



Total Quality Management in Supply Chain

Guangshu Chang

Zhengzhou Institute of Aeronautical Industry Management

Zhengzhou 450015, China

E-mail: cgs30@163.com

This work is sponsored by Aerospace Science Foundation of China (2008ZG55019), Important Science and Technology Project of Henan Province (072102240037), Foundation for University Key Teacher by Henan Province (2008-708-94), and Education Foundation of Henan Province (2008B630009).

Abstract

Since 1980's, the competition between enterprises has become the one between supply chains. Therefore, the implementation of total quality management (TQM) in supply chain system but not only in enterprise has become an exquisite premise for the survival of enterprise. This paper discussed the application of the eight modern TQM principles of ISO9000 in supply chain quality management, namely customer focus, leadership, involvement of people, process management, system management, continual improvement, factual approach to decision-making, and mutually beneficial supplier relationships.

Keywords: Supply Chain, Total Quality Management, ISO9000

1. Introduction

In nowadays, the core ideas of TQM set forth by W. Edwards Deming, Joseph Juran, and Kaoru Ishikawa gained significant acceptance and has become something of a social movement. The series standards of ISO9000 are implementing in many industries, such as manufacturing, service, health care, nonprofit organizations, educational institutions, even public bureaucracies. In the introduction of *Quality Management System* of ISO9000:2000, eight principles of TQM are proposed, namely customer focus, leadership, involvement of people, process management, system management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationship [1]. The eight principles generalize the success experience of the advanced enterprises in the developed countries.

In the current buyer's market with global hard competition, enterprises cannot respond rapidly to the customers' demand through traditional operation mechanism. Thereupon, a kind of new operation mechanism, i.e. supply chain management, emerges as the times require [2]. In supply chain circumstance, the majority of enterprises, especially some excellent enterprises, rely on their suppliers more and more heavily. The product quality and manufacturing process of suppliers has great effect on the quality of final product of core enterprise. It means that the emphasis of research and practice of TQM has transferred from enterprise focus to supply chain focus. Not only the high quality of product and service but also the high level of quality control of the whole supply chain system ensures the competition advance. The essence of competition advantages are not pursuing product quality and process quality simply, but the performance of the whole supply chain system. Therefore, the establishment of quality management system of supply chain based on the management ideas of ISO9000 will promote the involvement of all the members and facilitate the implement of quality control of the whole supply chain system.

Up to now, researchers has studied some related problems of quality management in supply chain. For example, Noori investigated the implementation of continuous collaborative improvement activities in the supply chains of Canadian industries, including the automotive, electronics and aerospace sectors [3]. Zhang et al. analyzed effect of product structure on supply chain quality control decision [4]. Mohamed et al. explored the relationship between first, second, and third tier suppliers in the automotive industry and the interconnection between ensuring quality and providing efficiencies in the supply chain [5]. Lin et al. identified the factors that influence supply chain quality management using empirical data collected from Taiwan and Hong Kong and found out that quality management practices are significant correlated with the supplier selection strategy [6]. Stanley & Wisner discussed the association between implementation of cooperative purchasing/supplier relationships, internal service quality, and an organization's ability to provide quality products and services to its external customers [7].

In this paper, we explore the application of the eight modern TQM principles of ISO9000 in supply chain quality

management, namely customer focus, leadership, involvement of people, process management, system management, continual improvement, factual approach to decision-making, and mutually beneficial supplier relationships, so as to promote the improvement of operation efficiency and competition advantage of the whole supply chain system.

2. Supply chain quality management based on the TQM principles

2.1 Customer focus

Customer focus is the core principle and idea of TQM because quality effort comes of customer's needs and ends with customer's acceptance. In supply chain circumstance, customer includes not only the end user but also many in-between users, such as suppliers, manufacturers, sellers, etc. However, more than half of the quality problems in supply chain are resulted by specifications because of the inadequate communications between the members of supply chain. In many cases, the procurement specifications released by buyers are equivocal while suppliers dare not to argue against buyers on the specifications in the bidding process [3]. Therefore, the core enterprise must pay attention to the needs and expectation of end users, and all the members of supply chain must pay attention to the needs and expectation of their backward users. The needs and expectation of end users should be deployed layer upon layer in the whole supply chain system. The end users will satisfy if all the member of supply chain can satisfy the needs of their backward users. Moreover, the operation efficiency of supply chain system can be improved through the satisfaction level of the end users. In supply chain quality management, some traditional tools of TQM are also effective. For example, we can use Quality Function Deployment (QFD) to identify the distinct and potential needs and preferences of users, use Fishbone Chart to investigate the factors affecting the satisfaction level of users and then use Pareto Chart to find out the key factors.

2.2 Leadership

The effective of quality management depend on the effective of leadership because quality effort can get actual effect only with the recognition and support of the leadership. In supply chain circumstance, the core enterprise play as the leadership since it establishes the development strategy and operation targets of supply chain affect the actual efficiency and effectiveness of the quality effort of all the other members. Therefore, the core enterprise must act as leadership to consider adequately the needs and expectation of the other members, establish a clear, realizable and coincident holistic target, and then lead and inspire the other members to strive jointly for the target. At the same time, the core enterprise should foster more leaders of TQM in each layer of supply chain and make them take their responsibility zealously.

2.3 Involvement of people

The exertion of enthusiasm and creativity of all the employees is the precondition of the actual effect of quality management. In supply chain circumstance, an up-and-coming excelsior work atmosphere should be established to inspire the enthusiasm and creativity of the employees of all the members. Each employee should understand his/her role and responsibility in the supply chain system, solve the problems forwardly as mastership, and learn the principles, skills and technologies of TQM and ISO9000. Here, we can foster the ethos of self-motion and self-knowledge in supply chain through 5S, i.e. seiri, seiton, seiso, seiketsu, and shitshke. Furthermore, we can make all the employees participate into supply chain quality management and strive for the satisfaction of users jointly through the establishment of QC teams that cross function or even enterprise.

2.4 Process management

The focus of modern quality view is the process quality management but not the product itself of traditional quality view. It is the requirement of the quality management system of ISO9004:2000 and the essential difference of modern and traditional quality view. In each step of supply chain, there are many correlative processes, such as procurement, logistics, production, inventory, selling, service, etc. These processes have their own independent objectives and programs. There are usually conflicts among the objectives and programs. Therefore, the processes and their mutual effects should be identified and managed to ensure the harmonious operation of supply chain. Then, all the processes, especially the key processes, can realize high quality, i.e. small variation, small waste, and more increment, through the continuous improvement and total quality control in all the nodes of supply chain system, as shown in Figure 1.

Insert Figure 1 Here.

2.5 System management

The application of system approach in quality management is to view the quality management system as a big and holistic system, identify and manage the sub-systems respectively. Then, the coordinated effect and mutual promotion among the sub-systems will make the whole effect greater than the sum of the improvement of each sub-system and improve the validity and efficiency of the realization of final targets [8]. In supply chain circumstance, enterprise should confirm the mutual dependence relationship among the processes in supply chain system, break the boundary among supply chain members, construct and integrate the processes in supply chain system. Then, many well operation sub-systems can be constructed to collocate the resources rationally among the sub-systems. Finally, the whole supply

chain system, including supply, transport, production, distribution, inventory, etc., can realize the target and policy of quality through the optimal operation mode.

2.6 Continual improvement

Continual improvement is one of the focuses of modern quality research and practice. Enterprise must improve the quality of product and service continually and reduce the cost to make customer satisfactory. In supply chain circumstance, the pressure of continual improvement is more and more pressing because the market competition is more and more hard. Not only the core enterprise but also the other members, such as suppliers, sellers, and logistics providers, must improve their product and service respectively so as to construct the continual improvement of products and services all over the supply chain process. Then, the continual, stable and harmonious ability of quality assurance can be established. Furthermore, the core enterprise and other members must find the ways and practices improving performance in or out of supply chain through benchmarking to make the continual improvement speed fast than the one of rivals. However, it is ironical that one of the most important reason in the predicament of Xerox, which initiated benchmarking practices, was exactly its slow reaction with the fast changing environment.

2.7 Factual approach to decision making

The sufficient and adequate data and information is the foundation of making right and effective decisions. Up to now, many enterprises have began to collect and deal with all kinds of data and information by utilizing many advanced information technology, e.g., EDI, MRP II, ERP, POS, Intranet/Extranet/Internet, so as to provide foundation for making effective decision. In supply chain circumstance, enterprise should collect data and information of not only itself but also the other members of supply chain to record and analyze the current operation situation of each member. Therefore, the potential problems in any step of supply chain can be found duly according to the results of data analysis. Then, the corresponding correct and timely decision can be made to avoid or rectify the problem.

2.8 Mutually beneficial supplier relationships

What impact can suppliers have in achieving quality? TQM authorities recommend that organizations work directly with raw material suppliers to ensure that their materials are of the highest quality possible [9, 10, 11]. Currently, at least 50 percent of TQM organizations collaborate with their suppliers in some way to increase the quality of component parts [12]. Often these organizations send out "quality action teams" to consult with their major suppliers. The objective is to help suppliers use TQM to analyze and improve their work processes [13]. Suppliers can contribute to quality in a number of other ways.

Therefore, the organization and its supplier are mutually dependent. Maintaining the mutually beneficial relationships between them can improve the ability of creating value both of them. In supply chain circumstance, the product quality is performed and ensured by all the members of supply chain because the production, sales and service process must be performed by all the members [14]. Therefore, the task of supply chain quality management is not only to establish the product inspection system and comprehensive evaluation system of suppliers, but also to strengthen the mutual beneficial partner relationships with suppliers. The core enterprise must realize the following activities:

- Identify and select the main suppliers, reduce the scale of supply system, and realize small supply base management;
- Investigate the requirements of customers and develop new product jointly with suppliers;
- Share information, technology, and resource with suppliers;
- Admit the improvement and achievement of suppliers;
- Take joint improving activities with suppliers;
- Ensure the conformity of quality system between core enterprise and the other members, including basic conformity (e.g. program files, technology specification, process interface) and advanced conformity (e.g. quality target, quality policy, and quality culture).

In fact, there is a new trend in the international practices of supply chain management. Namely, more and more large-scale enterprises have pay attention to the management and development of suppliers, e.g. providing capital, technology, human resource, equipment and training for suppliers, sending quality teams to help suppliers improve their processes, and sharing the yields of continual improvement with suppliers.

3. Concluding remarks

The series standards of ISO9000 are made for the standardization of quality management and quality assurance. Therefore, in supply chain circumstance, the implementation of ISO9000 is the basic assurance for an enterprise to provide acceptable product or service and improve the quality level in a certain supply chain. The application of the eight modern TQM principles of ISO9000 in supply chain quality management will promote the improvement of operation efficiency and competition ability of the whole supply chain system.

References

Deming, W. E. (1986). *Out of the Crisis*. Cambridge, Mass.: Massachusetts Institute for Technology, Center for Advanced Engineering Study, 1986.

Ishikawa, K. (1985). *What is Total Quality Control? The Japanese Way*. Englewood Cliffs, NJ: Prentice-Hall.

Juran, J.M. (1974). *The Quality Control Handbook* (3rd Ed.). New York: McGraw-Hill.

Lawler, E.E., Mohrman, S.A. & Ledford, G.E. (1992). *Employee Involvement and Total Quality Management: Practices and Results in Fortune 1000 Companies*. San Francisco: Jossey-Bass.

Lin, C., Chow, W.S., Madu, C.N., Kuei, C. & Yu, P.P. (2005). A structural equation model of supply chain quality management and organizational performance. *International Journal of Production Economics*, 96, 355-365.

Ma, S. & Tang, X. (2001). Characteristics & Strategies of Quality Management in Supply Chain. *Computer Integrated Manufacturing Systems*, 9, 32-35. [In Chinese]

Ma, S., Lin, Y. & Chen, Z. (2000). *Supply Chain Management*. Beijing: China Machine Press. [In Chinese]

Mohamed, Z., Parry, L.E. & Wharton, R. (2008). *Ensuring Quality in the Supply Chain: Coordinating Multi-tier Supplier Relationships*. White paper, Gordon Ford College of Business, Western Kentucky University, USA.

Noori, H. (2004). Collaborative Continuous Improvement Programs in Supply Chain. *Problems and Perspectives in Management*, 2, 228-245.

Sashkin, M. & Kiser, K.J. (1993). *Putting Total Quality Management to Work*. San Francisco: Berrett-Koehler.

Stanley, L.L. & Wisner, J.D. (2001). Service Quality along the Supply Chain: Implications for Purchasing. *Journal of Operations Management*, 19, 287-306.

Trent, R.J. (2001). Applying TQM to SCM. *Supply Chain Management Review*, May/June, 70-77.

Xu, X., Zhang, W. & Ye, C. (2002). Enterprise Quality Management Based on Supply Chain. *Industrial Engineering Journal*, 5, 39-42. [In Chinese]

Zhang, C., Chang, G. & Yu, H. (2006). Supply Chain Quality Control Decision under Different Product Structures. *Proceedings of the 2006 Asia-Pacific Service Computing Conference*, Guangzhou, China, 189-193.

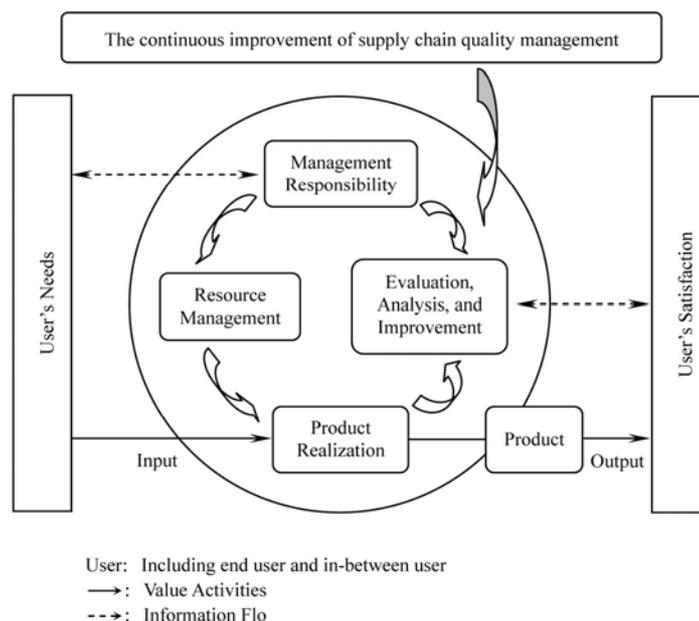


Figure 1. Supply chain quality management system based on the principle of process management