

Conceptual Model for Supply Chain and Quality Management integration

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Abstract

This paper presents a conceptual model proposal for Quality Management (QM) and Supply Chain Management (SCM) integration and its impact in the companies' performance. Based on a literature review, a set of QM and SCM principles that promote the integration have been identified. With this model we consider that we can embrace the most important issues concerning these two organizational areas. Furthermore, the statistical validation of the proposed model and the conclusions reached could help worldwide companies to adopt new management approaches in order to improve their performance.

Keywords: Supply chain management, quality management, integration

Introduction

Recent trends in the business world has forced companies to expand their activities into new regions where they can have access to qualified manpower, lower production costs and high availability of raw materials, giving rise to wider and more complex supply chains but also bringing in new opportunities to leverage their competitive advantages. These changes require the implementation of new organizational models with different suppliers and partners that will be responsible for an important part of the final product and consequently to provide a service of excellence to satisfy customers.

In order to produce value and optimize sustainability, it is fundamental to establish successful partnerships within the supply chain organizations. Thus, the use of quality management and supply chain management integrated approaches becomes necessary to accomplish and successfully fulfill all these objectives.

Much attention has been dedicated to supply chain management concepts in recent years. However, the relationship between supply chain management and quality management is still very limited (Robinson and Malhotra, 2005). Similar characteristics tie these two management areas together: the adoption of holistic approaches, the promotion of continuous improvement and innovation; customer satisfaction; leadership; strategic planning, among others. Also, areas of each management approach can be seen as complementary and their synergies can contribute to improve the global performance of a company. Considering that both QM and SCM require internal and external collaboration, they offer a unique framework to integrate participation and partnership between stakeholders (Guimenez, 2004). Therefore, since there are some similarities between quality and supply chain, the understanding of their integration can

contribute for future research. In order to go deeper in this topic, this paper presents the first result of a research project that is being conducted in order to analyze the influence of different aspects in both quality and supply chain management, and the relationship between these areas, and consequently the impact of their integration on companies' performance. This topic is important since both areas are seen as management philosophies which can have an unlimited potential for scope and applications.

Literature review

Interest in the concept of supply chain management has gradually increased since the 1980s when companies saw the benefits of collaborative relationships within and beyond their own organization (Lummus and Vokurka, 1999). Since then, different definitions have been proposed concerning the concept of "the supply chain" and its management, but there is still no universal agreement on these definitions. One of the definitions is that SCM is an integrated philosophy to manage the total flow from the supply of raw materials to the end customer (Tyndall et al., 1998; Ellram and Cooper 1990; Houlihan 1988). Chopra and Meindl (2001) state that a supply chain consists of all stages involved, directly and indirectly, in the fulfilling of the customer's request and that supply chain not only includes the manufacturer and suppliers, but also the transporters, warehouses, retailers and customers themselves. Cooper and Ellram (1993) suggested that the implementation of SCM has three major objectives that are: i) to reduce inventory investment in the chain; ii) to increase customer service through increased stock availability and reduced order cycle time; and iii) to build competitive advantage for the channel to create customer value. Therefore, with SCM, companies can become more specialized and search for suppliers who can provide a better service with lower price. So, it becomes critical for companies to manage the entire network of supply in order to optimize the overall performance. These organizations have realized that each time a company deals with another one that executes the next phase of the supply chain, both stand to benefit from the other's success (Robinson and Malhotra, 2005). Furthermore, some research considered that SCM provides a vision that focuses everyone in an organization, on the products, production and quality improvements, and these improvements are not only required by the market, but are also driven by the need for companies to survive (Agus, 2011).

Similarly to SCM, also for QM there is not a single standard definition. Many authors defined QM as a "management philosophy" (Perry and Sohal, 2001, Khan, 2003, Bon and Mustafa, 2013). QM is an approach to improve effectiveness, flexibility, and competitiveness of a business to meet customers' requirements (Oakland, 1993), as the source of sustainable competitive advantage for business organizations (Terziovski, 2006), as a source of attaining excellence, creating a right first-time attitude, acquiring efficient business solutions, delighting customers and suppliers etc. (Mohanty and Behera, 1996) and above all, as a source of enhancing organizational performance through continuous improvement in organization's activities (Claver-Cortés *et al.*, 2008; Teh *et al.*, 2009).

There are some studies concerning the relationship between SCM and QM (Fynes et al., 2005; Flynn and Flynn, 2005; Min and Mentzer, 2004; Forker et al., 1997; Yeung, 2008), although, to the best of our knowledge, there is none that covers the entire supply chain, and also, the largest number of publications, focus specifics QM practices. In fact, just a few studies consider these two important strategic approaches for the organizations together. Wong (1997) concluded that supply chain management is mandatory for the quality objectives of the suppliers. Flynn and Flynn (2005) realized that the organizations that pursue both quality and supply chain goals achieve a

competitive advantage. The authors have concluded that there is a relationship between SCM and QM. Kim (2007) found that the benefits of supply chain integration can be achieved by an effective coordination between supply chain activities. Later, in 2008, Tutuncu and Kacukusta published a work, based on healthcare organizations, that demonstrates that the factors that affects the integration of supply chain management, also have a strong effect on the quality system.

Furthermore, other researchers found mixed results related to the effect of quality management practices on supply chain performance. Those authors suggested that more research is required in order to provide some guidance to both researchers and supply chain managers, on how to distribute resources to issues that are critical for the integration of quality management to improve supply chain performance, and consequently analyze the impact of this in companies performance (Fynes et al., 2005; Flynn and Flynn, 2005; Min and Mentzer, 200; Forker et al., 1997; Yeung, 2008). Further research in this topic should also include the role and behaviour of suppliers and customers, in order to examine in depth how the practices of SCM are integrated in QM, and also, the way that QM practices impact on SCM (Wong, 1997).

Talib et al. (2010) stated in their study, that future research should focus on studying the management role in total quality management (TQM) and SCM and understanding the organizational structure in the integration of TQM and SCM for their implementation.

Research methodology

An extensive literature review was conducted and some practices have been identified in order to understand how these fields are related to each other, and the benefits that their integration can bring to companies' performance. After that, a conceptual model was developed. Some practices that were identified are related with both areas, while others concern only quality management or supply chain management. The whole set of practices identified attempts to represent the whole supply chain as well as quality principles.

A comprehensive validation process of the conceptual model is required to get further insight on the subject allowing understanding how companies implement SCM and QM management strategies and the way it impacts on the overall organization performance. For that purpose, an on-line questionnaire was developed and will be conducted internationally. A pilot test is been conducted in order to assess if the survey is appropriate to fulfil the research purposes. The questionnaire is supported in an agreement five-point Likert scale. Based on the answers that will be collected, a statistical validation of the model will be performed based on structural equation modelling techniques.

Proposed model and hypotheses

Integration of QM and SCM has already been described as a natural procedure that might improve the customer satisfaction and the performance of supply chain parties.

As seen before, there are some studies concerning the relationship between SCM and QM, but very limited in scope. For that reason, it has been developed a conceptual model which involves a group of common practices for SCM and QM, and some practices that concerns only to SCM and to the QM, specifically.

The conceptual model developed is illustrated in Figure 1. As can be observed, a set of six areas have been identified and classified as critical to both quality management and supply chain management: leadership, continuous improvement and innovation, sustainability, stakeholders' involvement and commitment, information, and management and strategic planning. It is our understanding that they are essential to

foster the integration between the two management areas which then has a great impact on the companies' performance. Performance has been disaggregated in four different levels, i.e., customer, financial, internal process and learning and growth. Additionally, specific issues within QM (Quality culture and product/service quality) and SCM (procurement, internal logistics and distribution) have also been recognized as critical in their particular areas.

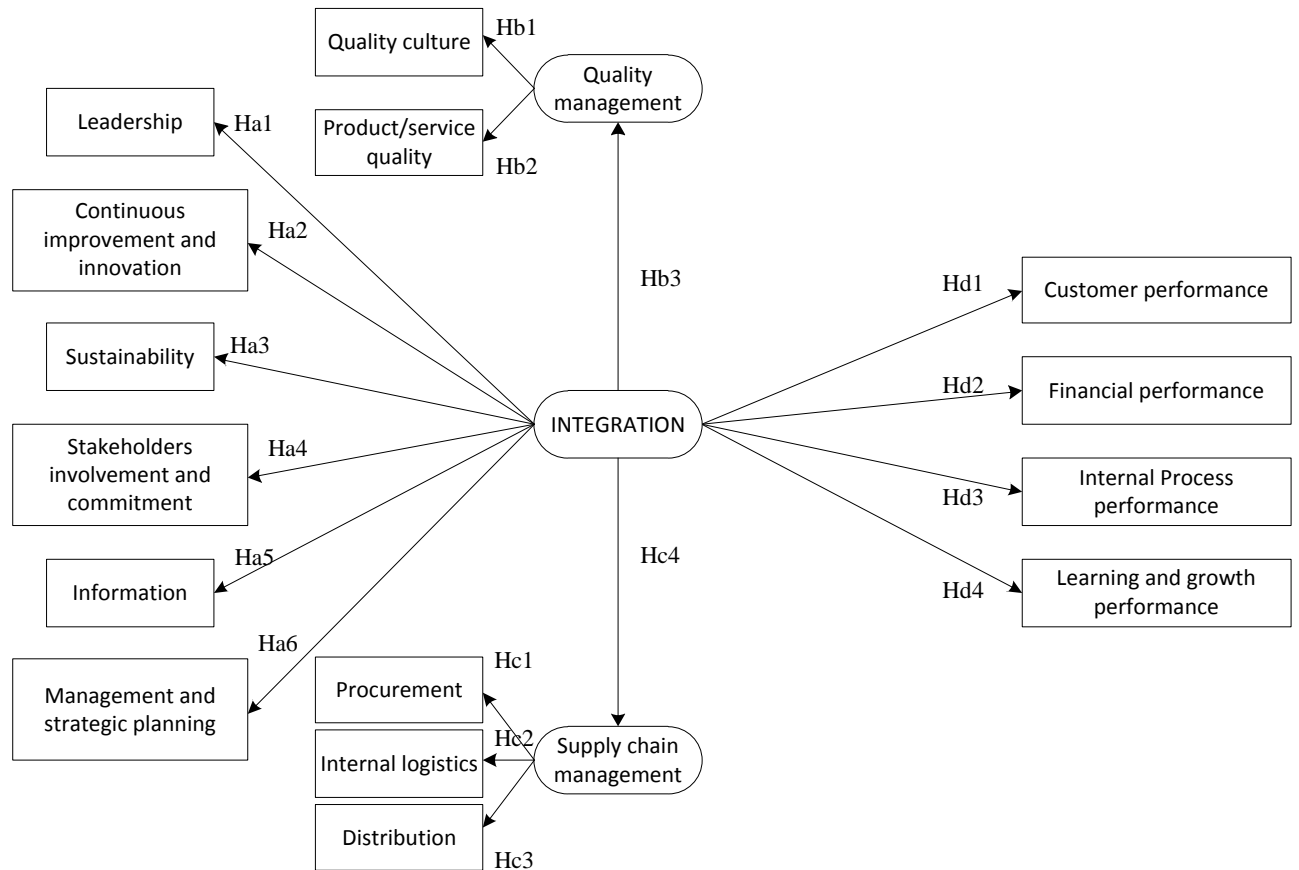


Figure 1 – Conceptual model developed

In the following, different elements of the model are discussed and hypotheses presented:

- **Leadership**

Leadership is a principle that is common to quality management and supply chain management, and it is focused on creating and maintaining an organizational environment where people become fully involved and committed to achieve the organization strategic objectives. Also in the context of supply chain management, leadership is responsible for maintaining stability in the supply chain that promotes the performance improvement (Sharif and Irani, 2012).

Ha1: QM and SCM integration is promoted by leadership.

- **Continuous improvement and innovation**

As written before, the main objective of QM and SCM is the continuous improvement and innovation of the companies. Innovation capacity is increasingly important in terms of competitiveness and in order to promote a dynamic capability to respond to dynamic markets and customer needs. Thus, companies should be prepared to quick changes of the market.

Ha2: QM and SCM integration is promoted by continuous improvement and innovation.

- **Sustainability**

Sustainability is related to the achievement of a sustainable performance in three dimensions: economic; social, and environmental. Supply chain sustainability is crucial and necessary to ensure long-term profitability, and is related to structural and organizational changes throughout the chain, promoting robust collaborations with suppliers and customers, reducing costs and environmental impacts (Seuring and Gold, 2013). In the quality perspective, sustainability can help companies to develop their long-term success, and for this it is necessary to optimize procedures and systematize the structures that comprise an entity (Reed et al., 2000). Thus, there is a commitment between all parties involved, which certifies that the sustainability criteria are respected.

Ha3: QM and SCM integration is promoted by sustainability.

- **Stakeholders involvement and commitment**

Includes all the interested parts that could influence the success of a business. Concerning the employees, their involvement and commitment at all levels of an organization is crucial, since their complete involvement allows their capacities to be used for the benefit of the organization (OSHA, 2005). Additionally, the involvement and commitment of the supply chain members is critical to the internal and external integration and will have a significant impact on organizational performance.

Ha4: QM and SCM integration is promoted by involvement and commitment of stakeholders.

- **Information**

Information systems allow the production of well-timed information that is a critical tool for managers struggling in highly competitive environments. In fact, it has been stated by some researchers that the performance of supply chain is influenced by managing and integrating key elements of information into the supply chain (Gunasekaran and Ngai, 2004). Thus, it is imperative that firms have an information technology system implemented, in order to plan, control and make adequate decisions, balancing trade-offs between quality, costs, level of service, profit, among other aspects. Additionally, information and communication technologies are the key element for a full integrated relationship between stakeholders, and the drivers for the implementation of coordinated relationships.

Ha5: QM and SCM integration is promoted by information.

- **Management and strategic planning**

Management and strategic planning in SCM includes a large set of complex issues, such as: network design, inventories location and management, suppliers' management, production planning, information management and quality. On the other hand, for QM involves: human resources; quality strategy; planning; responsibility; authority; communication, and commitment.

H_{a6}: QM and SCM integration is promoted by management and strategic planning.

Two major QM principles were identified: product/service quality, and quality culture. These two principles are well related to organizational performance. Product/service quality is what a customer expects in the product/service that he is acquiring. If a customer expects 'excellence' in everything he purchases, then his expectations are very high (Murthy, 2007). Therefore, it is important that the company financial policies, marketing strategies, and products are well designed and established. It is also imperative for the company to establish quality assurance steps and follow them.

- **Quality culture**

The development of a quality culture is an approach that is related with the sharing of values, beliefs, attitudes and patterns of behaviour that characterize the members of an organization, and aims to improve the overall organizational performance (Woods, 1998). In a healthy corporate culture, all transactions are carried out correctly and the relationships between all the people involved (employees, suppliers and customers) are successful.

H_{b1}: Quality culture promotes quality.

- **Product/service quality**

The propose of quality management practices is to improve product and service quality. In 1998, Juran and Godfrey defined product quality as the ability to meet customer needs and expectations avoiding defects and rework. The construct product/service quality has been defined as the degree of discrepancy between customers' normative expectations for service and their perceptions of service performance.

H_{b2}: Product/service quality promotes quality.

Regarding SCM, three main activities were considered: procurement, internal logistics and distribution.

- **Procurement**

Procurement activity involves all the actions and processes in order to acquire goods and services and defines all inbound supply processes (Stadtler and Kilger, 2000). This activity includes all the actions engaged in the establishment of fundamental requirements, such as, identification and featuring material requirements, receipt of orders, goods selection, and payments, among others.

H_{c1}: Procurement promotes supply chain management.

- **Internal logistics**

The internal logistics should be seen as a value-adding supply chain process (Stank et al., 2001), since it ensures the movement and storage of product inventories throughout the company. Thus, logistics has a critical importance to organizational performance, since it is responsible for the reduction of stocks and tasks that do not add value to the final product.

Hc2: Internal logistics promotes supply chain management.

- **Distribution**

The distribution includes a wide range of activities related to the effective and efficient movement of material from the source of supply to the point of use or consumption (Sanders, 2012). Those activities include, not only the choice of the most adequate distribution channel, but also a set of activities, such the freight transportation, warehousing, material handling, packaging, inventory management systems and information systems management.

Hc3: Distribution influences supply chain management.

- **Integration**

Organizational performance, business performance, employee satisfaction and customer satisfaction is improved and influenced by SCM and QM (Talib et al., 2010). Thus, the study of the integration benefits could be very useful.

Hb3: QM and SCM integration can be promoted by quality management.

Hc4: QM and SCM integration can be promoted by supply chain management.

Hd1: QM and SCM integration influence the customer perspective performance.

Hd2: QM and SCM integration influence the financial perspective performance

Hd3: QM and SCM integration influence the internal process perspective performance.

Hd4: QM and SCM integration influence the learning and growth perspective performance.

- **Performance**

The measure of the organizational performance is related with the balance of the current results with its planned goals. In this study, organizational performance will be measured based on the balanced scorecard perspectives. The balanced scorecard is a performance measurement matrix designed to capture financial and non-financial metrics that link the critical success factors of an organization in a cause-and-effect manner, to organizational strategy (Houck et al., 2012). The balanced scorecard covers four perspectives: customer; financial performance; internal processes; and the learning and growth environment. Each one of these areas contains multiple measures.

As a consequence of the stated above, we consider that this conceptual model is an adequate representation of QM and SCM integration, and it is expected that the model could contribute to understand the integration of these two areas, taking advantage of their complementarities and similarities, and may, in fact, be important to the overall organizational performance.

Conclusions

There isn't a significant number of works that explore the integration of SCM and QM. However, so far, the existing academic studies points out the importance of deepening the knowledge of this relationship. Having this in mind, in this work a conceptual model proposal is presented in order to try to illustrate the integration of supply chain management and quality management, as well as the impact of those in companies' performance.

The work developed highlights some major practices that are common for both areas: management and strategic planning; stakeholder's involvement and commitment; information; leadership; and continuous improvement and innovation. The conceptual model also includes for supply chain the activities of procurement, internal logistics and distribution; and for quality management the product/service quality and quality culture.

We believe that the conceptual model developed could help the companies and the academia to understand the integrations of these two important fields, and how the integration could create added value to the organizational performance.

Acknowledgment

This work was financed with FEDER funds by *Programa Operational Fatores de Competitividade* (COMPETE) and national funds by *Fundação para a Ciência e Tecnologia* (FCT) through Project: FCOMP-01-0124-FEDER-022674.

The first author would like to acknowledge the financial support of the FCT through a post-doctoral individual grant (SFRH / BPD / 87242 / 2012).

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