

Chapter XV

Quality Management, Control, and Assurance: Tools and Techniques

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ABSTRACT

This chapter provides a fundamental yet comprehensive coverage of quality management. Bringing managers and engineers the most up-to-date quality management tools, research, and theory, this chapter shows readers how to plan for quality and achieve quality control. Broad in scope and inclusive in methodology, the material covered in this chapter will be useful for anyone concerned with quality management and control in business and industry. Topics covered include planning and organizing for quality, total quality management, quality improvement, statistical quality control, and ISO 9000. The chapter begins with an introduction to the concept of quality. Next, the quality management philosophies developed by Deming, Juran, and Crosby are presented. The principles of total quality management (TQM) are described next. The major steps in planning and organizing for quality are addressed in this chapter. Next, the quality improvement process, approaches to problem solving, and tools for quality improvement are presented. The concepts and techniques of statistical quality control are also covered in this chapter. Finally, the ISO 9000 and ISO 14000 quality standards are described.

INTRODUCTION

During the past two decades, there has been a revolution in quality. Significant improvements

have occurred not only in the quality of products and services, but also in the leadership quality and business management quality. The demand for higher levels of quality appears to be customer

driven. People want to produce and use quality products and services.

The prevailing view of quality is that it is everyone's responsibility. According to Besterfield (2001), "The responsibility for quality begins when marketing determines the customer's quality requirements and continues until the product is received by a satisfied customer" (p.5).

Most organizations view quality more as a continuously improving process than a product. It is a process where lessons learned are used to improve future products and services. Therefore, present emphasis is on the development of quality improvement processes which constitute an important component of the strategic planning process.

The quality management system of an organization consists of collective plans, activities, and events that are provided to ensure that a product or a service will satisfy given needs. To be effective, the quality management system needs coordination and compatibility of its component processes and an understanding of their interfaces. The elements of a quality management system may include teamwork, strategic integration, continuous improvement, customer focus, and structured problem solving.

DEFINITIONS OF QUALITY

While the importance of quality is now generally recognized, there is no single generally accepted definition of "quality". Some of the definitions provided by Pyzdek (1996) are as follows:

1. **Transcendent definition:** "Quality cannot be defined, you know what it is". (Persig 1974, p. 213)
2. **User-based definition:** "Quality consists of the ability to satisfy wants". (Edwards 1968, p. 37) "Quality is fitness for use". (Juran 1974m, p. 2-2)

3. **Manufacturing-based definition:** "Quality is the degree to which a specific product conforms to a design or specification". (Gilmore 1974, p. 16)
4. **Value-based definition:** "Quality is the degree of excellence at an acceptable price and the control of variability at an acceptable cost". (Broh 1982, p. 3)

In addition, Besterfield (2001) quantifies the definition of quality as follows:

$$Q = P/E$$

Where

Q = quality

P = performance

E = expectations

The ISO 9000 definition of quality is provided by Kerzner (2006) as "the totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied needs" (p. 834)

Nine different dimensions of quality are described by Garvin (1988). They are:

1. **Performance:** Primary operating characteristic of a product.
2. **Features:** Secondary characteristics of a product.
3. **Conformance:** The extent to which physical and performance characteristics of a product meet specifications.
4. **Reliability:** Consistency of performance over time.
5. **Durability:** Useful life of a product.
6. **Serviceability:** Resolution of problems and complaints, competence, and ease of repair.
7. **Response:** Human-to-human interface.
8. **Aesthetics:** Sensory characteristics of a product.

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