

27.18: Quality Assurance

Learning Objectives

- Differentiate between statistical process control, benchmarking, lean manufacturing, and Six Sigma.
- Explain the benefits of national and international quality standards in the production of goods and services.



Figure \

What is *quality*? According to the American Society for Quality, quality refers to “the characteristics of a product or service that bear on its ability to satisfy stated or implied needs.”^[1]

As a customer, you’re constantly assured that when products and services make it to market, they’re of the highest quality, and if they aren’t—if they fail to meet your expectations or to live up to claims—you may decide to avoid certain brands or give up on those products/services altogether. When companies can’t deliver quality goods or services, they risk losing trust, loyalty, and business.

Nowhere are the high stakes of quality more evident than in the case of a product recall—when a company requests the return of a product after the discovery of safety issues or product defects that might endanger the consumer.

Consider Samsung’s recent recall on its popular tablet computer, the Galaxy Note7, in October 2016:

Samsung has announced an expanded voluntary recall on all original and replacement Galaxy Note7 devices sold or exchanged in the United States in cooperation with the U.S. Consumer Product Safety Commission and in partnership with carriers and retailers. Since the affected devices can overheat and pose a safety risk, we are asking consumers with a Galaxy Note7 to power it down and contact the carrier or retail outlet where they purchased their device.”^[2]

If you bought a Galaxy Note7, you probably weren’t expecting that it might catch fire during regular use! If you held shares of Samsung in your stock portfolio, you probably weren’t expecting that the company’s stock price would plummet practically overnight, either. After all, Samsung was the number one manufacturer of smartphones in the world, and as of September 30, 2016, it had sold 2.5 million Galaxy Note7 devices worldwide. Yet this is exactly what happened. Besides affecting millions of customers and taking a toll on shareholders, the recall meant lost income for retailers, who had to pull the device from their shelves, and for many of Samsung’s suppliers. The entire supply chain was impacted by this quality debacle.

Given the devastating financial and, in some cases, legal consequences of selling inferior goods or services, how do companies actually ensure that they’re producing products and offering services that meet customer expectations for quality? We will examine just a few of the ways that companies manage the production of quality goods and services.

Statistical Process Control

Statistical process control (SPC) is a method of quality control that uses statistical or mathematical methods to monitor and control a process. The goal of SPC is to ensure that production operates at its full potential. “Full potential” indicates the point where the process produces as much conforming product as possible with a minimum (if not the total elimination) of defective parts, rework, or scrap. SPC can be applied to any process in which the product can be measured. Key tools used in SPC include control charts with a focus on continuous improvement.

Example: Margie is the production manager at Wanda’s Widgets. The company uses SPC as their approach to quality assurance. Several times per day, the quality-assurance team comes to the production floor and takes a sample of widgets from the production line. These widgets are closely inspected to be certain that they meet the company standards. Everything from their weight to the

uniformity of the paint is closely inspected and entered into the SPC software program. When the data are analyzed, if the output from the SPC software indicates that the widgets do not meet the standard, Margie is alerted that there is an issue, and production may be stopped until the process is producing as many perfect widgets as possible.

Benchmarking

Benchmarking involves comparing one's business processes and performance metrics to industry bests and best practices from other companies. Dimensions typically measured are quality, time, and cost. In the process of best-practice benchmarking, management identifies the best firms in their industry—or in another industry where similar processes exist—and compares the results and processes of those studied (the “targets”) to one's own results and processes. In this way, management learns how well the targets perform and, more importantly, the business processes that explain why those firms are successful.

Benchmarking is used to measure performance using a specific indicator (cost per unit of measure, productivity per unit of measure, cycle time of x per unit of measure or defects per unit of measure) resulting in a metric of performance that is then compared to others. Benchmarking may be a one-time event but is often treated as a continuous process in which organizations continually seek to improve their practices.

Lean Manufacturing

The central idea of **lean manufacturing** is actually quite simple: Work relentlessly to eliminate waste from the manufacturing process. In this context, “waste” is defined as any activity that doesn't add value from the customer's perspective. Almost every company has a tremendous opportunity to improve by using lean manufacturing techniques. Lean principles were developed by the Japanese manufacturing industry—by Toyota and the Toyota Production System (TPS) specifically. Lean manufacturing is based on the following goals and assumptions:

- Continuous improvement
- Respect for people
- Long-term approach to process improvement
- The right process will produce the right results
- Add value to the organization by developing your people and partners
- Continuously solving root problems

Did You Know . . . ?

Toyota originally began sharing the TPS with its parts suppliers in the 1990s. Because of interest in the program from other organizations, Toyota began offering instruction in the methodology to others. Toyota has even “donated” its system to charities, providing its engineering staff and techniques to nonprofits in an effort to increase their efficiency and thus ability to serve people. For example, Toyota assisted the [Food Bank For New York City](#) to significantly decrease waiting times at soup kitchens, packing times at a food distribution center, and waiting times in a food pantry.^[3]

Six Sigma

In the United States, another approach to quality management was formulated at Motorola in 1986 and was named **Six Sigma**. Six Sigma is a company-wide process that focuses on measuring the number of defects that occur and systematically eliminating them in order to get as close to “zero defects” as possible. In fact, Six Sigma quality aims to have every process produce no more than 3.4 defects per million. Six Sigma focuses on designing products that not only have fewer defects but that also satisfy customer needs.

A key process of Six Sigma is called *DMAIC*. This stands for Define, Measure, Analyze, Improve, and Control. Employees at all levels define what needs to be done to ensure quality, then measure and analyze production results using statistics to see if standards are met. They are also charged with finding ways to improve and control quality. The following features also set Six Sigma apart from other quality-improvement initiatives:

- Focus on measurable financial returns
- Emphasis on good management
- Commitment to making data-driven decisions

General Electric was one of the first companies to institute Six Sigma throughout the organization. GE employees are trained in Six Sigma concepts, and many analysts believe this has given GE a competitive manufacturing advantage. Service firms and

government entities have applied Six Sigma to their quality initiatives as well.

? Practice Question

<https://assessments.lumenlearning.co...essments/14473>

International Quality Standards

As a consumer, wouldn't you like to know which companies ensure that their products meet quality specifications? Or, might you want to know which companies take steps to protect the environment? Some consumers want to know which companies continuously improve their performance in both of these areas—that is, practice both quality management and environmental management. By the same token, if you were a company doing a good job in these areas, wouldn't you want potential customers to be aware of your achievements? It might also be worthwhile to find out whether your suppliers were being conscientious in these areas—and even your suppliers' suppliers.

Through the International Organization for Standardization (ISO), a nongovernmental agency based in Switzerland, it is possible to learn which companies are making efforts to comply with quality and environmental standards. The resources of this organization will enable you to identify those organizations that have people and processes in place for delivering products that satisfy customers' quality requirements. You can also find out which organizations work to reduce the negative impact of their activities on the environment. Working with representatives from various countries, the organization has established the ISO 9000 family of international standards for quality management and the ISO 14000 family of international standards for environmental management.

ISO standards focus on the way a company does its work, not on its output (though there's certainly a strong correlation between the way in which a business functions and the quality of its products). Compliance with ISO standards is voluntary, and the certification process is time-consuming and complex. Even so, hundreds of thousands of organizations around the world are ISO 9000 and ISO 14000 certified.^[4] ISO certification has become an internationally recognized symbol of quality management and is increasingly essential to being competitive in the global marketplace.

Malcolm Baldrige National Quality Award

To provide encouragement and a consistent standard, the U.S. government created the Malcolm Baldrige National Quality Award in 1987 to encourage companies to improve quality. The award was named for Malcolm Baldrige, who was the U.S. secretary of commerce from 1981 to 1987.^[5] The Commerce Department's National Institute of Standards and Technology (NIST) manages the Baldrige Award in cooperation with the private sector. An organization may compete for the award in one of six categories: manufacturing, service, small business, health care, education, and nonprofit (including government agencies). An independent board of examiners recommends the Baldrige Award recipients after evaluating them in the following seven areas defined by the Baldrige Excellence Framework:

- leadership
- strategy
- customers
- measurement
- analysis and knowledge management
- workforce
- operations
- results

Past recipients of the Baldrige Award include the following:

- Price-Waterhouse-Coopers Public Sector Practice, McLean, VA
- Pewaukee School District, Pewaukee, WI
- Concordia Publishing House, St. Louis, MO
- City of Irving, Irving, TX
- Lockheed Martin Missiles and Fire Control, Grand Prairie, TX
- Nestlé Purina PetCare Co., St. Louis, MO

No one knows the cost of a defective product—don't tell me you do. You know the cost of replacing it, but not the cost of a dissatisfied customer.

—W. Edwards Deming

? Practice Question

<https://assessments.lumenlearning.co...essments/14474>

1. "Basic Concepts, Definitions," American Society of Quality, (accessed November 3, 2011). <http://asq.org/glossary/q.html>↵
2. Galaxy Note7 Safety Recall and Exchange Program. (n.d.). Retrieved March 01, 2017, from <http://www.samsung.com/us/note7recall/>↵
3. El-Naggar, Mona (26 July 2013). "In Lieu of Money, Toyota Donates Efficiency to New York Charity". The New York Times. Retrieved 1 September 2013. https://www.nytimes.com/2013/07/27/nyregion/in-lieu-of-money-toyota-donates-efficiency-to-new-york-charity.html?_r=0↵
4. "ISO Survey of Certifications," 2009 International Organization for Standardization, (accessed November 2, 2011). ↵
5. National Institute of Standards and Technology, "Frequently Asked Questions about the Malcolm Baldrige National Quality Award," November 25, 2008, (accessed August 14, 2009). ↵

Contributors and Attributions

CC licensed content, Original

- Quality Assurance. **Authored by:** Linda Williams and Lumen Learning. **License:** [CC BY: Attribution](#)
- Practice Questions. **Authored by:** Robert Danielson. **Provided by:** Lumen Learning. **License:** [CC BY: Attribution](#)

CC licensed content, Shared previously

- Six Sigma. **Provided by:** OpenStax CNX. **Located at:** <http://cnx.org/contents/4e09771f-a8aa-40ce-9063-aa58cc24e77f@8.5>. **License:** [CC BY: Attribution](#). **License Terms:** Download for free at <http://cnx.org/contents/4e09771f-a8aa...58cc24e77f@8.5>
- Cut Diamond. **Authored by:** Neil Rickards. **Located at:** <https://www.flickr.com/photos/neilrickards/471705233/>. **License:** [CC BY: Attribution](#)

27.18: Quality Assurance is shared under a [not declared](#) license and was authored, remixed, and/or curated by LibreTexts.