

# **Impact of Supply Chain Quality Management on Competitive Advantage and Organizational Performance**

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**Objective/Purpose:** The present work attempts to define the concept of Supply Chain Quality Management (SCQM) and develop a conceptual framework of SCQM after identifying the constructs of Supply Chain Management (SCM) and Quality Management (QM) practices through literature review.

**Design/Methodology:** The framework proposes that the impacts of both SCM practices and QM practices would be evaluated in terms of competitive advantage and organizational performance. Further the competitive advantage would be measured on the parameters of price/cost, quality, delivery dependability, product innovation and time to market while organizational performance will be measured in terms of marketing, operations and finance.

**Findings:** The framework will help the decision makers in making a comparison among three broad categories of organizations with regard to their competitive advantage and organizational performance which are pursuing only SCM practices, only QM practices and SCM & QM practices both.

**Limitation:** The main limitation of this research paper is the absence of empirical data.

**Keywords:** Supply chain quality management, Supply chain management, Quality management, Competitive advantage, Organizational performance.

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## **1. Introduction:**

Even though much attention has been focused on supply chain management (SCM) concepts in recent years, its interlinking with the quality management perspective is often limited and tangential in nature. While the importance of quality management is universally recognized, academic researchers need a more focused approach in evaluating quality management issues within the internal and external supply chain contexts. As global markets evolve, supply chain managers are faced with many new challenges, as traditional approaches to managing supply chains prove increasingly ineffective. The integration of quality management principles offers potential for broadening the perspective of supply chain management from its traditional narrow focus on costs and competitive relationships to a focus on cooperative relationships between members of the supply chain and the strategic importance of supply chain management to the achievement of competitive advantage.

In the past decade however, companies have begun to recognize not only the need for continual quality improvement and meeting the needs of their immediate customers, but also the necessity of competing quickly and efficiently in ever- changing global markets. As a result, SCM has come to the forefront as a philosophy by which firms can operate inter-organizationally, and merge both strategic initiatives and upstream and downstream processes in order to achieve business excellence. Traditional quality programs focusing on approaches such as TQM, and ISO 9001, must now transform to a supply chain perspective in order to simultaneously make use of supply chain partner relationships and quality improvement gains essential to market- place satisfaction.

To understand the field of supply chain quality management (SCQM), we must first define the term by deconstructing it. As per the definition of Supply Chain Council (2002), the supply chain encompasses every effort involved in producing and delivering a final product from the supplier's supplier to the customer's customer. This includes partnering with other firms in chains of relationships that result in downstream benefits to customers. Similarly, the quality management perspective has traditionally considered interacting aspects of systems such as processes, inputs, machines, people, procedures, plant, and equipment as means of creating excellence in products and services (Deming, 2000). This systems-based view of quality also applies to supply chains as well. According to Fawcett et al. (2006), competition now is not only found at the firm level. Business competition now exists as supply chains seek to gain advantage over competing supply chains. This level of competition requires a much greater level of coordination among chains or networks of suppliers, distributors, producers, and customers.' Moreover, the relevance of the impact of the quality movement in the international marketplace for the last 30 years is well established and documented by the loss of manufacturing jobs to those competitors who successfully understand and translate customer requirements to final products and services. In the reality of intense global competition, SCM principles and technologies are taking center stage as a means to achieve business excellence. This SCM movement embraces quality management initiatives, further supporting the notion that product quality is only one aspect of quality oriented continual improvement programs leading to competitive advantage and organizational performance. Satisfying final customers can only be achieved when the whole chain commits, integrates, and coordinates to pursue coherent and innovative practices.

The present work is an attempt to define Supply Chain Quality Management (SCQM) and develop a conceptual framework of SCQM through integrating and synergizing the concept

and philosophy of SCM and QM practices across the whole supply chain with a view to delivering value to the end customers involving all stakeholders of the supply chain. In order to further examine the role of quality in a supply chain framework, our focus in this paper is to analyze prior work that integrates quality management principles within the supply chain. Subsequently, we identify dominant constructs, themes and gaps within the literature base, and use it to define future research opportunities and agendas in this area.

The following section provides a brief review of literature pertaining to SCM and QM constructs and the findings of different researchers in respect of SCQM. Section 3 presents a conceptual framework of SCQM based on the early works of the researchers. The concluding section highlights the potential contribution of the work, its limitations and future research directions.

## **2. Review of Literature:**

The essence of SCM is the co-ordination and integration of different processes throughout the supply chain both upstream and downstream. The SCM concept has been advanced mainly from two bodies of knowledge: (1) purchasing and supply management and (2) transportation and logistics management [Tan et al, 1998]. According to purchasing and supply management perspective, SCM is synonymous with rationalization of supply base and integration of suppliers into product development and manufacturing activities [Lamming, 1993]. Further according to transportation and logistics management perspective, the focus of SCM is on reduction of inventories both within and across the organizations in the supply chain and improvement of service level [Romano and Vinelli, 2001].

As global markets evolve, supply chain managers are faced with continuously changing market dynamics, new global markets and stressful competitive environments (Mehra and Agrawal 2003). Organizations operating beyond their national boundaries can no longer depend on previously proven domestic quality practices (Mehra and Agrawal 2003). Dealing with traditional tradeoffs is no longer an option, and firms are finding the need to optimize their supply chain strategies over a much broader base (Meredith and Roth 1998). Because supply chains extend across several functions and many organizations, each has its own priorities and goals (Narayanan and Raman 2004). Additional challenges are presented by the availability of electronic links for improving supply chain performance (Poulymenakou and Tsironis 2003), which makes it much more difficult for organizations to observe other firms' actions (Narayanan and Raman 2004) and causes an increased focus on cost cutting and efficiency (Lee 2004, Liker and Choi 2004). Thus, serious threats from competition and declines in markets have forced a change in supply chain management. Initiatives such as quality management offer the potential for dealing with these challenge (Levy et al. 1995, Carter et al. 2000). Traditional supply chain management, where suppliers are selected based on price (Chen and Yang 2002), may lead to results that deter an organization from competing in global markets. Suppliers are pitted against each other to obtain the lowest price, buyers believe that their position is enhanced by having a large number of competing suppliers, and Internet-based technologies have led companies to the conclusion that the immediate benefits of low cost global suppliers outweigh the long-term benefits of investing in relationships (Liker and Choi 2004). Supplier development practices are traditionally perceived as uneconomical (Forker et al.1999), exemplified by the existence of large supplier bases and arms-length relationships. Low cost, efficient supply chains are often unable to

respond to unexpected changes in demand or supply, due to their scale economies (Lee 2004).

In an effective supply chain network, members maintain and sustain a customer-driven culture, offering the right product in the right place, at the right time and at the right price (Kuei et al. 2001). Although customers may blame the final producer for quality problems, they are often part of a broader problem related to how the supply chain is managed (Trent and Monczka 1999). Thus, customers are the drivers of supply chain management, just as they are the drivers of quality management. Ascertaining customer requirements completely and accurately are of the utmost importance (Crosby and LeMay 1998), and establishment of a close communication loop is critical in establishment of what Ferdows et al. (2004) refer to as a super- responsive supply chain. In fact, this is a two-way relationship: in addition to helping a buyer compete on speed, the best suppliers can also provide quality and design insights to the buyer. Quality management practices reduce process variance, which has a direct impact on supply chain performance measures, including inventory and time measures, such as cycle time and delivery dependability (Flynn et al. 1995). As process variance is reduced, there is less need for safety stock and cycle stock inventory. Quality management practices, such as design for manufacturability, facilitate setup time reduction, allowing the use of smaller lots, which reduces cycle stock. Pipeline inventory, which is held as a function of manufacturing, supply and delivery cycle times, is also improved through variance reduction. Cycle times are shortened through the improved flows resulting from quality management practices, correspondingly less pipeline inventory is needed. As quality management practices reduce the number of items requiring rework, cycle times are shortened by speeding product throughput (Flynn et al. 1995), allowing improved schedule attainment and correspondingly faster response to market demands. This allows a greater

extent of synchronization across the entire supply chain (Ferdows, et al.2004). The use of certified suppliers and long-term supplier relationships based on quality criteria reduces pre-processing cycle time delays for incoming inspection. In the processing and post-processing phases, quality at the source, feedback, statistical process control and effective product designs reduce or eliminate time delays for rework and process inspection of in-process and finished goods, respectively, and transportation times.

Researchers have identified a number of constructs pertaining to SCM, which is shown in table1.

**Table 1: SCM constructs identified by the researchers**

<b>SCM constructs</b>	<b>Researchers</b>
Strategic supplier partnership	Gunasekaran et al. 2001, Tan et al, 2002; Li et al, 2005; 2006
Customer relationship	Aggarwal, 1997, Tan et al, 2002; Li et al, 2005; 2006
Level of information sharing	Li and Lin, 2006; Li et al, 2005; 2006
Quality of information sharing	Li and Lin, 2006; Li et al, 2005; 2006
Postponement	Zografos and Giannouli, 2001; Li et al, 2005; 2006
Internal lean practices	Handfield and Nichols (1999), Mason-Jones and Towill (1997)

The quality management construct is complex, with many different formulations (Westphal 1997). Several authors have noted that quality management has a set of core characteristics (Dean and Snell 1991, Anderson et al.1994), for instance, it is ‘characterized by a few basic principles—doing things right the first time, striving for continuous improvement, and fulfilling customer needs—as well as a number of associated practices’ (Dean and Snell 1991). Quality management calls for developing and implementing a corporate culture

emphasizing customer focus, continuous improvement, employee empowerment and data driven decision making. Research works carried out in the field of quality management have covered a number of QM constructs, which are displayed in table 2.

**Table 2: QM constructs identified by the researchers**

<b>QM constructs</b>	<b>Researchers</b>
Top management leadership	Crosby, 1984; Deming, 1986; Anderson et al, 1995; Ahire et al, 1996; Black and Porter, 1996; Adam et al, 1997; Kaynak, 2003; Wong, 2003
Supplier quality management	Ahire et al, 1996; Black and Porter, 1996; Crosby, 1984; Deming, 1986
Customer focus	Ahire et al, 1996; Black and Porter, 1996; Adam et al, 1997; Deming, 1986
Product and services design	Ahire et al, 1996; Black and Porter, 1996; Adam et al, 1997; Ahire and Dreyfus, 2000; Kaynak, 2003
Process management	Ahire et al, 1996; Black and Porter, 1996; Anderson et al, 1995; Crosby, 1984; Deming, 1986
Employee training and human relations	Ahire et al, 1996; Black and Porter, 1996; Adam et al, 1997; Crosby, 1984; Deming, 1986
Quality data and reporting	Ahire et al, 1996; Black and Porter, 1996; Crosby, 1984; Deming, 1986; Kaynak, 2003

SCM constructs and QM constructs shown in table 1 and 2 respectively reveal that Supplier quality management and Customer relationship/ Customer focus are in the domain of both SCM and QM. Researchers have also attempted to integrate the concept of SCM with QM with a view to deriving the synergistic benefits of both [Flynn and Flynn, 2005; Lin et al, 2005; Robinson and Malhotra, 2004; Lo and Yeung, 2004; Stanley and Wisner, 2001; Romano and Vinelli, 2001; Kannan and Tan, 2005; Kaynak and Hartley, 2007]. The following table 3 presents the summarized findings of different researchers pertaining to SCQM/QM in supply chain.



**Table 3: Research findings relating to SCQM/QM practices along the supply chain**

<b>Authors</b>	<b>Main Findings</b>
Flynn and Flynn, 2005	Organizations pursuing sound quality management practices are likely to achieve better supply chain performance due to the reduced variances associated with the use of quality management practices. Further integrating quality goals with supply chain management goals enhance the capability of the organization for achieving other strategic goals.
Lin, et al, 2005	QM practices are significantly correlated with supplier participation, which, in turn, influences organizational performance. Further QM practices are significantly correlated with supplier selection, but it does not influence organizational performance.
Stanley and Wisner, 2001	Implementation of co-operative purchasing/supplier relationship has a strong positive relationship with internal service quality and the service and product quality provided to external customers.
Romano and Vinelli, 2001	QM practices in traditional customer-supplier approach and the same along the whole supply network were compared. Findings reveal that QM practices along the whole supply chain improve the ability of the organization to meet the expectation of final customers in terms of quality through the joint definition and co-management of quality practices.
Kuei and Madu, 2001	High-quality tendency organizations tend to perform better than low-quality tendency organizations on cost savings. High-quality tendency firms can be differentiated from medium-quality firms in respect of productivity, sales growth and earnings growth and medium-quality firms are differentiated from low-quality firms on indicators like employee satisfaction, productivity and sales growth.
Romano, 2002	ISO 9001 certified suppliers are characterized by better level of quality system, greater top-management involvement in formulating, supporting and communicating quality strategy, and larger diffusion and use of quality management procedures (e.g. more advanced internal quality system).
Tan et al, 2002	Link business practices to performance. SCM factors, JIT capability and supply chain characteristics have positive relationship with overall product quality. Delivery and communications improve overall customer service levels' six constructs of SCM practices.
Benito et al, 2003	Supplier quality assurance practices are positively related to technological complexity, purchase value, company internationalization, product essentiality and suppliers' specialization.
Wong and Fung, 1999	Collaborative and structured relationships with suppliers in meeting quality objectives.
Levy et al, 1995	There is scope for extending the organizational forms, processes, tools and techniques of internal total quality into the supply chain. Total quality relationship will need to reach beyond the customer-relationship into the whole supply chain.

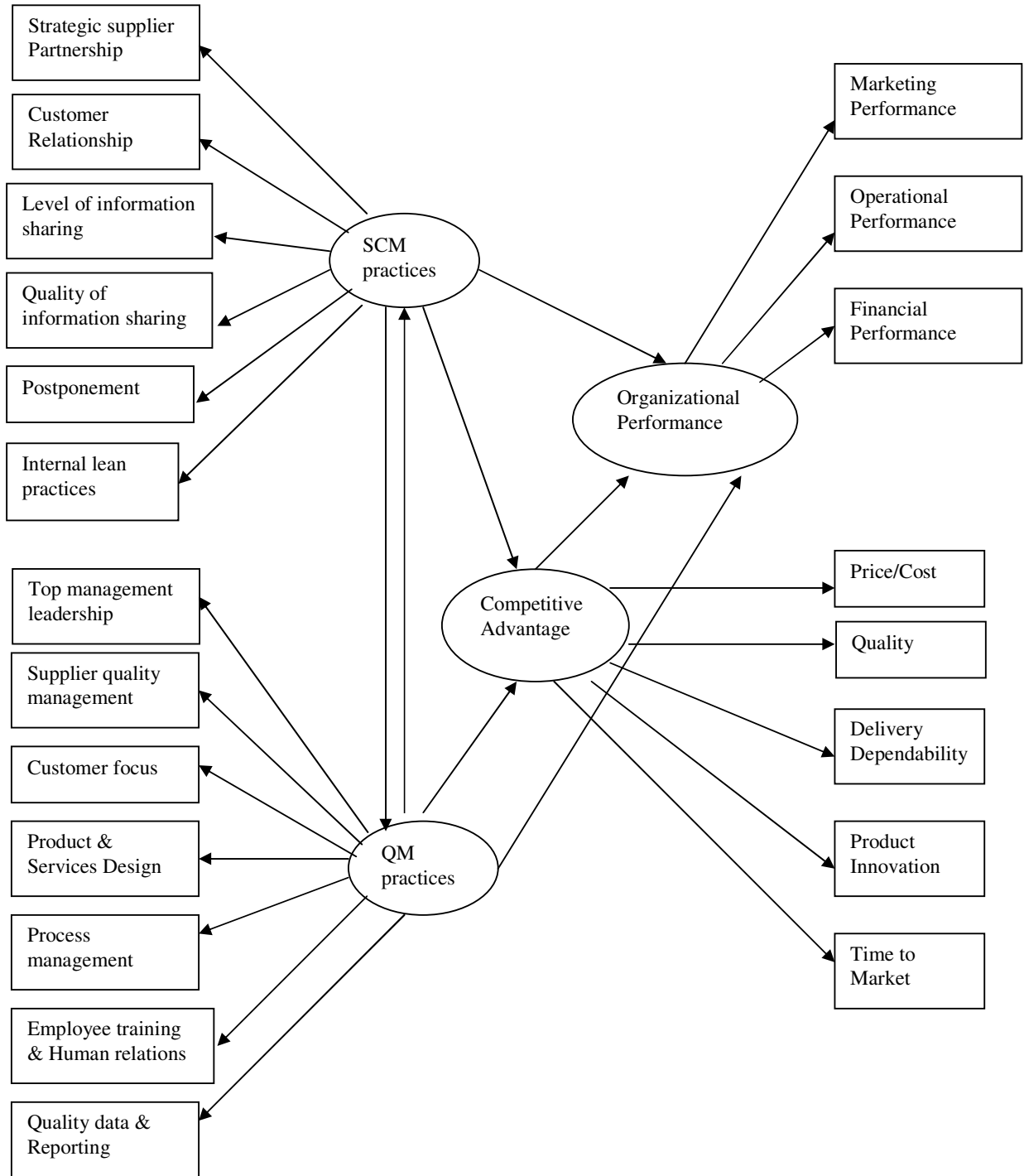
Forker et al, 1997	QM practices, for instance, supplier QM, role of the quality dept., training, quality data and reporting etc. are positively related to the performance of the firm. Research findings encourage manufacturers to continue promoting TQM practices throughout the whole supply chain.
Wong, 2003	Application of the supply chain excellence model applying TQM principles which provides insights into success factors managing supply partners.
Rodriguez and Hemsworth, 2005	Implementation of quality management practices in purchasing has a direct positive effect on purchasing performance and an indirect effect on business performance.
Kannan and Tan, 2005	Linkages exist between JIT, TQM and SCM at both strategic and operational level. Findings reveal that TQM and SCM related factors have greater influence on business performance, while JIT-related factors have very little influence on the same.
Lo and Yeung, 2004	Manufacturing companies developing strategic alliances with their critical suppliers by adopting total quality approach enable them to reduce production cost, improve quality performance and competitiveness.
Robinson and Malhotra, 2005	Defined the concept of SCQM by exploring quality management issues within the external and internal supply chain contexts.
Fynes et al, 2005	Supply chain relationship quality has positive impact on design quality but not on conformance quality. Suppliers can become much more proactive in the design of new product development process by engaging in true partnership with them.
Casadesus and Castro, 2005	Implementation of QM practices in the organization reveals that there are some indicators of QM which reinforce the improvement in SCM strategies.
Sila et al, 2006	SCQM has a positive impact on product quality. Further findings reveal that price, quality and trust are all important attributes in a company's relationship with its suppliers and customers. However, quality was rated more important than trust and price in the company's relationship with its suppliers and customers.
Kaynak and Hartley, 2007	The inclusion of two supply chain management-related quality practices namely supplier quality management and customer focus in the QM model suggests that the integration of processes both upstream and downstream influences quality performance.
Krause et al, 2007	Understanding of buyer-supplier relationship and the relationship of social capital accumulation with buying firms' performance.
Foster, 2007	Identified the key variables of SCQM through literature review and classified the variables according to their commonality and uniqueness.

### **3. A conceptual framework of Supply Chain Quality Management (SCQM):**

SCM and QM constructs identified in the previous section will be utilized in developing the conceptual framework of SCQM. For the purpose of this paper we provide the definition of SCQM as below:

“Supply chain quality management is a set of approaches utilized to efficiently and responsively integrate all channel partners through applying quality management practices across the whole supply chain, in order to enhance trust between channel partners and deliver maximum value to customers”.

Most of the early researches are confined to finding out the impact of QM practices and SCM practices on organizational performance separately. Current research trends indicate some works on SCQM pertaining to investigating the synergy between SCM and QM [Flynn and Flynn, 2005; Romano and Vinelli, 2001; Sila et al, 2006] or defining the concept of SCQM [Robinson and Malhotra, 2005] etc. Very few works have attempted to find out the influence of SCQM on overall organizational performance by comprehensively utilizing the constructs of SCM and QM. The present work will attempt to make use of SCM and QM constructs with a view to developing a framework which will enable the researchers to find out the impact of SCQM on competitive advantage and organizational performance of the firm. Competitive advantage of the firm will be evaluated through price/cost, quality, delivery dependability, product innovation and time to market while organizational performance of the firm will be evaluated through marketing, operational and financial performance [Li et al, 2006]. The Figure 1 demonstrates the conceptual framework of SCQM.



**Figure 1: Conceptual framework of SCQM**

The above figure suggests that SCM practices of a firm will be measured by the five SCM constructs while QM practices will be measured by the seven QM constructs. The figure

further reveals that few constructs like customer focus/customer relationship, strategic quality management/strategic supplier partnership are common to both SCM and QM practices. The impact of SCM practices will be evaluated in terms of organizational performance and competitive advantage. Further the impact of QM practices will also be evaluated on the same measures. These are shown by arrows in appropriate directions in figure 1. Further as mentioned earlier, organizational performance will be measured on the dimensions of marketing, operations and finance while competitive advantage will be measured on the parameters of price/cost, quality, delivery dependability, product innovation and time to market which are clearly revealed in figure 1. The figure suggests that the organizational performance of a firm is directly influenced by SCM and QM practices and indirectly influenced by the same practices mediated through competitive advantage. Further SCM and QM practices are supportive of each other which are shown by the bi-directional arrows between SCM practices and QM practices.

On the basis of findings of various literatures we can support following propositions preceded by relevant literatures.

Researchers have indicated that QM practices along the whole supply chain, in fact, reinforce the implementation of SCM strategies and improve the ability of the organization to meet the needs of its customers [Romano and Vinelli, 2001; Casadesus and Castro, 2005; Sila et al, 2006].

**Proposition 1:** QM practices and SCM practices are significantly correlated.

SCM practices influence the competitive advantage of a firm in respect of price/cost, quality, delivery dependability, time to market and product innovation [Li et al, 2006] Research

studies disclose that the components of SCM practices like strategic supplier partnership improves supplier performance, reduces time to market [Ragatz, 1997] and increase the level of customer responsiveness and satisfaction.

**Proposition 2:** Firms with high level of SCM practices will have high level of competitive advantage.

SCM practices are known to positively influence the organizational performance [Li et al, 2006]. Organizations that are best at SCM hold a 40% to 65% advantage in their cash-to cash cycle time over average organizations. Further high performing organizations carry 50% to 85% less inventory than their competitors [Sheridan, 1998].

**Proposition 3:** Firms with high level of SCM practices will have high level of organizational performance.

Empirical works of the researchers suggest that QM practices/quality dimensions positively influence organizational performance [Kuei and Madu, 1995; Madu et al 1996].

**Proposition 4:** Firms with high level of QM practices will have high level of competitive advantage.

**Proposition 5:** Firms with high level of QM practices will have high level of organizational performance.

Competitive advantage of a firm indicates that the said firm possesses better capability in respect of price, quality, delivery dependability etc. compared to its competitors, which, in turn, enhances its overall performance. Thus competitive advantage leads to high level of economic performance, customer satisfaction and loyalty, less brand switchover thereby

increasing sales and profitability. Therefore, a positive relationship between competitive advantage and organizational performance is proposed.

**Proposition 6:** Higher the level of competitive advantage, higher will be the level of organizational performance.

Integration of QM practices with the SCM practices enhances the capability of an organization for achieving its strategic goals [Flynn and Flynn, 2005]. Further since QM and SCM practices appear to be positively correlated, implementation of QM practices along the whole supply network increases the ability of the firm to meet the needs of its customers [Romano and Vinelli, 2001]. Organizations pursuing strategic alliances with their critical suppliers by adopting total quality approach enable them to reduce production cost, improve quality performance and competitiveness [Lo and Yeung, 2004].

**Proposition 7:** Firms pursuing both QM and SCM practices will have very high level of competitive advantage.

**Proposition 8:** Firms pursuing both QM and SCM practices will have very high level of organizational performance.

#### **4. Conclusion:**

SCQM is an emerging area of research in the field of operations management which has attracted the attention of the researchers for the last few years. The present work has attempted to define and develop a simple conceptual framework of SCQM after identifying the constructs of SCM and QM practices through literature review across diverse disciplines. Most of the prominent works pertaining to SCQM/QM in supply chain have been reviewed with a view to identifying the types and nature of researches carried out by the researchers.

We argue that SCQM possesses greater potential than either SCM or QM in isolation in improving the performance and competitive advantage of a firm. Accordingly we have mentioned several propositions based on our observations in literature. The framework developed in this paper will provide an insight to the decision maker in respect of making a comparison among three categories of firms with regard to their competitive advantage and organizational performance which are practicing only SCM (category 1), only QM (category 2) and SCM and QM both (category 3).

## **5. Limitation:**

The main limitation of this work is the absence of empirical research. The validity and the theoretical soundness of the conceptual framework of SCQM can only be tested by collecting empirical data from real-life cases and testing the propositions of the framework subsequently. This will be taken up as the future scope of the present work.

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