A New Framework Based on EFQM to Achieve Continuous Improvement in Higher Education Institutions (HEIs)

Mehrdad Soltanifar

Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of requirement for degree of

Master of Science
in
Industrial Engineering

Eastern Mediterranean University
February 2015
Gazimagusa, North Cyprus

Approval of the Institute of Graduate Studies and Research

Prof. Dr. Serhan Çiftçioğlu
Acting Director

I certify that this thesis satisfies the requirements as a thesis for the degree of Master of Science in Industrial Engineering.

Asst. Prof. Dr. Gökhan İzbırak
Chair, Department of Industrial Engineering

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Master of Science in Industrial Engineering.

Asst. Prof. Dr. Gökhan İzbırak
Supervisor

Examining Committee

1. Assoc. Prof. Dr. Adham Mackieh
2. Asst. Prof. Dr. Sahand Daneshvar
3. Asst. Prof. Dr. Gökhan İzbırak

ABSTRACT

There is no room for doubt that effort to improve is necessary and inevitable in this fast pace of global changes. The aim of this thesis is to define a new framework to assess the levels of continuous improvement in Industrial Engineering Department of Eastern Mediterranean University as a case study. The thesis suggests that excellence models may be applicable to this department, although there are difficulties to verify the quality in Higher Education Institutions (HEIs). European Foundation for Quality Management (EFQM) excellence model was chosen to be implemented and evaluate the results. Both descriptive and analytical approach was adapted and the relevant data collected through questionnaires based on EFQM standard criteria, and analyzed by using SPSS 22. The questionnaires were distributed to a sample of 94 academic leaders (deans and chairs), staff (lecturers, assistants and administrative personnel) and students. The findings show that achieving excellence in Higher Education Institutions has some differences from business organizations. Furthermore, a new practice that increases management commitment in order to promote the process was suggested. This thesis expands the theoretical literature about continuous improvement in HEIs and offers some practical improvement projects.

Keywords: Continuous improvement, Higher Education institutions, EFQM, Management commitment

ÖZ

Bu tezin amacı Doğu Akdeniz Üniversitesi endüstri mühendisliği bölümünde var olan sürekli iyileştirme çabalarının değerlendirilebilmesi için yeni bir çerçeve tanımlamaktır. Çalışmada Avrupa Kalite Yönetimi Vakfı'nın (European Foundation for Quality Management - EFQM) mükemmellik modeli esas alınmış ve 94 personelden (dekan, bölüm başkanı, hoca, asistan, idari personel ve öğrenciden) anket yolu ile veriler toplanıp SPSS 22 ile değerlendirilmiştir. Bu çalışmada yükseköğretim kurumlarında mükemmelliğe ulaşmanın şirketlerinkinden farklı olduğu tespit edilmiş ve yükseköğretim kurum yöneticilerinin süreci daha iyiüstlenebilmeleri için bir öneride de bulunulmuştur. Bu tez yükseköğretim kurumlarında sürekli iyileştirme konusundaki kuramsal literatürü geliştirmenin ötesinde ayni konuda bazı pratik geliştirme önerilerinde de bulunmaktadır.

Anahtar Kelimeler: Sürekli iyileştirme, Yükseköğretim kurumları, EFQM, Yönetim taahhüdü

DEDICATION

I would like to dedicate this to my lovely parents Hossein and Tahereh, whom without their early inspiration and coaching none of this would have happened. I hope that this achievement will continue the dream you had for me all those many years ago when you chose to give me the best education you could.

ACKNOWLEDGMENT

First of all, I would like to thank our almighty God that gave me the courage and strength to follow my dreams.

I also like to express my gratitude to the following individuals who guided and supported me through my studies:

- Professor Gökhan İzbırak who accepted to be my supervisor. It was a great pleasure for me to work with this great person and use his precious advice and support.
- Professor Adham Mackieh for his valuable guidance and comments on my research. I'm so grateful for his wisdom and patience.
- Professor Sahand Daneshvar for his time and efforts on my study and data analyzes techniques.

Finally, I want to say that I'm very fortunate to study in this outstanding department of Industrial Engineering of EMU.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

1.1 Purpose

Nowadays, universities as a center of knowledge and ideas play an important role in societies. They are creators of opportunities in the world of rapidly circulating capital. To meet the demands of tomorrow marketplace, it's necessary to gradually improve our Higher Education (HE) systems by understanding, predicting and responding to students academic needs. For this reason, it's vital to establish a system for continuous improvement in Higher Education Institutions to assure that efforts to reach our organizational goals are monitored and measured properly.

1.2 Methodology

Based on types of questions which are going to be answered and the extent of control over behavioral events, case study methodology followed by questionnaires and surveys was used because it makes it possible to measure, demonstrate and expand the theories.

By using this method, our theory construction process, other than concentrating on literature, it will also emphasize on empirical observations or reality experiences. A qualitative or quantitative data which will be analyzed in a research is called case study research. [8, 16]

Among different methods of data collection, sample survey (a kind of study that wants to estimate attributes of a population by gathers data from a subset of a population) was used to gather information by: Interviews, questionnaires and direct observations. By using this, our results will be validated by applying the triangulation technique that empowers the fact that our result is not a methodological artifact and it's valid.

To achieve authentic results, primary and secondary resources were used.

The primary data were collected through:

1. Interviews (28 Deans and chairs)
2. Questionnaires (66 Staff and students)
3. Direct observations (contact with leaders, students and employees)

The secondary resources included access to external and internal documents: Books, journals, statistics and web pages which utilized to support our primary data.

1.3 Eastern Mediterranean University

University as a whole

The Eastern Mediterranean University, located in Northern Cyprus, was established in 1979. EMU offers 139 programs (11 faculties and 5 schools) for undergraduate and postgraduate degrees and research infrastructure. The instructions are offered in two languages, Turkish and English. University is a full member of the European University Association and the International Association of Universities.

EMU as a foundation for improvement in quality of education follows international accreditations as well as national standards and rules. In this respect, university achieved enormous success regarding international accreditations, recognition and memberships as part of its vision.

Department of Industrial Engineering

The industrial engineering department was founded in the academic year 1994-95 as a branch of the faculty of engineering. In its first academic year, the department only had 2 Assoc. Prof. Dr.'s for the educational facilities whereas today the industrial engineering department has got 1 Professors, 2 Assoc. Prof. Dr. s, 4 Assist. Prof. Dr. s, 3 part-time lecturer and 11 research assistants. ABET accredited undergraduate programs of industrial engineering department on October 2009. [37]

1.4 Problem Statement

EMU is an international university with a high growth rate in the number of students. During the past decades, different improvement systems were established and hard works toward achieving organizational goals have been done. Since developing continuous improvement system is vital especially in HEIs, this study is looking for an effective and express way to define, develop and control the quality in Higher Education Institutions based on EFQM excellence model. This study tries to answer these questions:

Q1: What would be the 3 most important criteria to evaluate at the first steps toward excellence in academic leader’s (Deans and Chairs) point of view?

Q2: If we give a chance to leaders to choose the most important parts of the organization to start the implementation, will their support and commitment increase significantly?

Q3: What are the levels of excellence in those 3 criteria at the industrial engineering department?

Q4: What improvement projects would be suggested?

1.5 Study Objectives

1. To expand the definition of quality and continuous improvement in HEIs.

2. To detect an efficient, quick and applicable step toward excellence from university leader's point of view.

3. To assess levels of continuous improvement in Industrial Engineering Department of EMU.

4. To demonstrate the strengths and the areas for improvement that needs to be attended to.

Chapter 2

LITERATURE REVIEW

Van Der Wiele & Iwaarden (2011) believed that the vital role of contexts in business and its insights in quality management should be revised. Therefore, they used four factors of quality control designed by Simon to search through quality management sectors. These four factors are displayed in Figure 1. [31]

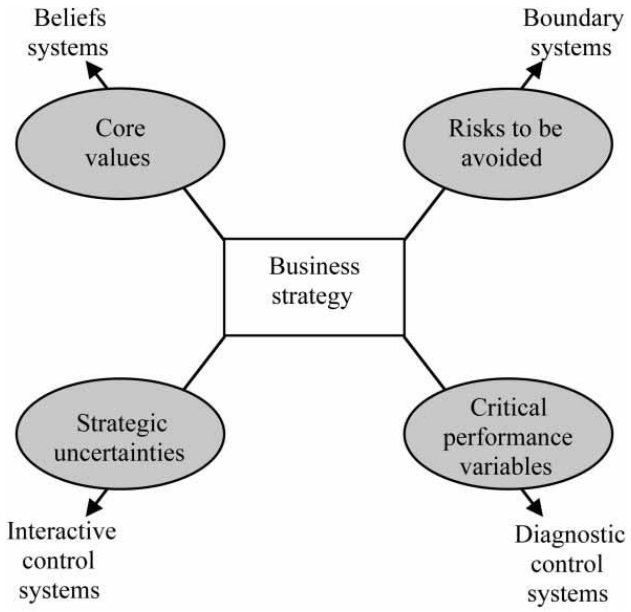


Figure 1: Simon's levers of control 1995

It has been found that all four levers of Simon's model have to be used in an uncertain environment to manage pivotal processes; however, the issues which are becoming more and more important are interactive control mechanisms. Therefore, in order to handle uncertain environment, methods to develop the more interactive

management activities should be supported and covered by quality management, other than application of process control in order to find deviations from the visions.

The concept of quality in higher education is not adequate to manage recent quality issues and a new definition of quality has to be introduced based on studies of Van Kemenade, Pupius & Hardjono (2008). They tried to illustrate these concepts by four constituents: object, standard, subject and values. Finding shows that the reason that external evaluation is not very popular in Higher Education Institutions might be connected with too much control and too little improvement. Increase of use of ISO 9000:2000 might be caused by its greater focus on continuous improvement than its former versions ISO 9000:1994 and ISO 9000:1987. [32]

Vand der Wiele & Van Iwaarde (2007) demonstrated that avoiding defects and diminish wastes is the basic concepts of classical quality management. Although, the importance of this type of management is inevitable in any organization, but how much it will be effective is rely on how closely the environment in which an organization now operates resembles that pertaining when these kinds of quality management and improvement methods were advanced. [30] They've considered six operations for an effective system:

1. Clear mission and vision
2. Those involved should communicate the goals clearly
3. Scale in an appropriate interval should be defined to assess the progress into the goals
4. Feedback of progress to those involved is fast and ideally in real time
5. Appropriate identification and implementation of improvement projects
6. Appraisal systems are linked to target progress

Based on Osseo-Augustus and Asare (2005) studies, the most important and critical factor of implementing any TQM model is “Leadership”. TQM-driven models, such as the EFQM excellence model, is the premise that “leadership” through “processes” is required if excellent “performance results” are to be delivered (Figure 2). [20]

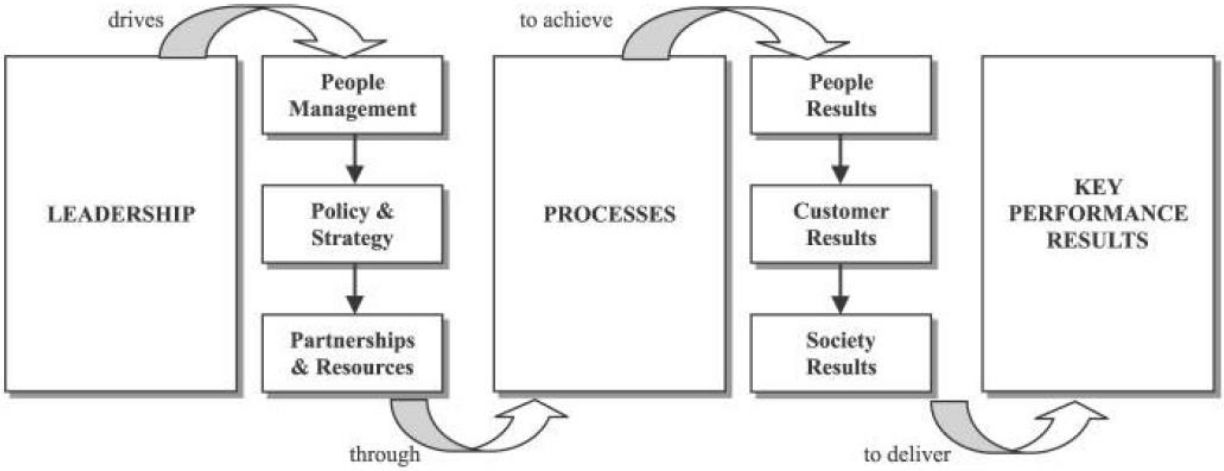


Figure 2: EFQM driven model

To maintaining quality developments in England HEIs, leadership commitment is irrefutable. Leadership in most England HEIs is not keen on achieving Total Quality Management based on literatures, but to reach an excellent point and have proper techniques in leadership they are ready to undergo training and be educated to sustain their development.

Boras University was used by Shokraiefard (2011) as a case study to measure the achievement of quality improvement. EFQM model following PDCA (Deming wheel) to support the projects was utilized to be implemented in engineering school of Boras University. Their findings indicate that one of the challenging issues in quality management is improving quality in HEIs. In this research, the main concepts

of quality in HE was defined and tools for quality improvement were introduced. There is also an introduction on expanded PDCA to implement in HEIs. [24]

Jose Tari (2011) examined the EFQM self-assessment process in order to analyze the similarities and differences between two of the most common self-assessment approaches (questionnaire and workshop). [25, 26] The similarities and differences of process, success, difficulties and benefits of these approaches were measured by case study methodology. Teams were divided to two groups: six services assessed in the academic year 2003–2004 using the workshop approach (Group 1) and the 8 services assessed in the academic year 2005–2006 using the questionnaire approach (Group 2). Results demonstrate that there is a significant difference based on the results achieved. For example data shows a difference in time consumed which is one of seven difficulties ($p = 0.043$). The reason of this significant difference is that obviously workshop required more time. Scores are 4.20 and 3.38 (significant level is 0.04) for first and second group respectively regarded to knowledge of quality-related subjects.

To assess the current quality management levels, a literature review focusing on HEIs in the US, UK and Australia was conducted by Cruickshank (2010). [10] It revealed an emerging interest, but paucity of research-based literature on Total Quality Management in the US, UK and Australian higher education sectors. Some academic organizations see TQM as a new quality practice which is not applicable in all organizations, while others see it as a major paradigm shift. If the aim is to have a successful implementation of TQM in Higher education sectors, there should be an effective evaluation of culture in HEIs and introducing changes in attitudes, values and beliefs.

Main-force of TQM in any organization is its leaders and management commitment of the center based on Calvo-Mora and Leal (2006) research. Other than that, management of resources especially human resources should be designed to follow the goals of policy and strategy. Thirdly, Best results to managing the processes can be reached when management of people works properly. [7]

Results of Implementing EFQM model to Sabanci University (SU) was illustrated by Akyuz (2006). [1] Sabanci University is the first university in Turkey that has adapted all of its processes to the EFQM's Management's "Excellence" model.
Surveys were distributed and results show that the satisfaction of customers was high in this university. 93% have requested proper information from IC (Information Center) and 98% resources check was conducted from the users. To achieve improvement they targeted the other 7% and 1.5% who didn't have information requested from the center and group that didn't use the service respectively. After that an SWOT analysis was conducted to find the strength points and areas for improvement. They have pointed out that benefits of the model for both organization and employees are undeniable. Some of the organizational benefits are as below:
The current position of the organization will be defined as well as its future position; Make it possible to carry out the mission, Policy and Strategy will be applied properly; it will lay a foundation to improve plans of succession, etc. And From the Perspective of the Employee, this Model will:
Create a great working environment which enables staff to use their creation and skills; Develop team spirit and teamwork; Awareness of employees about quality improvement will be increased as well as their motivation.

Definition of quality in HEIs is a challenging issue. Some researchers define it in terms of the Input-Process-Output (IPO) framework, derived from West's viewpoint of quality. Entry requirement is 'Input', teaching and learning process is defined by 'processes' and employability and academic standings are our 'Output' (Arjomandi 2011). [2] Self-assessment is adaptable in HEIs environment based on these studies. However, the gap between researches of relation among different business sectors and Higher Education is inevitable. The three most important areas for universities to focus on during their assessments are teaching, research and services (Tari, 2006). [25] Although, EFQM is a very powerful tool to improve the quality in business, it's a very difficult challenge to define product, customers, stakeholders, etc in education systems. Students, staff, families, industries and even local society benefits from a university. In teaching, employees, student and even their parents should be considered as costumers.

Chapter 3

FRAMEWORK

3.1 Quality and Excellence

The word “excellence‟ is now part of the language of business. While many claims are no doubtfully justified, it seems that anyone making a claim about their products or services feels they should use it. We can check for early quality management from 1920’s when statistical theory was first applied to product quality control. [35] But the starting point of Total Quality Management (TQM) was in Japan in the 40s which was introduced by Americans, such as Shewhart, Juran and Deming.

As we move into the 21st century, TQM has developed in many countries into holistic frameworks to guide organizations to achieve excellence in customer and business results. In Europe, a similar framework is called “Business Excellence” or “Excellence” Model, promoted by the European Foundation for Quality Management (EFQM).

3.2 EFQM

History and Establishment

The EFQM Excellence Model was founded in 1989 by 14 leading European organizations to stimulate and assist management in adopting and applying the principles of Total Quality Management. European Quality Award first introduced this framework in 1992 to evaluate the performance of organizations. The EFQM model is used as a management system that encourages the discipline of organizational self-assessment. It's applicable to any organization irrespective of its structure or size to help leaders understanding the gaps and proving appropriate solutions.

Self-assessment

Organizations can improve quality both in total quality and on their own strategy by utilizing self-assessment technique. This methodology have been adopted and expanded both in private sector and public sector. [18, 30] Self-assessment is a new management technique. In self-assessment first of all, the company search for its competitive capabilities. Self-assessment identifies the points that there are possibilities for improvement. [29] For driving changes in an organization, EFQM provides an efficient application to help leadership. It should be mentioned that EFQM self-assessment instead of scores and weaknesses will focus on strengths and areas for improvement which provides this application for improvement. Several countries have used self-assessment method, to achieve stable and continuous excellence.

Fundamental Concepts

In the Model, Excellence is defined as:

Outstanding practice in managing the organization and achieving results based on a set of fundamental concepts. These fundamental concepts are:

• Results Orientation

• Customer Focus

• Management by Processes and Facts

• People Development and Involvement

• Continuous Learning, Innovation and Improvement

• Leadership and Constancy of Purpose

• Public Responsibility

• Partnership Development

Figure 3: EFQM Fundamental concepts 2013

These fundamental concepts are defined further in higher education sectors. [28]

Table 1: EFQM fundamental concepts definitions

Results Orientation	Excellence is achieving results that delight all the organization's stakeholders
Customer Focus	Excellence is creating sustainable customer value
Management by Processes and Facts	Excellence is managing the organization through a set of interdependent and interrelated systems, processes and facts.
People Development and Involvement	Excellence is maximizing the contribution of employees through their development and involvement
Continuous Learning, Innovation and Improvement	Excellence is challenging the status quo and effecting change by using learning to create innovation and improvement opportunities
Leadership and Constancy of Purpose	Excellence is visionary and inspirational leadership, coupled with constancy of purpose
Public Responsibility	Excellence is exceeding the minimum regulatory framework in which the organization operates and to strive to understand and respond to the expectations of their stakeholders in society
Partnership Development	Excellence is developing and maintaining value-adding partnerships

(Sheffield H University, 2003)

The model, shown in Figure 4 contains EFQM nine criteria, five of them are 'Enablers' and four of them are 'Results'. The function of organization is covered by enablers, and achievement of organization is covered by results. Key components are criterion and sub-criterions in this model.

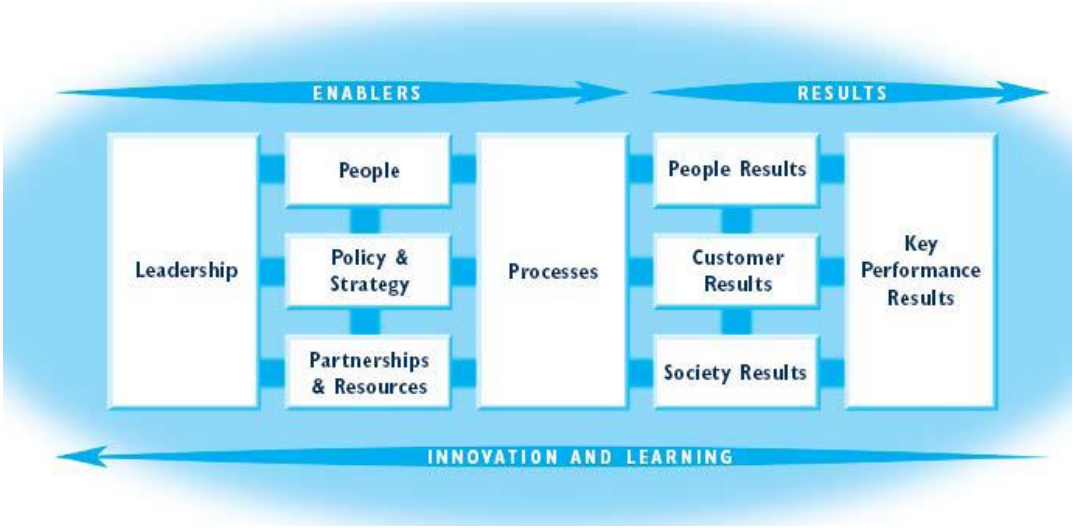


Figure 4: EFQM 9 criteria 2003

Enablers

Effectiveness of approaches will be assessed by five enablers to see whether goals and performances of the organization have been identified to deliver appropriate results. Analyzing the model will seek into the details to see if strategy and approaches which was chosen before can illustrate:

• Effectiveness and Efficiency to achieve goals

• Are deployed to their full potential

• Improved continuously is assured

Each of the enablers are broken down into sub-criterion parts, with guidance points within these criterion parts to help develop and support knowledge and learning in that particular area.

Results

Results criteria are to assess whether goals have been met by tracking and monitoring performances. Each criterion has two sub-criterions to see the extent of achievement of chosen indicators:

- Assessment of the important issue from customer's point of view.
- Measuring continuous improvement level which caused by approaches.

3.3 EFQM for Higher Education

From the establishment of EFQM, the adaptation of the model for HEIs has been a challenge. Although, several education centers around the world successfully implemented this model, further researches on definition of Quality and Customer is suggested. EFQM excellence model – HE version is an effective tool to measure excellence level of any organization irrespective of its structure and size and proves practical projects to improve continuously.

In EFQM, Excellence means:

Satisfying stakeholders by proper and efficient approaches which leads to a stable and long term success as an organization. In universities, this means balancing the needs of students, staff, funding and regulatory bodies as well as those in our local communities. [28, 34]

Difficulties in Definitions

Managing quality improvement in HEIs is very difficult and challenging since its definition is changing in each situation. This might be due to the different meaning of quality for different stakeholders or it should be due to the challenging nature of HE product. Becket and Brookes (2008) identified the ambiguity in the definition of quality in higher education and the need for quality assurance for the fundamental gaps in the adaptation of any quality model. [4]

Chapter 4

STUDY METHODOLOGY

The study followed both analytical and descriptive approaches in addition to the statistical analysis. Primary and secondary sources were used to collect data.

- The primary data were collected by using Interview and questionnaires.
- The secondary resources include the use of books, journals, statistics and web pages.

To have a more reliable study, among different Methods of data collection, sample survey was used to gather information by: Interviews, questionnaires and direct observations. This way, the findings were validated much more by employing the triangulation technique.

Since EFQM is a complex model and it takes long time and lots of resources to implement the whole model, researcher just concentrated on first part of the model which is “Enablers”.

4.1 Conceptual Framework

Despite many successful projects about the implementation of excellence models, many researchers believe that there should be some changes through a business model before implementing it in service-oriented organizations such as universities and that's because they failed to address the learning experience of a diverse student body. For this reason, in this research, a new framework (Figure 5) based on EFQM model was designed and analyzed that can address the concepts of excellence in higher education properly. Other than that, this framework does not require many resources.

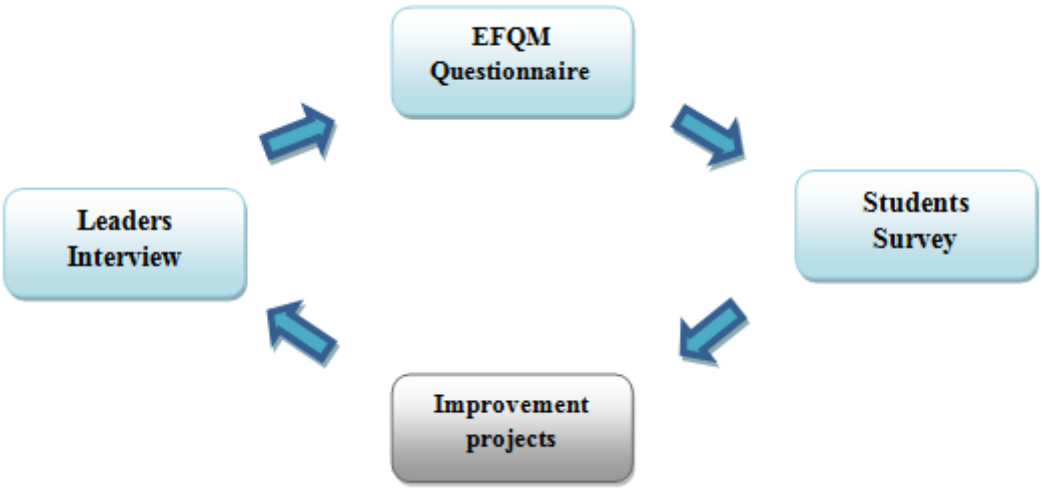


Figure 5: Cycle of improvement in higher education institutions

The Assessment was conducted in 3 levels:

1. Leaders
2. Staff
3. Students

4.2 Leader's Interview

Most vital factor in each TQM application is Leadership based on a research by Kanji (2002). Personal and professional relationship among leaders and their staff is called leadership in higher education. [18]

Regardless of the approach chosen, the generic stages for self-assessment are the following:

1. Raising commitment of Leaders
2. Plans for self-assessment should be communicated properly
3. arrange self-assessment
4. providing self-assessment team and training
5. implementing self-assessment
6. conducting action plans
7. applying action plans
8. review

Achieving management commitment has always been a challenge in EFQM. Some organizations derive little benefit from self-assessment processes and that's due to the difficulties such as lack of commitment and enthusiasm from the management, the time-consuming nature of the process and lack of resources. [25, 34] In this study, interview with academic leaders contains two phases.

As it can be seen, first step toward excellence is developing management commitment. So, one aim of this study is to find a way to increase this commitment. For this reason, during an interview with academic management of EMU, first the

model was explained briefly in 10 minutes. Then they were asked how much they support the model to be implemented in our university. The scale was from 1 to 5 where 1 was “disagree” and 5 was “full support”. (Appendix A)

Then they were given a chance to choose which criteria they think are better to focus on in EMU since they know their organization better than anybody else. Finally, they’ve been asked to see if they support the model more when they had a chance to choose the criterions they wanted to focus on.

Population and Sample Size

The population of this study is 36 senior academic staff including 11 faculty deans and 25 department chairs at EMU which has direct interaction with all stakeholders and are responsible for quality of University. Due to difficulty of finding senior leaders of university, a reasonable response rate of 78% with number of 28 interviews was conducted.

Data Measurement

To select the best method of assessment first the level of measurement should be understood. In this study, ordinal scales were used. Ordinal scale is a ranking data that normally uses integers in ascending or descending order. The following table demonstrates the likert scale used in this study:

Disagree	No Idea	Partially agree	agree	Full support

Statistical Analysis

Following statistical techniques have been done utilizing SPSS 22 to analyze the Leader's result:

1. Kolmogorov-Smirnov test of Normality.
2. Wilcoxon signed-rank test to test the hypothesis of $\mu_1 = \mu_2$.
3. Friedman test to rank the priority of criterions

Test for Normality

Kolmogorov-Smirnov and stem-and-leaf tests had run to check the normality of both primary and secondary support questions of leaders.

The Kolmogorov-Smirnov test is defined by:

H_0: The data follows Normal distribution

H_1: The data do not follow the Normal distribution

Table 2: Leader's interview kolmogrov- smirnov result

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
support1	.326	28	.000
support2	.273	28	.000

a. Lilliefors Significance Correction

A Kolmogrov-Smirnov test indicates that distribution of data is statistically significantly different from Normal distribution. Decision is to reject the null hypothesis.

support1 Stem-and-Leaf Plot

Frequency	Stem &	Leaf
10.00	3 .	0000000000
.00	3 .	
16.00	4 .	0000000000000000
.00	4 .	
2.00	5 .	00

support2 Stem-and-Leaf Plot

Frequency	Stem &	Leaf
3.00	3 .	000
.00	3 .	
13.00	4 .	0000000000000
.00	4 .	
12.00	5 .	000000000000

Figure 6: Steam-and-leaf result for leader's interview

It can be seen also in stem-and-leaf plot that there is skewness to the right in both supports. This means that leaders of this university showed a very good support for our European quality model and they care about quality assurance. Now we should check to see if the new framework was effective or not by comparing answers before and after ranking criteria.

Non-Parametric Wilcoxon Signed-rank test to test the hypothesis of $\mu_1 \neq \mu_2$

To see if there is a significant positive difference between the means of phase 1 and phase 2, Wilcoxon test was used. The Wilcoxon signed-rank test is a non-parametric statistical hypothesis test used when comparing two related samples, matched samples, or repeated measurements on a single sample to assess whether their population means rank differ. Normality assumption is not necessary in this test.

The Assumptions of the test are as below:

- Data are paired and come from the same population.
- Each pair can be chosen randomly and independently.
- The data should be in Ordinal scale.

Hypothesis:

H_0= There is no significant difference between means of Support 1 and Support 2.

H_1= There is a significant difference between means of Support 1 and Support 2.

Table 3: Wilcoxon Sign- rank test

Wilcoxon Test				
	Ranks	z	Sig.	Decision
Support 2 – Support 1	0 Negative 15 positive 13 ties	3.690	.001	Reject the null hypothesis

Test Statistics

	support2 - support1
Z	3.690[b]
Asymp. Sig. (2-tailed)	.000

A Wilcoxon sign-rank test illustrates that leader's support 2 is statistically significantly higher than leader's support 1 ($Z = 3.69$, $p < 0.00$)

Top 3 Criteria

To find the top 3 EFQM criteria from the Academic Leader's point of view, after explaining the model and concepts, we asked them to rank criterions based on their

importance in the EMU (Appendix A). Then, Friedman test was ran to analyze the results.

Friedman Test

The Friedman test is the non-parametric test for differences between groups when the dependent variable being measured is ordinal. Samples do not need to be normally distributed. Friedman's test compares medians of more than two dependent variables.

In friedman test hypothesis are:

H_0= Samples distribution have the same median.

H_1= Samples distribution does not have the same median.

Table 4: Friedman test results

Friedman Test

Ranks

	Mean Rank
People	3.26
Partnership and Resources	2.22
Leadership	4.00
Policy and Strategy	3.56
Processes	1.96

Test Statistics[a]

N	27
Chi-Square	33.007
df	4
Asymp. Sig.	.000

a. Friedman Test

As it can be seen, the most important criteria from academic leader's point of view is Leadership with mean rank 4. After that is Policy and Strategy (3.56), and the third one is People (3.26).

4.3 EFQM Questionnaire

Questionnaire method is deemed by the EFQM as one of the least labor intensive, providing an existing questionnaire is used. Some of its benefits are listed below:

- Implementation is quick and easy
- All of the organization's people can be involved
- Other methods can be conjuncted
- The questions can be customized to cope with organization challenges

Questionnaire is a common and reliable form of collecting feedback to improve quality. Different kind of questionnaire is: descriptive, multi answer, online, paper base. Each kind is designed for a purpose and choosing among them depending on the aim of the study. Based on statistical analysis, it was found that priority of criterions: Leadership, Policy and Strategy and People have the highest priorities among all enabler criteria. So, a standard questionnaire obtained from the EFQM Higher Education model 2003 (Appendix D).

> "It must be agreed at which level self-assessment should be undertaken, whether it'll be departmental, in academic areas, or across the whole institution." [28]

Based on resources and availability, departmental assessment was chosen and questionnaires distributed among industrial engineering department staff because they are relatively familiar with the concepts of quality improvement.

Identify the Population and Sample Size

Twenty questionnaires were hand delivered to academic staff and administrative personnel, responsible for quality in industrial engineering department of EMU. Reasonable response rate of 95 percent (i.e. 19 questionnaires) were obtained. The responses to the questionnaire were presented and analyzed using SPSS version 22.

Questions divided by their criterion and percent achieved by each question was calculated. In the next step, level of implementation of each criterion and each of its questions were evaluated by RADAR Scoring Matrix recommended by EFQM organization. Questions which were implemented in 75% percent or more of relevant areas were considered as strengths and questions which were implemented less than 75% of relevant areas were considered as areas for improvement.

The scale is as follows:

Table 5: Scoring matrix based on RADAR

	0%					25%					50%					75%					100%				
CRITERIA	No evidence or anecdotal					Some evidence					evidence					Clear evidence					Comprehensive evidence				
	No evidence of implementation					Implemented in $\frac{1}{4}$ of relevant areas					Implemented in $\frac{1}{2}$ of relevant areas					Implemented in $\frac{3}{4}$ of relevant areas					Implemented in all relevant areas				
			0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		

EFQM Questionnaire Results

1. **Between Criteria:** The final results of EFQM questionnaire leads us to level of achieved continuous improvement by Industrial Engineering Department of EMU. Table 7 demonstrates the results in this case study. According to the table, result shows a clear evidence of previous success in all three studied criteria.

Validity and Reliability of Questionnaire

In a research validity and reliability are very important concepts. Validity refers to whether the researchers actually measured what they wanted to measure. Validity of each criterion and validity of questionnaire as a whole was measured to test the structure validity of questionnaire. Since in our questionnaire scale of measurement is ordinal, Spearman rank correlation was used. If P-values are not greater than 0.05, the correlation of these criteria will be significant at $\alpha = 0.05$, and it can be interpreted that criteria are consistent and valid to measure what it was set for. The only assumption of spearman rank correlation test is that data should be in ordinal scale and there is no assumption on its distribution.

In addition, Cronbach's Alpha test was used to check the reliability of the questionnaire. Degree of consistency of an instrument which assesses attributes is called reliability. Best reliability occurs with least variation that instrument produces if attribute will be evaluated repeatedly. The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of consistency, and since in this research coefficients are in the range of 73 and 85, internal consistency is considered high.

Table 6: Scores achieved by each criterion and its reliability and validity test

Criteria	**Score achieved**	**Cronbach's Alpha**	**Spearman correlation**	**P-value (sig)**
Leadership	73%	.733	.853	.000
Policy and Strategy	74%	.770	.875	.000
People	70%	.852	.853	.000
Total	**72%**	-	-	-

Note: The correlation coefficients were calculated based on the average response of each criterion

Empirical Data Analysis

From the figure we can define that:

Seventy three percent of respondents agree that Leadership criteria have implemented effectively in IE department, In other words there is a clear evidence of Leadership achievements in this department. Similar results were obtained for "Policy and Strategy" and "People" criteria. All three criteria are in a range of 70 to 74 percent. Figure 7 shows the scoring per criterion of the EFQM Excellence Award applicants 2007 to 2010 which were obtained from EFQM award reports and scores achieved by Industrial Engineering department of EMU. Here we can see that IE department scores more than average in these three criteria. The graph shows the average scores and highest scores per Criterion. The lowest score is for People criterion and also it's the biggest gap from the maximum score.

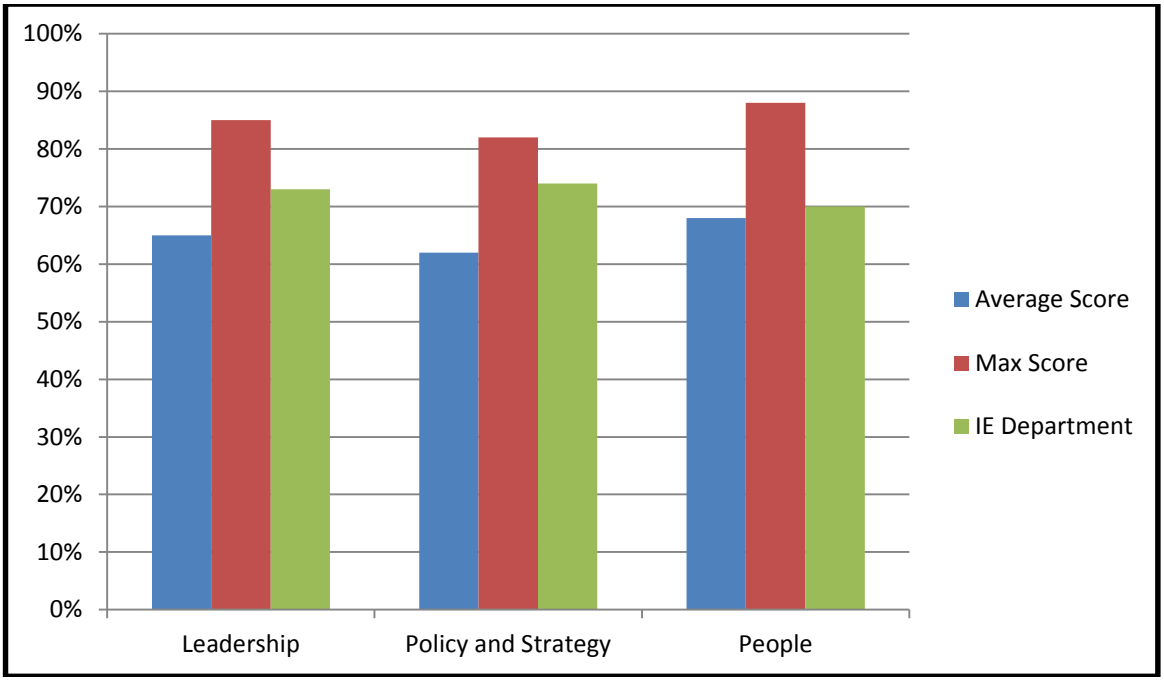


Figure 7: scoring per criterion of the EFQM Excellence Award applicants 2007 to 2010 and IE department of EMU

2. **Within Criterions:** Besides comparing success between criteria, to achieve a stable and practical improvement projects it's necessary to compare the results within sub-criteria. It provides details of how to achieve success on the path to excellence. Moreover, other than checking the structure validity of the whole questionnaire, internal validity to measure the correlation of each question and the whole criteria was used. If P-values be less than 0.05, the correlation coefficients of those criteria will be significant at $\alpha = 0.05$, and it can be interpreted that criteria are consistent and valid as a measure of what it was set for. In this study, questions and related criteria were all positively correlated, $p<0.05$. However, Some questions correlation are not as high as others (i.e. questions: 3,6 Leadership, 1 Policy and Strategy, 3 People). (Appendix E)

4.4 Students Satisfaction Survey

Student Assessment

Student assessment has been done at the end of the semester. The time is proper because students may feel more responsible as they experienced the strength and areas for improvement of the department whole semester. 90 surveys were distributed and 47 were collected which involved PhD, Master and Bachelor (Junior and Senior) students in the research. In this study, questions were selected from standard EFQM criteria related questions of National Student Survey "NSS" of England and Student Satisfaction Survey "SSS" of U.S. In each group of questions, related criterion is indicated and questions are ranked based on scores they achieved. It'll make it easier to find the spots that need improvement and spots that their strength should be maintained. (Appendix F & G)

Model Dynamics

There is also a strong relationship among criteria of the model. Here relationship across those 3 enablers was focused, where improvement of one area is related to circumstances and improvements of another area.

Table 7: Dynamics of 3 criteria of EFQM model [28]

	Policy and Strategy	**People**
Leadership	2e – Communicating policy and strategy 2b – Using creativity outcomes as inputs to policy and strategy 2a – Establishing and balancing customers needs and expectations 2b – Using knowledge to influence policy and strategy	1c – Leaders communications with internal and external stakeholders 3b – Developing people 1d – Leaders involvement with people 3e – Caring for people promoting cultural and social activities 1a – Leaders stimulating and encouraging 2b – Using creativity outcomes as inputs to policy and strategy 3c – Provision of opportunities for creative and innovative behavior 3a – People planning and managing 3b – Identify, developing and sustaining people skills 3c – Involving and empowering people 3e – Rewarding, recognizing and caring for people

Comparing Staff Results and Student Results

To achieve excellence, data should be analyzed in a manner that demonstrate the main gaps and help us to find a perfect point for improvement. To perform a pair-wise comparison among results of each survey, we first check for normality by Kolmogrov-Smirnov test by $\alpha = .05$.

H_0: The data follows Normal distribution.

H_1: The data does not follow the Normal distribution.

Table 8: Kolmogrov normality test for questionnaires

Kolmogorov-Smirnov Test for Normality ($\alpha = .05$)			
	Statistic	**df**	**Sig.**
Leadership (Student)	.151	47	.21
Policy (Student)	.133	47	.20
People (Student)	.192	47	.21
Leadership (staff)	.147	19	.20
Policy (Staff)	.160	19	.20
People (staff)	.159	19	.20

The results in this table indicate our data follows Normal distribution and they are compatible with test on means. For this reason, it's appropriate to run the paired comparison T-test over their means.

H_0: Mean of sample 1 is equal to mean of sample 2.

H_1: Mean of sample 1 is not equal to mean of sample 2.

Table 9: Paired sample T-test for Staff and Students results

Paired Sample Test				
	Mean difference	t	df	Sig.
Student Leadership – Staff Leadership	-.137	-.71	18	**.487**
Student Policy – Staff Policy	.293	1.30	18	**.207**
Student People – Staff People	.601	2.912	18	**.009***

*Indicate significant factor

Paired sample test demonstrate that there is no significant difference between students and staff about Leadership and Policy and Strategy criteria of EFQM. But based on the people criteria there is a significant between students and staff answers. To have stable improvements, this gap should be coped well and not only this problem should be solved, but a system should be designed to overcome the future gaps.

Table 10: Hypothesis testing over mean of staff and students results

Hypothesis Title	**Sig.**	**Status**
There is no significant difference about **Leadership** of IE department from Staff and Student point of view.	**.487**	**Confirmed**
There is no significant difference about **Policy and Strategy** of IE department from Staff and Student point of view.	**.207**	**Confirmed**
There is no significant difference about **People** of IE department from Staff and Student point of view.	**.009**	**Denied**

Chapter 5

RESULTS

In this chapter, each result and table obtained during the study will be interpreted in details to illustrate the achievements of the research.

Table 2 and Figure 6 shows that leader's support does not follows normal distribution and it has noticeable skewness to the right which means most of them supported the model and they chose answers 4 and 5 (agree and full support) more than 1 and 2 (Disagree and No idea).

Wilcoxon Sign- rank test (Table 3) was used, since data does not follow normal distribution and we were not allowed to use other tests on means such as T-test. Results indicates that leader's support 2 is statistically significantly higher than leader's support 1 ($Z = 3.69$, $p < 0.00$).

Friedman test conducted on data gathered to choose top 3 enabler criteria based on leader's point of view (Table 5). Leadership with mean rank 4.00 was chosen as the most important criteria of enablers. In addition, policy and strategy (3.56) and people (3.26) were 2^{nd} and 3^{rd} respectively. Now when these 3 criteria are selected, questionnaire based on these 3 was designed to measure implementation of related criteria in IE department of EMU.

Table 7 describes scores achieved by each criteria and percentage they got from the total scores. All of them are in the range of 70%-74%. This indicates that there is a clear evidence of implementation of these 3 criteria in IE department and from RADAR scoring matrix (Table 6) it can be interpreted that these criteria were implemented in 75% of relevant areas. Furthermore, Cronbach's alpha results shows high internal consistency in the questionnaire and Spearman correlation results shows that these 3 criteria are highly correlated to each other which empowers the relation among them where improvement of one area is related to circumstances and improvements of another area (Table 10).

In EFQM questionnaire results [appendix E] the percentage of each question from total scores was calculated and ranked to find highest and lowest areas among the whole criteria. Questions which were implemented in 75% percent or more of relevant areas were considered as strengths and questions which were implemented less than 75% of relevant areas were considered as areas for improvement. Moreover, spearman correlation coefficient for each question was calculated to see how much each question was related to its criteria. Some questions especially in 'Policy and Strategy' and 'People' were highly correlated to their criteria. However, some questions show less correlation to their related criteria. But none of them shows significant P-value and it can be interpreted that all of the questions are related to their criteria.

Mean value for each question of student survey [Appendix G] was calculated and they ranked based on their scores. Questions divided by their related criteria so that it would be possible to compare them with staffs EFQM questionnaire. Questions which scored more than 85% were considered as strength and questions which

scored less than 60% were considered as areas for improvement. Improvement projects based on these questions were suggested and discussed further in chapter 7.

Table 11 shows the results of Kolmogrov-Smirnov test of normality for EFQM related questions of student survey and staff questionnaire. Normality test demonstrate that all of the sections follow normal distribution and T-test is appropriate to compare their means. Table 12 shows the results of paired sample T-test on their means. It illustrates that in ‘Leadership’ and ‘Policy and Strategy’ criteria there is no significant difference of IE department staff and students point of view. But there is a significant difference between their ideas about ‘People’ criteria ($t(18)=2.912$, $p=.009$).

Chapter 6

CONCLUSION

One of the difficult challenges of continues improvement field is to improve quality in Higher Education sectors. In this research, basic concepts of continues improvement in HEIs were demonstrated and a new framework to achieve quality improvement is suggested.

Throughout the research, hypothesis is tested and questions were answered. The following are the main findings and results of the study:

1. From EMU Leader's point of view, most important criteria to start quality improvements are **Leadership**, **Policy and Strategy** and **People**. Although, it's undeniable that there is a strong relation among different criteria of this model and they are influenced and analyzed in different ways, but since Leaders understand the problems of their organization better, they believe that these 3 criteria are the most important ones in EMU.

2. The study illustrates that if we give the Leaders chance to choose starting points of model in their organization, their support from the model will increase significantly and one of the biggest challenges of achieving continues improvement which is management commitment will be developed.

3. From EMU Industrial engineering staff point of view, EMU Leaders specially IE department were very successful to achieve equality of opportunity and encouraging and support their staff. They meet, anticipate and respond to their staff properly. However, they believe that systems for managing the processes should be developed to deliver policy and strategy more effectively and prepare the organization to identify the changes and provide the best solution.

4. From EMU Industrial engineering staff point of view, communicating with managers regarding policy and strategy is a strength point of the department and it is the same in short-term as in long-term projects to achieve the goals. They believe that to define and tackle the present and future needs of the department staff, information should be gathered in a specific period to review and develop policy and strategy of the department.

5. From EMU Industrial engineering staff point of view, department was successful to provide a safe and friendly working condition and it should continue to be improved in the same way as before by permitting them to take role and participate in improving working conditions. EMU staff believes that human resource plans should be improved to meet the objectives and goals of the organization.

6. From EMU Industrial engineering student point of view, the most powerful strength of IE department is its staff. They are good at teaching and explaining the subjects and they offer proper advice. Studying in IE department helped students gain confidence and they are accomplishing their goals through their education.

However, they believe that student employment is one of the areas of improvement in this department. More focus should be put on this issue and more opportunities should be created. They believe that complaint/grievance process should be developed to permit the students sound to be communicated to the managers in a proper channel.

Chapter 7

RECOMMENDED PROJECTS

To achieve a stable success, our current strengths and opportunities for improvement had been identified and compared to projects that EFQM (2003) suggested. Based on scores each project achieved a priority was suggested.

Table 11: Leadership, Policy and Strategy, People criteria suggestions

Leadership		
Strengths	**Opportunities for improvement**	**Priority**
✓ Personal, open and direct communication of mission, ethics, principles and values in a simple way (as part of a coordinate communications strategy). ✓ All leaders at all levels employing an open door policy for all staff. ✓ Walking-the-job/walkabouts – show support and recognition for staff and helps to break down hierarchical barriers ✓ Leaders being personally and directly involved in the process to review and improve the University's management system, whilst including a cross-section of opinion from other staff	➢ Own, drive and actively engage in self-assessment and review activities, including ownership and implementation of actions through strategic and operational planning ➢ Developing a change program which concentrates on both the structural change of the fabric of the organization and the cultural needed to drive and support this within the organization and set someone as 'ambassador of change' who work closely with leaders at all levels to plan and implement change effectively ➢ Developing appraisal system, which links policy and strategy to personal objectives, communicating and discussing individuals roles in delivering these broader goals	❖ Short-term action is required ❖ Short-term action is required ❖ Long-term action is required

Policy and Strategy		
Strengths	**Opportunities for improvement**	**Priority**
✓ University wide communications plan, which includes a cascade system, annual general meetings and Intranet	➢ Staff satisfaction surveys undertaken with the results used to evolve staff related policies and strategies	❖ Force majeure
✓ Management involvement at conferences, seminars, networks to gain detailed and current knowledge of market trends and national policy changes	➢ Access to all policies and strategies for all staff and selected stakeholders	❖ Short-term action is required

People		
Strengths	**Opportunities for improvement**	**Priority**
✓ Ideas interchange or forum (locally or centrally) to share ideas, best practice and to involve others ✓ Presentation ceremonies ✓ Walk the job policy to listen, learn, see and be seen ✓ Involvement in improvement projects within and across individuals and team structures	➢ Human Resource Review Committee - includes staff in the development of policies and strategies and Staff meetings to enable staff contribution ➢ Compulsory health and safety training for all staff ➢ Environmental policy communicated to all staff ➢ Recognition scheme to recognize and reward staff achievement ➢ Rewarding staff by giving them discount to sport and leisure facilities	❖ Force majeure ❖ Force majeure ❖ Long-term action is required ❖ Short-term action is required ❖ Short-term action is required

5.1 Further suggested studies

These topics are helpful for those who want to continue researches in this field:

- Applying this framework in the whole university
- Finding new ways to raise management commitment during the process
- Applying the model with other approaches and compare results
- Implementing suggested projects in the departmental level

REFERENCES

[1] Akyüz, A. (2006). "Application of EFQM excellence model to the Sabanci University."

[2] Arjomandi, M, C. K., Paul Grimshaw (2009). "An EFQM Excellence Model for higher education quality assessment."

[3] Bayazit, O. & B. Karpak (2007). "An analytical network process-based framework for successful total quality management (TQM): An assessment of Turkish manufacturing industry readiness." *International Journal of Production Economics* **105**(1): 79-96.

[4] Becket, N. & M. Brookes (2008). "Quality management practice in higher education - What quality are we actually enhancing?" *Journal of Hospitality, Leisure, Sport and Tourism Education* **7**(1): 40-54.

[5] Borahan, N. G. & R. Ziarati (2002). *A multi-dimensional quality system for application in higher education*. ASEE Annual Conference Proceedings.

[6] Borahan, N. & R. Ziarati (2002). "Developing quality criteria for application in the higher education sector in Turkey." *Total Quality Management* **13**(7): 913-926.

[7] Calvo-Mora, A., et al. (2006). "Using enablers of the EFQM model to

manage institutions of higher education." *Quality Assurance in Education* **14**(2): 99-122.

[8] Carroll, T. J., et al. (2000). "Method for rapidly determining and reconstructing the peak arterial frame from a time-resolved CE-MRA exam." *Magnetic Resonance in Medicine* **44**(5): 817-820.

[9] Conti, T. (2001). "Why most companies do not get the most out of their self-assessments." *Annual Quality Congress Transactions*: 229-238.

[10] Cruickshank, M. (2003). "Total Quality Management in the higher education sector: A literature review from an international and Australian perspective." Total *Quality Management and Business Excellence* **14**(10): 1159-1167.

[11] Da Rosa, M. J. P., et al. (2003). "Excellence in Portuguese higher education institutions." *Total Quality Management and Business Excellence* **14**(2): 189-197.

[12] Davis, L. & N. Brookes (2001). "Project management - A case study approach." *IEE Colloquium (Digest)*(46 I): 115-118.

[13] Grant, D., et al. (2002). "Quality management in US higher education." *Total Quality Management* **13**(2): 207-215.

[14] Grant, D., et al. (2004). "A comparative analysis of quality management in

US and international universities." *Total Quality Management and Business Excellence* **15**(4): 423-438.

[15] Hides, M. T., et al. (2004). "Implementation of EFQM excellence model self-assessment in the UK higher education sector - Lessons learned from other sectors." TQM Magazine **16**(3): 194-201.

[16] Johnson, W. O., et al. (2004). "Sample Size Calculations for Surveys to Substantiate Freedom of Populations from Infectious Agents." *Biometrics* **60**(1): 165-171.

[17] Jones, C. R. (1998). "Customer focused performance improvement: Developing a strategy for Total Quality." *International Journal of Technology Management* **16**(4-6): 494-504.

[18] Kanji, G. & P. Moura E Sá (2007). "Performance measurement andbusiness excellence: The reinforcing link for the public sector." *Total Quality Management and Business Excellence* **18**(1-2): 49-56.

[19] Ojanen, V., et al. (2002). "Applying quality award criteria in R&D project assessment." *International Journal of Production Economics* **80**(1): 119-128.

[20] Osseo-Asare, A. E., et al. (2005). "Leadership best practices for sustaining quality in UK higher education from the perspective of the EFQM excellence model." *Quality Assurance in Education* **13**(2): 148-170.

[21] Pires Da Rosa, M. J., et al. (2001). "The development of an Excellence Model for Portuguese higher education institutions." *Total Quality Management* **12**(7): 1010-1017.

[22] Saada, I. J. A. (2013). Applying Leadership Criterion of EFQM Excellence Model In Higher Education Institutions.

[23] Samuelsson, P. & L. E. Nilsson (2002). "Self-assessment practices in large organisations: Experiences from using the EFQM excellence model." *International Journal of Quality and Reliability Management* **19**(1): 10-23.

[24] Shokraifard (2011). Continuous Quality Improvement in Higher Education A case study in Engineering School of Boras University.

[25] Tarí, J. J. (2008). "Self-assessment exercises: A comparison between a private sector organisation and higher education institutions." *International Journal of Production Economics* **114**(1): 105-118.

[26] Tarí, J. J. (2011). "Similarities and differences between self-assessment approaches in public services in higher education institutions." *Service Industries Journal* **31**(7): 1125-1142.

[27] Tarí, J. J. & C. Madeleine (2011). "Preparing Jordanian University services to implement a quality Self-Assessment methodology." *International Review of*

Administrative Sciences **77**(1): 138-158.

[28] University, S. H. (2003). EFQM Excellence Model HE Version 2003.

[29] van der Wiele, A., et al. (1996). "Self-assessment: A study of progress in Europe's leading organizations in quality management practices." *International Journal of Quality and Reliability Management* **13**(1): 84-104.

[30] van der Wiele, T. & A. Brown (1999). "Self-assessment practices in Europe and Australia." *International Journal of Quality and Reliability Management* **16**(3): 238-252.

[31] van der Wiele, T., et al. (2011). "A new foundation for quality management in the business environment of the twenty-first century." *Total Quality Management and Business Excellence* **22**(5): 587-598.

[32] Van Kemenade, E., et al. (2008). "More value to defining quality." *Quality in Higher Education* **14**(2): 175-185.

[33] Williams, R., et al. (2006). "Quality management: The new challenges." *Total Quality Management and Business Excellence* **17**(10): 1273-1280.

[34] http://www.efqm.org.

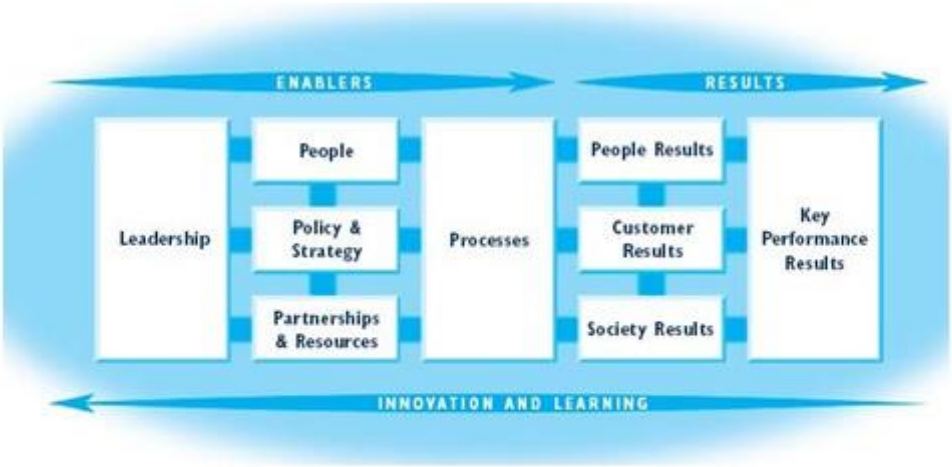
[35] www.bpir.com.

[36] www.dti.gov.uk.

[37] http://ie.emu.edu.tr/department/

APPENDICES

Appendix A: Leader's interview form



CRITERION 1: **LEADERSHIP**
Excellent leaders **develop** and facilitate the achievement of the **mission and vision**, **develop** values required for **long term success** and implement these via appropriate actions and behaviors, and are personally involved in ensuring that the University's management system is developed and implemented.
(**Mission** statement, is organization's purpose and tend to be short, clear and powerful. **Vision** statements also define your organization's purpose, but they focus on its goals and aspirations.)

CRITERION 2: **POLICY AND STRATEGY**
Excellent Universities implement their mission and vision by **developing a clear stakeholder focused strategy** that takes account of the relevant Education sector and sector trends.

CRITERION 3: **PEOPLE**
Excellent Universities manage, **develop** and release the knowledge and **full potential of their staff** at an individual, team-based and University-wide level. They care for, communicate, reward and recognize, in a way that **motivates staff** and builds commitment to using their skills and knowledge for the benefit of the University.

CRITERION 4: **PARTNERSHIPS AND RESOURCES**
Excellent Universities plan and **manage internal and external partnerships, suppliers** and internal resources in order to support its policy and strategy and the effective operation of its processes.

CRITERION 5: **PROCESSES**
Excellent Universities design, manage and improve processes in order to support its policy and strategy, fully satisfy, and **generate increasing value for, staff, students and other stakeholders**.

To what extent do you support implementing this model?

Disagree	No Idea	Partially agree	agree	Full support

Place in order of importance to you the following criteria of EFQM:
(Indicate by numbering from 1-5 in order where 5 is the most important)

People	
Partnership and Resources	
Leadership	
Policy and Strategy	
Processes	

To what extent do you support implementing this model **now**?

Disagree	No Idea	Partially agree	agree	Full support

Appendix B: Leader's interview support results

	position	sex	support1	support2
1	chair	male	agree	agree
2	chair	male	agree	full support
3	dean	male	agree	full support
4	dean	male	agree	full support
5	chair	female	agree	agree
6	dean	male	partially ag...	agree
7	chair	male	partially ag...	full support
8	chair	male	agree	agree
9	dean	female	agree	full support
10	chair	male	full support	full support
11	chair	male	agree	agree
12	chair	male	partially ag...	agree
13	dean	male	agree	agree
14	chair	male	agree	full support
15	dean	female	partially ag...	partially ag...
16	chair	female	partially ag...	agree
17	chair	male	agree	agree
18	chair	male	agree	full support
19	chair	female	partially ag...	full support
20	dean	male	agree	agree
21	chair	female	agree	full support
22	chair	male	partially ag...	agree
23	dean	male	agree	agree
24	dean	male	partially ag...	partially ag...
25	dean	male	partially ag...	partially ag...
26	chair	male	partially ag...	agree
27	chair	male	agree	full support
28	chair	male	full support	full support

Appendix C: Leader's interview enabler criteria results

	People	Partnership	Leadership	Policy	Processes
1	5	3	4	1	2
2	4	1	2	5	3
3	3	2	5	4	1
4	2	1	4	5	3
5	3	1	4	5	2
6	3	4	5	2	1
7	4	2	5	3	1
8	1	3	5	2	4
9	5	1	4	3	2
10	2	1	5	4	3
11	3	1	5	4	2
12	5	1	3	4	2
13	1	3	4	5	2
14	3	2	5	4	1
15	2	5	3	4	1
16	4	2	5	3	1
17	5	2	3	4	1
18	2	5	4	3	1
19	1	3	2	4	5
20	4	1	5	2	3
21	5	2	4	3	1
22	3	4	5	2	1
23	5	2	4	3	1
24	2	1	4	3	5
25	3	4	2	5	1
26	5	1	3	4	2
27	3	2	4	5	1
28	.	1	5	4	2

Appendix D: EFQM questionnaire

Leadership

STATEMENTS (POTENTIAL AREAS TO ADDRESS)	Strongly disagree	Disagree	No Idea	Agree	Strongly agree
1. As an active staff, I'm informed about the vision and mission of my department and it has been clarified how to move to achieve them.	1	2	3	4	5
2. My Leaders are my role models of a culture of excellence and they support the creation of the organization's culture.	1	2	3	4	5
3. There is an effective system for managing processes across the University and it develops properly to deliver our policy and strategy.	1	2	3	4	5
4. My leaders meet, understand and respond to my needs and expectations and they are involved with professional organization activities, including conferences and seminars.	1	2	3	4	5
5. As an active staff, I encouraged, helped and supported by my leaders to achieve their plans, objectives and targets for the benefit of both individuals and the University.	1	2	3	4	5
6. Equality of opportunity in all aspects of University life is actively encouraged and supported by my leaders.	1	2	3	4	5
7. My Leaders identify and champion organizational changes and review them through periodic meetings with staff.	1	2	3	4	5

Policy and Strategy

STATEMENTS (POTENTIAL AREAS TO ADDRESS)	Strongly disagree	Disagree	No Idea	Agree	Strongly agree
1. Periodic information is gathered and understood in order to define the present and future needs and expectations of all staff, students, managers, and other stakeholders.	1	2	3	4	5
2. Policy and Strategy in our department has been designed based on information from performance measurement, research, learning and externally related activities.	1	2	3	4	5
3. Our Policy and Strategy are developed reviewed and updated periodically.	1	2	3	4	5
4. There are short-term and long-term actions in our department to achieve the values and goals.	1	2	3	4	5
5. Policy and strategy are communicated with all staff, and with other stakeholders, in an appropriate way, with the effectiveness of the communication reviewed and adjusted as necessary.	1	2	3	4	5
6. I feel free to communicate with my managers to give them non-official feedbacks on the processes and strategies.	1	2	3	4	5

People

STATEMENTS (POTENTIAL AREAS TO ADDRESS)	Strongly disagree	Disagree	No Idea	Agree	Strongly agree
1. Our department periodically evaluates if the humanresource plans are in line to deliver objectives and strategies.	1	2	3	4	5
2. In Industrial engineering department, staff surveys and other forms of staff feedback are used to inform and improve humanresource policies, strategies and plans.	1	2	3	4	5
3. My managers motivated and trained me to develop and use my full potential as an individual and also as a team to achieve the best results on my objectives according to my department mission and vision.	1	2	3	4	5
4. The working conditions, including health, safety, environment, etc., is being improved continuously.	1	2	3	4	5
5. I take part in the working condition improvements, such as health, safety, and ergonomics	1	2	3	4	5
6. Communication channels across the department are identified, developed, used andregularly evaluated.	1	2	3	4	5
7. Staff are rewarded and recognizedin order to promote and sustain their involvement, and levels of benefit, such as pension, healthcare etc., are determined.	1	2	3	4	5

Appendix E: EFQM questionnaire results

Leadership				
STATEMENTS (POTENTIAL AREAS TO ADDRESS)	Percent	Spearman correlation	P-value	Rank
1. As an active staff, I'm informed about the vision and mission of my department and it has been clarified how to move to achieve them.	82%	.584	.009	**3**
2. My Leaders are my role models of a culture of excellence and they support the creation of the organization's culture.	80%	.615	.005	**4**
3. There is an effective system for managing processes across the University and it develops properly to deliver our policy and strategy.	61%	.534	.006	**7**
4. My leaders meet, understand and respond to my needs and expectations and they are involved with professional organization activities, including conferences and seminars.	83%	.632	.004	**2**
5. As an active staff, I was encouraged, helped and supported by my leaders to achieve their plans, objectives and targets for the benefit of both individuals and the University.	62%	.653	.002	**5**
6. Equality of opportunity in all aspects of University life is actively encouraged and supported by my leaders.	87%	.493	.046	**1**
7. My Leaders identify and champion organizational changes and review them through periodic meetings with staff.	61%	.666	.002	**6**

Policy and Strategy				
STATEMENTS (POTENTIAL AREAS TO ADDRESS)	Percent	Spearman correlation	P-value	Rank
1. Periodic information is gathered and understood in order to define the present and future needs and expectations of all staff, students, managers, and other stakeholders.	58%	.550	.015	**6**
2. Policy and Strategy in our department has been designed based on information from performance measurement, research, learning and externally related activities.	77%	.828	.000	**3**
3. Our Policy and Strategy are developed reviewed and updated periodically.	62%	.598	.007	**5**
4. There are short-term and long-term actions in our department to achieve the values and goals.	85%	.708	.001	**2**
5. Policy and strategy are communicated with all staff, and with other stakeholders, in an appropriate way, with the effectiveness of the communication reviewed and adjusted as necessary.	75%	.758	.000	**4**
6. I feel free to communicate with my managers to give them non-official feedbacks on the processes and strategies.	89%	.774	.000	**1**

People				
STATEMENTS (POTENTIAL AREAS TO ADDRESS)	Percent	Spearman correlation	P-value	Rank
1. Our department periodically evaluates if the human resource plans are in line to deliver objectives and strategies.	50%	.726	.000	**7**
2. In Industrial engineering department, staff surveys and other forms of staff feedback are used to inform and improve human resource policies, strategies and plans.	64%	.806	.000	**5**
3. My managers motivated and trained me to develop and use my full potential as an individual and also as a team to achieve the best results on my objectives according to my department mission and vision.	77%	.541	.008	**4**
4. The working conditions, including health, safety, environment, etc, are being improved continuously.	85%	.905	.000	**1**
5. I take part in the working condition improvements, such as health, safety, and ergonomics	53%	.708	.001	**6**
6. Communication channels across the department are identified, developed, used and regularly evaluated.	84%	.652	.004	**2**
7. Staff are rewarded and recognized in order to promote and sustain their involvement, and levels of benefit, such as pension, healthcare etc., are determined.	79	.695	.001	**3**

Appendix F: Student satisfaction survey

The teaching on my course:	Strongly Disagree	Disagree	No Idea	Agree	Strongly Agree
1. Staff are good at explaining things	1	2	3	4	5
2. Staff have made the subject interesting	1	2	3	4	5
3. Staff are enthusiastic about what they are teaching	1	2	3	4	5
Academic support					
4. I have received sufficient advice and support with my studies	1	2	3	4	5
5. I have been able to contact **advisers** when I needed to	1	2	3	4	5
6. I have been able to contact **assistances** when I needed to	1	2	3	4	5
7. I have been able to contact **administrative personnel** when I needed to	1	2	3	4	5
8. Good advice was available when I needed to make study choices	1	2	3	4	5
9. There is a clear student complaint/grievance process	1	2	3	4	5
Management					
10. The timetable works efficiently as far as my activities are Concerned	1	2	3	4	5
11. I have been able to access general IT resources, specialized equipment, facilities, or rooms when I needed to	1	2	3	4	5
12. Courses are academically demanding	1	2	3	4	5
13. Dropping and Adding courses is easy to do	1	2	3	4	5
14. Variety of courses offered is adequate	1	2	3	4	5

15. Students receive adequate recognition for their accomplishments	1	2	3	4	5
16. There are adequate opportunities for student employment	1	2	3	4	5
Facilities					
17. Classroom space is adequate	1	2	3	4	5
18. Space for clubs, activities, leisure, lounges, etc. is adequate	1	2	3	4	5
19. Study space for students is adequate	1	2	3	4	5
20. Computer Labs are adequate	1	2	3	4	5
Personal development					
21. The courses has helped me to present myself with confidence	1	2	3	4	5
22. My communication skills have improved	1	2	3	4	5
23. As a result of the course, I feel confident in tackling unfamiliar problems	1	2	3	4	5
24. I am accomplishing my educational goals	1	2	3	4	5
Please add any comments you may have:					

Appendix G: Student survey results

Student Satisfaction Survey Results			
The teaching on my course:	Mean	Related Criterion	Rank
1. Staff are good at explaining things	4.38	people	**1**
2. Staff have made the subject interesting	4.04		**11**
3. Staff are enthusiastic about what they are teaching	4.09		**7**
Academic support			
4. I have received sufficient advice and support with my studies	3.87	Leadership	**13**
5. I have been able to contact **advisers** when I needed to	4.3		**2**
6. I have been able to contact **assistances** when I needed to	3.04		**22**
7. I have been able to contact **administrative personnel** when I needed to	3.68		**17**
8. Good advice was available when I needed to make study choices	3.98		**12**
9. There is a clear student complaint/grievance process	2.51		**23**
Management			
10. The timetable works efficiently as far as my activities are Concerned	3.64	Leadership	**18**
11. I have been able to access general IT resources, specialized equipment, facilities, or rooms when I needed to	3.83		**14**
12. Courses are academically demanding	4.04		**10**
13. Dropping and Adding courses is easy to do	4.19		**5**
14. Variety of courses offered is adequate	3.34		**20**
15. Students receive adequate recognition for their accomplishments	3.32		**21**
16. There are adequate opportunities for student employment	2.36		**24**
Facilities			
17. Classroom space is adequate	4.19	Policy	**4**
18. Space for clubs, activities, leisure, lounges, etc. is adequate	3.7		**16**

20. Computer Labs are adequate	4.06		**8**
Personal development			
21. The courses has helped me to present myself with confidence	4.23	People	**3**
22. My communication skills have improved	3.64		**19**
23. As a result of the course, I feel confident in tackling unfamiliar problems	4.04		**9**
24. I am accomplishing my educational goals	4.17		**6**