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## ROLE OF QUALITY MANAGEMENT SYSTEM IN SUPPLY CHAIN MANAGEMENT

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**Abstract:** In today's world of global outsourcing, supply chain management plays an ever important, strategic and expanding role in delivering results. Supplier quality management now must transform itself from simply measuring supplier compliance to gathering knowledge, managing risk and executing project management. Total quality management (TQM) ensures processes are followed and customers are satisfied. In this paper, we define supply chain and quality management to operationalize and understand the effect of increased emphasis on supply chain management on the practice of quality management. We review current research in quality management and identify common themes found in the literature.

**Keywords:** Supply Chain Management, Quality Management System, Factor Analysis

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## INTRODUCTION

In order to survive in the increasingly customer-oriented marketplace, continuous quality improvement marks the fastest growing quality organization's success. Quality is defined as the degree to which a set of inherent characteristics

fulfils requirements.

Recently, supply chain management and the supplier (vendor) selection process have received considerable attention in the business-management literature. During the 1990s, many manufacturers seek to collaborate with their suppliers in order to upgrade their management performance and competitiveness [7]. The purchasing function is increasingly seen as a strategic issue in organizations. Buyer and supplier relationships in on long term relationships, a company's supply chain creates one of the strongest barriers to entry for competitors. In other words, once a supplier becomes part of a well-managed and established supply chain, this relationship will have a lasting effect on the competitiveness of the entire supply chain.

Therefore, the supplier selection problem has become one of the most important issues for establishing an effective supply chain system. The overall objective of supplier selection process is to reduce purchase risk, maximize overall value to the purchaser, and build the closeness and long term relationships between buyers and suppliers[8]. In supply chain, coordination between manufacturing enterprises has received a great deal of attention. When it is built in supply chains, coordination between a manufacturer and suppliers is typically a difficult and important link in the channel of distribution.

As competition moves beyond a single firm into the supply chain, focus is shifting from management of internal practices alone[6]. Instead, quality managers must integrate their firms' practices with those of customers and suppliers. Integrating QM and supply chain management (SCM) will be important for future competitiveness.

Given the transfer of market's power to the customers, supply network providers are undergoing more and more pressure to provide products of high quality, more variation and cheaper price in a shorter time. Meeting customer's demands in today's interactive world not only involves producers but also the whole supply chain and its resources. Therefore, all the supply chains have to utilize the most appropriate information technologies to apply suitable SCM methods by sharing facilities and sources, which act such as an orchestra in a harmonic way.

## 2 . LITERATURE REVIEW

### 2. .1 Quality Management System

Quality characteristics form the backbone of Quality Management (QM). It consists of setting quality objectives and specifying processes and related resources necessary to fulfill these objectives. The system within which QM is done is called Quality management systems (QMS). It is defined as the collective policies, plans, practices, and the supporting infrastructure by which an organization aims to reduce and eventually eliminate nonconformance to specifications, standards, and customer expectations in the most cost effective and efficient manner.

ISO 9001:2000 (from the International Organization for Standardization) specifies requirements for a quality management system where an organization needs to demonstrate its ability to consistently provide product that meets customer and applicable regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable regulatory requirements.

A quality management system may be defined, then as an assembly of components, such as the management structure, responsibilities, processes and resources for implementing total quality management.

A good quality management system will ensure that two important requirements are met:

- The customer's requirements — for confidence in the ability of the organization to deliver the desired product or service consistently.
- The organization's requirements- Both internally and externally including regulatory and at an optimum cost, with efficient utilization of the resources available -material, human, technological, and information.

The quality management system should apply to and interact with all processes in the organization. It begins with the identification of the customer requirements and ends with their satisfaction, at every transaction interface. The activities may be classified in several ways- generally as processing, communicating and controlling, but more usefully and specifically as shown in the quality management process model described in ISO 9001:2000, as shown in Fig. 1. It reflects graphically the integration of four major areas: Management responsibility, Resource management, Product realization, Measurement, analysis and improvement.

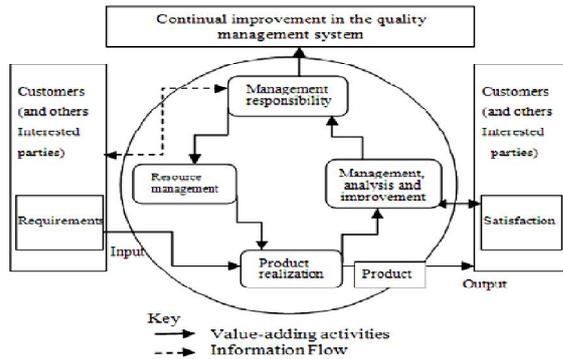


Fig 1 : Model of a Process based Quality Management system

## 2.2 Supply Chain Management

In general, a supply chain is defined as follows. "A supply chain is the network of facilities and activities that performs the functions of product development, procurement of material from vendors, the movement of materials between facilities, the manufacturing products, the distribution of finished goods to customers, and after-market support for sustainment."

SC systems can be studied and analyzed from several viewpoints. Yet there are three major perspectives of SC systems: (a) "Material Flow", (b) "Information Flow", and (c) "Buyer-Seller Relations" (Fig. 2). Apart from these three aspects of SC systems, there are some other building blocks for these systems, such as raw material suppliers, manufacturers of parts, assemblers, Original Equipment Manufacturers (OEMs), distributors, retailers, customers, etc. It should be noted that these aspects examine the SC and all its components in an integrated way.

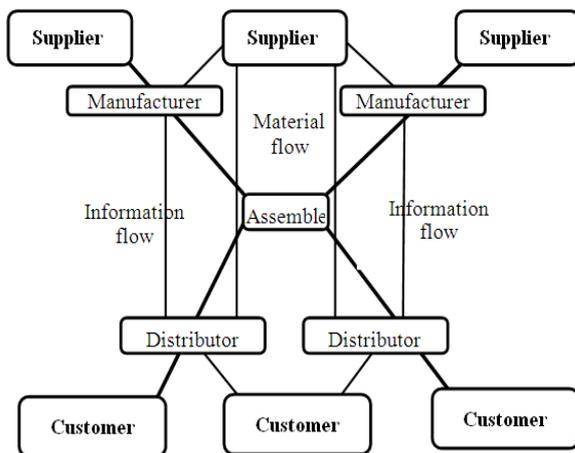


Fig 2 : Supply Chain Management

### 2.2.1 Material Flow

Manufacturers should manage their supply resources to meet customer needs. As a matter of fact, today an integrated management of the material flow through different levels of suppliers and distributors is challenging for managers. Production planning in different sections of a manufacturing enterprise and planning its upstream and downstream activities in a harmonized way are two of the main tasks of managing the flow of materials in an SC. Synchronizing production planning of each entity and, in a more detailed way, scheduling production lines or job shops in these components of the SC are very complicated and often intractable. This complication can be highlighted if we investigate this chain from a product-oriented point of view. Consider a product structure or a tree. In the real world, each level of the product tree is assigned to a supplier. A production plan for such a product which uses, e.g., the MRP approach, determines a due date for each level and each component. When all of these components are produced in one factory, the problem is easier to solve. However, when these levels expand through a chain of suppliers, synchronizing them is usually very complicated, while this synchronization is an obligation in Customer-Driven Manufacturing (CDM).

Clearly, a successful plan critically needs supportive logistics. Transportation planning, inventory management and quality assurance activities are some logistics in the smoothing flow of materials through the SC. These logistic activities should be managed in an integrated way.

### 2.2.2 Information Flow

The managing and control of each system comprise several parts. In an SC system, information management is an essential sector. Complexities in business planning activities occur in four areas: (a) technological revolution, (b) product changes, (c) research and development, and (d) information explosion[9]. The SC system could be seen as a business enterprise with a high level of data transaction. As a matter of fact, a well organized information system is a foundation for a proper material flow in the SC.

### 2.2.3 Buyer—Seller Relations

The buyer-seller relation is the main aspect of an SC. While traditional approaches to the buy-sell process focus on factors like the price in the buyer-seller relation, the SC draws attention to quality, R&D, cost reduction, customer satisfaction, and partnerships. In an SC, both external and internal resources are important. Consequently, the relations are not established based just on the price and cost. In the design of new products, for instance, Early Supplier Involvement and Concurrent Engineering[3] are new concepts which are applied to the SC and

lead it to a holistic and comprehensive approach. Some other aspects of the SC which make it different from traditional approaches are long-term contracts with suppliers and distributors, emphasizing the value adding activities, strategic alliances and information sharing.

### 3. CRITICAL FACTORS

In order to implement an effective Quality Management system in an organization the necessary critical factors are to be analysed. From the literature review[1,2,4,5] the following critical factors are obtained: Strong Top Management Leadership Commitment, Customer relations, Supplier Relationships, Workforce Management, Employee attitudes and Behavior, Product design process, Process flow management, Quality data and reporting, Role of the quality Department and Benchmarking.

Establishing a link between various key factors and the impact of quality management system helps to provide some insight on how to better manage the supply chain process.

#### Strong Top Management Leadership Commitment

- Commitment of top management to the quality program
- Extent to which quality goals are based on the quality policy
- Degree to which top executives are dynamic in leading the quality program
- Willingness of top management to identify and remove the root cause of problems in supplier selection
- Emphasis of top management on quality rather than cost in supplier selection
- Extent to which top management assign importance to supplier selection

#### Customer Relations

- Degree to which customer feedback is used as the basis for quality improvement
- Level of customer involvement during the sourcing and evaluation stage of supplier selection
- Level of customer involvement during the selection and monitoring stages of supplier
- Evaluation of suppliers

- Extent to which the organization encourages interaction between the customers and the suppliers.

#### Supplier Relationships

- Degree to which the supplier accept quality as a strategic weapon to gain competitive advantage
- Degree to which the supplier realize the importance of customer satisfaction in achieving quality
- Extent to which the suppliers believe in doing things right the first time and every time
- Support and co-operation of the suppliers toward the implementation of quality standards
- Level of co-ordination between suppliers and management
- Promptness in payment and orders to the suppliers
- Availability of opportunities for enhancement of services
- Degree of respect and fairness in treatment that suppliers get within the organization

#### Workforce Management

- Extent to which employees are treated as long-term asset of the organization
- Extent to which steps are taken to recruit/select employees who have a quest for excellence in whatever they do
- Effectiveness of strategies adopted for retaining talented and experienced people
- Level of training of employees in quality management systems such as ISO 9000 and so on
- Level of training of employees in skill related to the monitoring and control of supplier selection
- Extent to which the employees are trained in using metrics for quality improvement
- Extent to which the employees are trained in the sourcing and evaluation stage of supplier selection

#### Employee Attitudes & Behavior

- Level of motivation and initiative among employees
- Level of enthusiasm shown by employees for learning new technologies
- Willingness shown by employees to co-operate with the suppliers
- Overall level of interpersonal relationship among the selection team members of suppliers
- Overall response to supplier change among the employees

#### Product Design Process

- Extent to which the organization accepts continuous improvement in the product sign as a long term strategy for quality improvement
- Extent to which pro-active design is practical rather than reactive correction
- Degree to which customer feedback is sought and used for quality improvement
- Extent to which the aspiration of improvement for

product design enhances the supplier selection

#### Process Flow Management

- Extent to which the key processes that are critical to the progress are regularly monitored and evaluated
- Level of systematic documentation of procedures and processes
- Degree to which the processes are made defect free
- Extent to which costs due to defects are evaluated at various stages in the supplier selection
- Extent to which costs due to the introduction of quality standards are systematically assessed

#### Quality Data and Reporting

- Extent to which the scheduled delivery date and duration for each process is systematically assessed
- Extent to which the mean-time failure is systematically assessed

- Extent to which statistical tools and controls charts are used to monitor and control the processes
- Extent to which adherence to quality is ensured at every stage of supplier evaluation

#### Role of the Quality Department

- Availability and access to body of knowledge, that is data related to all the projects completed during the past
- Extent to which reports on the effectiveness of quality management system are transferred to the other department
- Extent to which risks involved, due to changes in supplier, are foreseen and considered during the supplier selection process
- Extent to which the backups of data and information regarding the suppliers selected is maintained

#### Benchmarking

- Emphasis on benchmarking the level of defectives
- Emphasis on benchmarking the quality standards
- Extent to which the level of simulation and performance measures an gap analysis is facilitated
- Level of communication with the suppliers is made easy

The above parameters give an exhaustive list of criteria to be considered during the implementation of a QMS for SCM. Using the above, a questionnaire is constructed and administered to determine the critical factors that need to be considered for effective QMS.

#### 4. CONCLUSION

Today's markets and the technological and competitive forces within them are changing at an ever-increasing rate. To respond to these forces, radical changes in organizations have become necessary. Supply chain management is a key strategic factor for increasing organizational effectiveness and for achieving better organizational goals such as enhanced competitiveness, better customer care and increased profitability. This study contributes to the development of

supply chain quality management theory in several ways. To improve quality performance in supply chain management, two factors were found to be important namely supplier quality management and customer focus. More research is needed to understand how to most effectively integrate quality processes with various members across the supply chain. Thus, it appears that QM practices are not a fad but have become integrated into normal business practices.

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