Fundamentals of Quality

Quality (business)

Quality in business, engineering and manufacturing has a pragmatic interpretation as the non-inferiority or superiority of something; it is also defined as fitness for purpose. Quality is a perceptual, conditional, and somewhat subjective attribute and may be understood differently by different people. Consumers may focus on the specification quality of a product/service, or how it compares to competitors in the marketplace. Producers might measure the conformance quality, or degree to which the product/service was produced correctly. Support personnel may measure quality in the degree that a product is reliable, maintainable, or sustainable. Simply put, a quality item (an item that has quality) has the ability to perform satisfactorily in service and is suitable for its intended purpose.

Notable definitions

The common element of the business definitions is that the quality of a product or service refers to the perception of the degree to which the product or service meets the customer's expectations. Quality has no specific meaning unless related to a specific function and/or object. Quality is a perceptual, conditional and somewhat subjective attribute.

The business meanings of quality have developed over time. Various interpretations are given below:

1.American Society for Quality: "A combination of quantitative and qualitative perspectives for which each person has his or her own definition; examples of which include, "Meeting the requirements and expectations in service or product that were committed to" and "Pursuit of optimal solutions contributing to confirmed successes, fulfilling accountabilities". In technical usage, quality can have two meanings: a. The characteristics of a product or service that bear on its ability to satisfy stated or implied needs;b. A product or service free of deficiencies."

2.Subir Chowdhury: "Quality combines people power and process power."

3.Philip B. Crosby: "Conformance to requirements." The requirements may not fully represent customer expectations; Crosby treats this as a separate problem.

4.W. Edwards Deming: concentrating on "the efficient production of the quality that the market expects," and he linked quality and management: "Costs go down and productivity goes up as improvement of quality is accomplished by better management of design, engineering, testing and by improvement of processes."

5.Peter Drucker: "Quality in a product or service is not what the supplier puts in. It is what the customer gets out and is willing to pay for."

6.ISO 9000: "Degree to which a set of inherent characteristics fulfills requirements." The standard defines requirement as need or expectation.

7.Joseph M. Juran: "Fitness for use." Fitness is defined by the customer.

8.Noriaki Kano and others, present a two-dimensional model of quality: "must-be quality" and "attractive quality." The former is near to "fitness for use" and the latter is what the customer would love, but has not yet thought about. Supporters characterize this model more succinctly as: "Products and services that meet or exceed customers' expectations."

9.Robert Pirsig: "The result of care."

10.Six Sigma: "Number of defects per million opportunities."

11.Genichi Taguchi, with two definitions: a. "Uniformity around a target value."The idea is to lower the standard deviation in outcomes, and to keep the range of outcomes to a certain number of standard deviations, with rare exceptions.b. "The loss a product imposes on society after it is shipped." This definition of quality is based on a more comprehensive view of the production system.

12.Gerald M. Weinberg: "Value to some person".

Market sector perspectives

Operations management

The dimensions of quality refer to the attributes that quality achieves in operations management:[citation needed]

Quality supports dependability

Dependability supports speed

Speed supports flexibility

Flexibility supports cost

There are five aspects of quality in a business context:

1.Producing – providing something.

2.Checking – confirming that something has been done correctly.

3.Quality Control – controlling a process to ensure that the outcomes are predictable.

4.Quality Management – directing an organization so that it optimizes its performance through analysis and improvement.

5.Quality Assurance – obtaining confidence that a product or service will be satisfactory. (Normally performed by a purchaser)

Quality applied in these forms was mainly developed by the procurement directorates of NASA, the military and nuclear industries from the 1960s and this is why so much emphasis was placed on Quality Assurance. The original versions of Quality Management System Standards (eventually merged to ISO 9001) were designed to contract manufacturers to produce better products, consistently and were focused on Producing, Checking and Quality Control.

The subsequent move of the Quality sector towards management systems can be clearly seen by the aggregation of the product quality requirements into one eighth of the current version of ISO 9001. This increased focus on Quality Management has promoted a general perception that quality is about procedures and documentation. Similar experiences can be seen in the areas of Safety Management Systems and Environmental Management Systems.

The emergence of tools like Asset Optimization and 6 sigma is an interesting development in the application of quality principles in business.

Managing quality is fundamental to any activity and having a clear understanding of the five aspects, measuring performance and taking action to improve is essential to an organizations survival and growth.

Manufacturing

In the manufacturing industry it is commonly stated that "Quality drives productivity." Improved productivity is a source of greater revenues, employment opportunities and technological advances. However, this has not been the case historically, and in the early 19th century it was recognized that some markets, such

as those in Asia, preferred cheaper products to those of quality. Most discussions of quality refer to a finished part, wherever it is in the process. Inspection, which is what quality insurance usually means, is historical, since the work is done. The best way to think about quality is in process control. If the process is under control, inspection is not necessary.

However, there is one characteristic of modern quality that is universal. In the past, when we tried to improve quality, typically defined as producing fewer defective parts, we did so at the expense of increased cost, increased task time, longer cycle time, etc. We could not get fewer defective parts and lower cost and shorter cycle times, and so on. However, when modern quality techniques are applied correctly to business, engineering, manufacturing or assembly processes, all aspects of quality - customer satisfaction and fewer defects/errors and cycle time and task time/productivity and total cost, etc.- must all improve or, if one of these aspects does not improve, it must at least stay stable and not decline. So modern quality has the characteristic that it creates AND-based benefits, not OR-based benefits.

Quality, especially in manufacturing and diverse industries, is regulated, tested, and certified. Diverse methods, models and standards are provided to test the quality. For instance, the Fitness For Use (FFU), concept introduced to help test the quality of various types of electrical and electronic equipment, including household appliances and video/audio equipment. All types of equipment are manufactured in accordance to relevant standards, including performance testing requirements. FFU testing means testing products to ensure their ‘fitness for purpose’; that is, to certify their quality as well as durability.

Customers

One view of quality is that it is defined entirely by the customer or end user, and is based upon that person's evaluation of his or her entire customer experience. The customer experience is defined as the aggregate of all the interactions that customers have with the company's products and services. For example, any time one buys a product, one forms an impression based on how it was sold, how it was delivered, how it performed, how well it was supported etc.

1) Quality

1.1 Quality assurance (**QA**) refers to the engineering activities implemented in a quality system so that requirements for a product or service will be fulfilled. It is the systematic measurement, comparison with a standard, monitoring of processes and an associated feedback loop that confers error prevention. This can be contrasted with quality control, which is focused on process outputs.

Two principles included in QA are: "Fit for purpose", the product should be suitable for the intended purpose; and "Right first time", mistakes should be eliminated. QA includes management of the quality of raw materials, assemblies, products and components, services related to production, and management, production and inspection processes.

Suitable quality is determined by product users, clients or customers, not by society in general. It is not related to cost and adjectives or descriptors such "high" and "poor" are not applicable. For example, a low priced product may be viewed as having high quality because it is disposable where another may be viewed as having poor quality because it is not disposable.

1.2 Quality Objectives Must Be

- measurable
- Relate to your business products
- documented
- reviewed
- tracked

Quality Objectives Documentation:

- Tell specifically what you are measuring
- State how you collect the data.
- The frequency of the measurement
- Provide targeted goals
- State who is responsible for gathering the data
- State how they are recorded.
- State when they are reviewed.

Determining Objectives

When determining metrics, select metrics that are global to the entire operation. Then select metrics that support those global metrics. Break the metrics down by department, process, organization function or product.

The metrics have to be agreed upon. A management committee determines the metrics. Senior management communicates these metrics throughout the company.

All employees should be able to identify the metrics. All employees should know how their work affect the metrics.

Make metric targets reasonable and challenging. Management provides the plans to achieve the targets. During the quality management review, review the metrics and document the plans to achieve the targets.

Some companies put the quality objectives within the quality assurance manual. I do not recommend this. Your customers do not need to see your quality objectives.

1.3 Quality and Manufacturing Systems and Service

Quality assurance refers to the entire system of policies, procedures, and guidelines established by an organization for the purpose of achieving and maintaining quality. Quality assurance consists of three principal functions: quality engineering, quality control, and quality management. The aim of quality engineering is to incorporate quality into the design of products and processes and to predict potential quality problems prior to delivery of the product. Quality control involves making a series of planned measurements in order to determine if quality standards are being met. If not, then corrective action and future preventive action must be taken to achieve and maintain conformance. Quality management involves the planning, organization, direction, and control of all quality assurance activities. While many manufacturing firms have Quality control departments to provide technical support, successful businesses have found that quality must be integrated throughout the firm. This concept of integrating quality throughout all business functions-total quality management.

Quality in Manufacturing Systems

In manufacturing, quality is an important component of all functions. For example,

effective market research is necessary to determine customer needs and identify functional requirements for product designers. Product designers must take care to neither over engineer (resulting in inefficient use of a firm's resources) nor under engineer products (resulting in poor quality). Purchasing must ensure that suppliers meet quality requirements. Production planning and scheduling should not put undue pressure on manufacturing that will degrade quality. Tool engineering and maintenance are responsible for ensuring that tools, gages, and equipment are properly maintained. Industrial engineering must select the appropriate technology that is capable of meeting design requirements and developing appropriate work methods. Packaging, shipping, and warehousing have the responsibility of ensuring the condition, availability, and timely delivery of products in transit. Ancillary functions such as finance, human resources, and legal services support the quality effort by providing realistic budgets, a well-trained and motivated workforce, and reviews of warranty, Safety, and liability issues.

1.4 Quality Philosophy

Quality Management refers to the overall quality philosophy and summarizes the preventative and appraisal quality activities that have been integrated into the project management processes that occur throughout the delivery life cycle.

All Delivery staff must understand that the project team is responsible for building quality into the project's products and services and that ‘quality processes’ are defined throughout my posts to this blog. However, the Quality Management philosophy also recognizes that proper investments in preventative and appraisal activities increase the probability of project success. This concept is accepted throughout the industry as the cost of quality and is built in to external standards for project management such as *ISO9000*, the *SEI's Capability Maturity Model* (CMM) and *PMI's Project Management Body of Knowledge (PMBOK)*. For example, if a system were to be delivered untested to a customer, the cost of quality to that point would be minimal. However, once the system went live and the inevitable bugs appeared, the operational costs to the customer, rework and damage control costs, and the resulting cost to the professional reputation of the delivery organization, would far outweigh any prevention or appraisal costs that might be incurred up front.

The Quality Management role will be implemented differently based on project size, budget and contractual requirements. On smaller projects the Quality Management

role may integrated into the Deliverer's responsibilities. On larger projects, the project team may include a Quality Assurance group, with an independent reporting relationship around the Deliverer, to make sure that proper attention is given to quality throughout the project.

Although Quality Management is described in terms of discrete processes, the work is iterative and is conducted in parallel with the project life cycle activities. The sub processes are:

Plan for Quality Planning for quality begins in Bid and Proposal and continues through Project Initiation to establish the level of investment in preventative, appraisal and testing activities that need to be incorporated into the overall project work plans. The output of this process is a clear understanding of the customer's quality expectations for the project. For example, a 911 emergency call system would have a very low tolerance for defect – people's lives are at stake - but if a customer information system fails, access to the information the next day may not be a problem. Using the quality requirements as input, the most important quality factors to be tracked during the project are then identified. These quality factors in turn lead to definition of the quality criteria, measurements and quality activities that make sense for the project.

Monitor Quality Ongoing monitoring ensures that the quality processes documented in the Quality Plan are being appropriately carried out (such as adherence to project standards and procedures). One of the more important quality processes is that all projects should have the following regularly scheduled reviews:

- Regular Walkthroughs and Inspections – to ensure the quality of project processes.
- Monthly Reviews performed by the Delivery Line Management role, in connection with the monthly status report.
- Semi-annual Reviews performed by Delivery Management (especially for high-risk, high-visibility projects), as an independent review to assess and increase the probability project success.

Manage Continual Improvement Process Use quality metrics and measures to promote visibility of quality-related efforts. Analyze the metrics to identify areas where targets are not being met. Evaluate existing work operations for possible improvements.

Manage Acceptance Managing acceptance includes creating the process for facilitating prompt acceptance of deliverables by the customer. On a large project, the Quality Assurance team typically serves as the primary interface with the customer for this process.