Sayı 2
- Özdemir, S., (2002), "Eğitimde Toplam Kalite Yönetimi", *Kırgızistan-Türkiye Manas Üniversitesi Sosyal Bilimler Dergisi*, Sayı 2: ss.253-270..
- Özkan, Y., (2000), *Toplam Kalite*, Sakarya Üniversitesi, İktisadi İdari Bilimler Fakültesi
- Pamir, G., (1997), *Süreç Yönetimi ve Bir Süreç Geliştirme Uygulaması*, yayınlanmamış yüksek lisans tezi, İstanbul Teknik Üniversitesi, İstanbul
- Rita, S. and Lakshmi, K., (2009), "Mechanics of How to Apply Deming's PDCA Cycle to Management Education",
(SSRN: <http://ssrn.com/abstract=1353763>)
- Saraç, Ö., ve Özdemir, G., (2003), "Mermer Fayanslarının Boyutlandırmasında İstatistiksel Kalite Kontrolü", *Türkiye IV. Mermer Sempozyumu (Mersem'2003) Bildiriler Kitabı 18-19 Aralık*
- Scordaki, A. ve Psarakis, S. (2005), "Statistical Process Control in Service Industry an Application with Real Data in a Commercial Company", *Proc. 7th Hellenic European Conference on Computer Mathematics and Its Applications*
- Serin, H., ve AYTEKİN, A., (2009), "Yüksek Öğretimde Toplam Kalite Yönetimi", *Bartın Orman Fakültesi Dergisi*, Cilt: 11, Sayı: 15, 83-93 ISSN: 1302-0943 EISSN: 1308-5875
- Smeti, E.M., Thanasoulis, N.C., Kousouris, L.P. ve, Tzoumerkas, P.C., (2007), "An Approach for the Application of Statistical Process Control Techniques for Quality Improvement of Treated Water", *Elsevier, Desalination* 213 (2007) 273–281
- Şimşek, M., (2004), *Toplam Kalite Yönetimi*, Alfa Basım Yayım Dağıtım Ltd. Şti., İstanbul
- Tan, T., (2008), *İlaç Sektöründe Kalite İyileştirme Teknikleri ve Bir Uygulama*, yayınlanmamış yüksek lisans tezi, Marmara Üniversitesi, Sosyal Bilimler Enstitüsü, İşletme Anabilim Dalı, Uluslararası Kalite Yönetimi Bilim Dalı, İstanbul
- Thareja, P., (2008), "Deming Metrics to Measure the Quality of World (D(R)E(A)Ming for a Quality World", 20.03.2011. Head, Metal Engineering Deptt Punjab Engineering College, Chandigarh.
(<http://ssrn.com/abstract=1495043>)
- Uryan, B., (2005), "Toplam Kalite Yönetimi", *Mevzuat Dergisi*, Yıl 5, Sayı 55
- Woodall, W., (2000), "Controversies and Contradictions in Statistical Process Control", *Journal of Quality Technology Session at the 44th Annual Fall Technical Conference of the Chemical and Process Industries Division and Statistics Division of the American Society for Quality and the Section on Physical & Engineering Sciences of the American Statistical Association in Minneapolis, Minnesota, October 12–13*
- Yıldız, G., ve Ardıç, K., (1999), "Eğitimde Toplam Kalite Yönetimi", *Sakarya Üniversitesi, Sosyal Bilimler Dergisi* 1999, Sayfa: 73-82
- Yiğit, M., (2009), *Altı Sigma' da Kullanılan İstatistiksel Yöntemlerin İncelenmesi*, yayınlanmamış yüksek lisans tezi, Çukurova Üniversitesi, Fen Bilimleri Enstitüsü, İstatistik Anabilim Dalı, Adana
- Yücel, Ö., (2003), "Dikimde Hata Oluşturan Nedenlerin Belirlenmesine Yönelik İstatistiksel Bir Araştırma", *Pamukkale Üniversitesi, Mühendislik Fakültesi, Mühendislik Bilimleri Dergisi*, Sayı :3, sayfa: 327-332
- Yücel, M., (2007), "Toplam Kalite Kontrolü Açısından İstatistiksel Süreç Kontrol Tekniklerinin Önemi", 8. *Türkiye Ekonometri ve İstatistik Kongresi, İnönü Üniversitesi Malatya*
- Zeyveli, M. ve Selalmaz, E., (2008), "İstatistiksel Proses Kontrol Yöntemlerinden Pareto Analizi ve Sebep-Sonuç Grafiğinin Zincir İmalatına Uygulanması", *Teknoloji*, Cilt 11(4), 267-274
- Yılmaz, M. (2011). Süreç iyileştirme (Gaziosmanpaşa Üniversitesi'nde bir uygulama). *Yüksek lisans tezi Gaziosmanpaşa Üniversitesi Sosyal Bilimleri Enstitüsü*; 101 (unpublished).