

Chapter 70

Total Quality Management in the Global Supply Chain

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ABSTRACT

This chapter provides an overview of the importance of total quality management in supply chain management. It provides a summary of the evolution of quality and how supply chain management fit into the evolution. It then discusses the importance of quality for each entity of the value chain and how the reduction of variability along the entire supply chain is critical to optimum delivery performance. The latter sections of the chapter discuss how quality and continuous improvement tools and methodologies can be mapped with supply chain management strategies to optimize the performance of the entire supply chain.

THE EVOLUTION OF QUALITY

What is quality? Quality has many definitions but, its primary definition is determined by the perspective of the user. The American Society of Quality Control (ASQ) defines quality as: “A subjective term for which each person or sector has its own definition” (ASQ, 2011). Quality is not a new concept in the modern business world; however, the concepts and principles evolved over the years. The stones of the pyramids built back in the fifteenth century B.C. show evidence of the importance of quality. The stones were cut

so precisely that even today, it is nearly impossible to get a knife blade between them. (Evans & Lindsay, 2008).

Before the days of mass production, the artisan served as both the manufacturer and inspector (ASQ, 2011; Evans & Lindsay, 2008; Summers, 2006). These skilled craftsmen completed individual products and inspected them prior to providing them to the customer. If the customer was dissatisfied with the product, he/she communicated directly with the artisan. This approach to quality was followed by manufacturing in the industrialized world until early in the nineteenth Century.

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The factory system approach which emphasized product inspection started in Great Britain in the mid-1750s. This model was a product of the Industrial Revolution in Europe. It divided the craftsmen trade into specialized tasks. Quality was ensured through skilled laborers and was supplemented by inspections and audits. Non-conforming product was reworked or scrapped. Prior to the onset of mass production, the concept of interchangeable parts evolved. In the middle of the eighteenth century, Honoré Le Blanc, a French gunsmith, developed a system for manufacturing muskets to a standard pattern using interchangeable parts (Evans and Lindsay, 2008). After learning about this idea, Thomas Jefferson brought it to America. As a result, the United States government awarded Eli Whitney a contract in 1798 to supply muskets to the armed forces (Evans and Lindsay, 2008). The need for interchangeable parts as well as, the need from random matching of mating parts created the necessity for the control of quality.

Quality in the Twentieth Century

Early in the twentieth century, the United States drifted from the European approach to quality and adopted the efficiency improvement approach developed by Frederick W. Taylor (ASQ, 2011; Evans and Lindsay, 2008; Turner, et. al, 1993). Taylor's approach was to improve the method of performing work, reduce the time required to complete tasks, and set standard time for the work. This method led to significant and rapid increases in productivity but negatively affected quality. Because this method segmented jobs into specific work tasks and focused on increasing efficiency, inspection departments were created to keep defective product from reaching the customer. Quality became the responsibility of inspectors and inspection became the primary means of quality control. This approach to quality resulted in the development of separate quality departments. Quality became primarily the responsibility of the quality departments.

As the shift of responsibility for quality continued, the fundamentals of total quality were developed by Henry Ford, Sr. however; the Bell System was credited as the leader in early modern history of industrial quality assurance. The Bell System achieved its noteworthy quality through the inspection department in its Western Electric Company in the early 1900s. From this group, employees were transferred to the Bell Telephone Laboratories. The focus of this group was the development of new theories and methods of inspection to improve and maintain quality. Several of the quality assurance pioneers—Walter Shewhart, Harold Dodge, George Edwards, Joseph Juran, and W. Edwards Deming (who coined the phrase “quality assurance”)—were members of this group.

An output of the era of quality assurance (QA) was quality control (QC). Quality control went beyond inspection. It referred to the use of specifications and inspection to design, produce, review, sustain, and improve the quality of products and service (Summers, 2006). After the United States (U.S.) entered World War II in 1941, legislation was enacted to steer the civilian economy to military production. During this time of high demand, the U.S. military helped suppliers improve quality and statistical quality control (SQC) became widely known and gradually adopted throughout manufacturing industries.

After World War II ended, during the late 1940s and early 1950s, the shortage of civilian goods in the U.S. made production a top priority. In the push for high short-term profitability and high production levels, quality was neglected and little interest was placed in quality improvement. It was during this time that Dr. Joseph Juran and Dr. W. Edwards Deming introduced SQC to the Japanese to help them rebuild their country. Overtime, the emphasis on quality shifted from that of inspection and detection to the prevention of poor quality. Statistical Process Control (SPC) emphasized the prevention of defects. SPC techniques also tried to limit the variation present in the product produced or service provided.

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