

## A GENERAL FRAMEWORK FOR THE ASSESSMENT AND EVALUATION OF QUALITY SYSTEMS

Ercan Oztemel and Kenan Aydogdu  
Sakarya University  
Engineering Faculty  
Dept. of Industrial Eng.  
Esentepe Campus  
Sakarya  
eoztemel@sakarya.edu.tr, aydogdukenan@yahoo.co.uk

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### ABSTRACT

*In this study, a new model is presented for evaluating quality systems of enterprises. This assessment model is a part of extensive manufacturing assessment model. After completing development of the model, this assessment model was employed in an industrial company. The results of application are presented in this paper.*

### 1. INTRODUCTION

Quality systems are always being the top agenda items of the enterprises regardless of the products and services produced. It is obvious that there are several factors affecting the success of the quality related activities. However, despite very intensive interest and careful analysis, there are still some failure stories as well as success. Apart from some cultural diversity, one of the main reasons behind the failure is the mis-implementation of the quality systems and principles. There is always a need for reviewing the effectiveness and efficiency of quality tasks in order to make sure everything is set up properly and complying with enterprise requirements including the customer needs. Enterprises may not always be able to recognize and realise these failures. Besides, some enterprises consider their quality systems are well set up and ignore self-assessment of their quality systems. This in turn creates extra costs of failure that could be prevented through objective evaluation of quality system. In this study, a quality assessment model was developed for this purpose. The proposed model provides a general evaluation framework, which could be employed by different enterprises in different business sectors. Note that, the model proposed in this paper is in fact a part of extensive manufacturing assessment model and is an extension of the taxonomy provided by [1,2].

The following process is employed to create the proposed model.

- Defining of components of the model
- Defining importance of each components with respect to others
- Defining assessment methodology
- Defining an over all scoring system
- Defining evaluation criteria

Each of these is briefly explained below.

## 2. DEFINING OF COMPONENTS OF THE MODEL

The following components are defined as the main elements of proposed assessment model.

- **Quality Assurance System (Quality Standards):** Using the criteria defined for this element, the implementation of quality standards such as ISO Standards, QS 9000 and HACCP etc. is evaluated. (23 Criteria was defined for this assessment)
- **Process Management:** Several criteria are developed to assess the process management and improvement activities under this component. (15 Criteria was defined for this assessment)
- **Customer Focus Activities:** Assessment of handling customer requirements, customer classification, utilising customer knowledge, customer loyalty, performing customer relations etc. are carried out using this component. (13 Criteria was defined for this assessment)
- **Continuous Improvement, Problem Solving and Team Works:** Criteria of this component are used to assess the organizational capability of handling problems, creating solutions using scientific improvement techniques as well as team working such as quality circles. (17 Criteria was defined for this assessment)
- **Training:** With this component, it was intended to assess the training facilities and the performance of training efforts. (15 Criteria was defined for this assessment)
- **Complaints and Suggestions:** With this component, it was aimed at evaluating the practices related to complaints and suggestion generation as well as evaluating the proposed recommendations within the enterprises. (15 Criteria was defined for this assessment)
- **Measuring Satisfaction Levels:** Using the criteria defined for this element, the model is assumed to assess how customer, employee and supplier satisfaction are measured and the results are used in creating improvements in the enterprises (13 Criteria was defined for this assessment)
- **Input Control:** With this component, the way to control the procurement processes and supplier input. (16 Criteria was defined for this assessment)
- **Process Control:** Assessment of quality control activities such as statistical process control (SPC) techniques is carried out under this component. (21 Criteria was defined for this assessment)
- **Final Inspection Control:** Under this component company's final inspection activities are assessed. (13 Criteria was defined for this assessment)

## 3. DEFINING IMPORTANCE OF EACH COMPONENTS WITH RESPECT TO OTHERS

The most important stage of the proposed model is defining the importance of the components as the activities assessed in each of them have different affect on quality practices. The importance of the components is indicated as "importance grades" an indicated by  $\alpha$  in this paper.

Quality activities are evaluated and checked using these importance grades against predefined set of assessment criteria. Note that, importance grades, which are defined through questionnaires and interviews, are weighted average of the grades provided by the quality experts, engineers and academics as well as quality managers. Also note that indicate the maximum score each component can have in the scoring procedure. Table 1 indicates the proposed importance grades.

## 4. DEFINING ASSESSMENT METHODOLOGY

Quality assessment in the proposed model is carried out using a systematic and hierarchical approach. Figure 1 illustrates the methodology used for this purpose. Note that, the model is based on evaluation of criteria for a certain component and then makes a conclusion about the quality implementations after assessing all components given in Table.1.

Table 1: Importance grades for the components of the quality assessment model

QUALITY ASSESSMENT COMPONENTS		Importance Grades (%)
1	Quality Standards	11,30
2	Process Management	11
3	Customer Focus Activities	13,80
4	Continuous Improvement, Problem Solving and Team Works	12,90
5	Training	8,60
6	Complaints and Suggestions	9,95
7	Measuring Satisfaction	10,60
8	Input Control	6,95
9	Process Control System	7,90
10	Final Inspection Control	7
		<b>100</b>

The model currently comprises of 161 assessment criteria. The criteria are defined using questionnaires, interviews with the experts and related literature (see for some examples in [3-8])

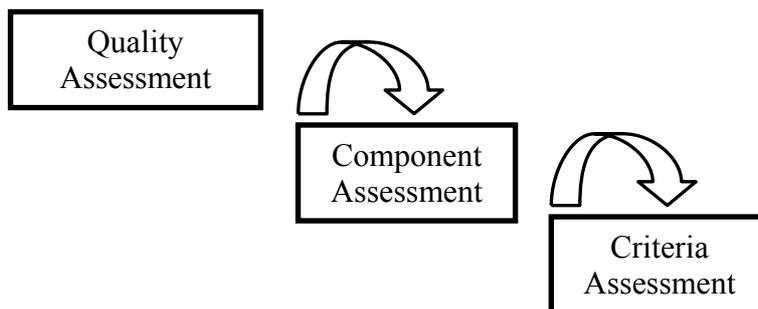


Figure.1 Hierarchical assessment methodology

## 5 DEFINING AN OVER ALL SCORING SYSTEM

Over all scoring system of the proposed model is based on scoring each criterion using 5 levels each indicating the level of practical implementation level within the organization under assessment for that particular criterion. Level 0 indicate the poorest implementation whereas level 5 indicate the best implementation. Note that the importance grade of each component is equally distributed among the criteria of that particular model. For example if the importance grade for a component with 5 criteria is 10, then each criterion receives the score of max 2 for its Level 5.

## 6. DEFINING EVALUATION CRITERIA

As mentioned above, each assessment component uses several criteria to perform the evaluation. The criteria are defined using the following aspects.

- *Systematic Approach* of the quality implementations.
- Fundamental and basic *rationales* behind the implementations and main *reasons* of the changes if any.

- *System Definition* of the quality components implemented in the organization.
- *Documentation* of the quality implementations.
- *Performance Indicators* of the quality processes
- *Interaction* between the quality processes.
- *Integrity in quality application*

## 7. A CASE STUDY

The proposed model is employed in an industrial company producing gas and water armatures and valves. Currently the company has around 200 employees and has a good amount of market share in Turkey. Note that, the company considers its quality system as effective and efficient enough. A specific guidebook is prepared for the assessors taking all criteria and related components of the model into account. Table 2 shows the results of the assessment. As shown in the table the quality implementations were not satisfactory enough as it was thought before the assessment. It was concluded that the company only fulfils %22.17 of ideal quality system requirements.

Table 2: Assessment results of a particular company

QUALITY SYSTEMS		Importance grades	Company scores
1	Quality Standards	11,30	6,633
2	Process Management	11	0
3	Customer Focus Activities	13,80	4,512
4	Continuous Improvement, Problem Solving and Team Works	12,90	0
5	Training	8,60	2,58
6	Complaints and Suggestions	9,95	0
7	Measuring Satisfaction	10,60	0
8	Input Control	6,95	3,583
9	Process Control	7,90	3,386
10	Final Inspection	7	1,48
		<b>100</b>	<b>22,174 Grades</b>

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