

Supply Chain Quality Management: a theoretical framework for integration measurement

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Abstract. This paper aims to present a theoretical framework for performance measurement of supply chain quality management (SCQM). A review of the literature on supply chain quality management, supply chain and quality management was conducted to develop key performance measurements related to six areas of integration between quality management and supply chain management environment: leadership, continuous improvement and innovation, sustainability, stakeholder involvement and commitment, information, and management and strategic planning. The findings suggest that SCQM integration can be assessed by nine performance measurements. The study contributes to our understanding of quality management practices within a supply chain (SC) environment from an integrated perspective. It extends the concept of supply quality chain integration by focusing on key performance measurement that may help to improve the overall performance of the supply chain.

Keywords: Supply Chain; quality, performance measurement, theoretical framework.

1 Introduction

Recent studies on performance in supply chain management have indicated the need to deepen the understanding of the integration of quality management [1–3]. The integration of quality management and supply chain management changes from a cost-based and competitive relations focus to a more cooperative approach between the different members of the supply chain, leading to cumulative capabilities that prepare organizations for a dynamic and global competition [4]. Performance measurements of the supply chain can facilitate inter-understanding and integration among the supply chain members [5], as well as the integration of quality management (QM) and supply chain management (SCM), quality-related tools and practices that are compatible with supply chain activities [6]. Therefore, it is important to deploy performance measures that help managers towards the integration of quality management through the supply chain.

Previous studies identified the need for research on performance measurements in different contexts. For example, the positive association between hierarchy-like governance of transactions with quality was studied in fresh produce farms [7]. This governance is linked to the firm's activities of supply chain quality management, in order to support collaboration and coordination along the value chain, such as hazard monitoring and training to implement quality assurance standards, providing logistics, sorting and packaging of the products [7]. Concerning information systems, performance measurements should support changes in processes of supply chain and information security [8]. Regarding relationships, improvements in performance can reinforce and consolidate supply chain relationships and generate even more product design and development collaboration [9]. In fact, although supply chain quality practices and maturity vary by industry sector [10], a key question remains: what are the key performance measurements to assess Supply Chain Quality Management (SCQM) integration?

In this work we start from a set of six areas identified as critical to SCQM integration [11–14]. For each of one of these areas a set of performance measurements for SCQM integration are proposed, based on the literature review.

2 Supply Chain Quality Management overview

Supply chain and quality management are two important factors in every firm or organization [15]. Supply chain quality is a key component in achieving competitive advantage [16, 17]. SCQM is defined as “*The formal coordination and integration of business processes involving all partner organizations in the supply channel to measure, analyze and continually improve products, services, and processes to create value and achieve the satisfaction of intermediate and final customers in the marketplace* [18]”, SCQM externalizes an organization’s quality management practices to assist in governing the exchange between buyers and sellers [12]. For this reason, SCQM has been recognized as one of the most important ways to the respond rapidly, correctly, and profitably to market demands [19]. Improvements in organizational performance are associated with improvements in supply chain quality management [20]. This complex process involves measuring, analyzing, and continuously improving products, services, and other processes [21]. That is why the relationship between supply chain management and quality management needs to be further research.

3 Literature review and propositions development

The integration of quality management and supply chain management is not a simple task. There are some studies concerning the relationship between SCM and QM, although few cover the entire supply chain [22]. Some research suggests that for a better integration it is necessary to identify the similarities between QM and SCM [15, 22, 23].

Thus, based on the literature, a conceptual model for SCQM integration is proposed, gathering and classifying the six areas considered critical both to for quality management and supply chain management, namely: leadership, continuous improvement and innovation, sustainability, involvement and commitment of stakeholders, information, and management and strategic planning [11–14]. Each one of these areas has been deeply analyzed the literature, and propositions about the performance measurements will be developed and presented in the coming paragraphs. The proposed model is presented in Fig. 1.

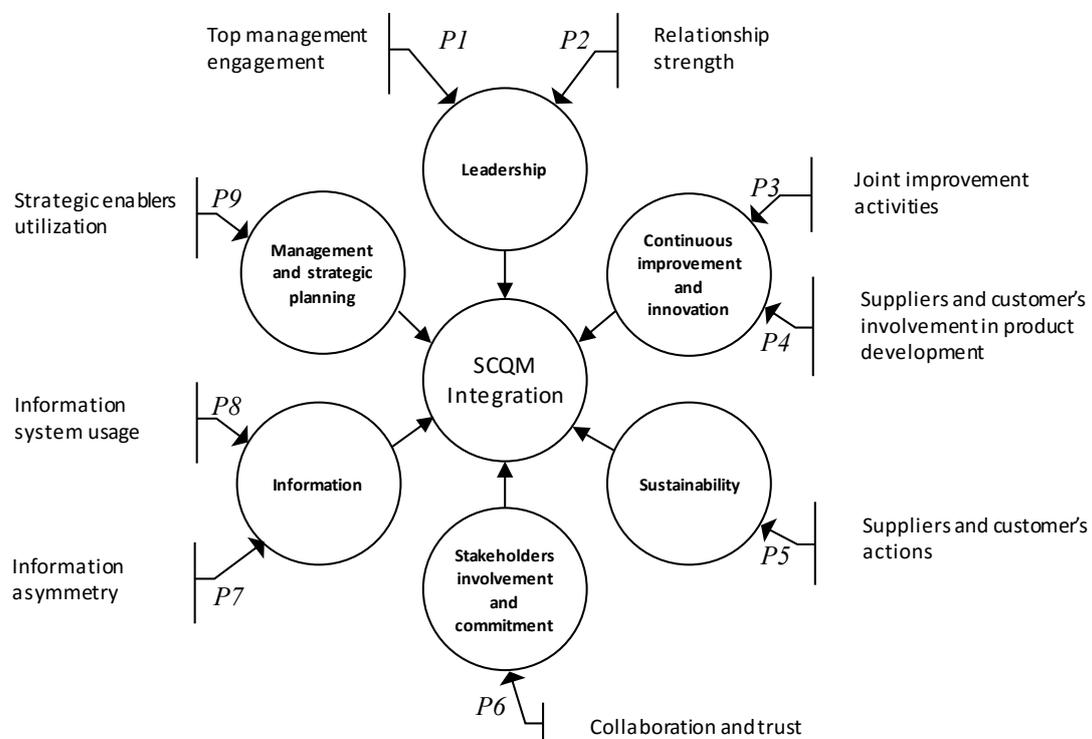


Fig. 1. Conceptual framework for performance measurements of SCQM.

Leadership. SCQM leadership emerges from a close relationship between members of the supply chain. However, a close relationship does not come easily. Leadership consists in a cooperative culture, commitment to relationship and commitment to quality variables. It may require some cultural changes among the people in the supply chain. To develop a close relationship between the parties it is necessary that someone in the supply chain should assume the leadership to integrate the various parties [24]. Effective leadership enhances relationships with suppliers, is positively related to supplier quality management [25] and is essential in order to cope with the cultural differences between firms, as well as the differences concerning human resource practices and processes along the supply chain [26]. Leadership implies that management influences relationships and operations with supply chain partners [18].

When conducted by top management it shapes organizational quality culture, cultivating cooperative buyer–supplier relationships [27], creating enabling conditions and enhancing trust for supply chain quality [28]. When top management establishes unity of purpose and direction for the organization, they create an internal environment in which people can become fully involved in achieving the organization’s objectives [29]. Top management provides the necessary leadership of enabling conditions for QM [30, 31]. When there is a core enterprise in the SC, this company must act as a leader, to consider adequately the needs and expectation of the other members, establish a clear, achievable and coincident holistic target, and lead and inspire the other members to strive jointly for the target [32]. Based on the literature review, we propose that:

P1. Higher top management engagement leads to higher impact of leadership on SCQM integration.

P2. A stronger relationship between the different members of the SC leads to higher impact of leadership on SCQM integration.

Continuous improvement and innovation. Production and operations activities of the various members of the supply chain can benefit from continuous improvement programs. These programs include reducing set-up times, increasing production capacity and eliminating rework as a result of learning-based improvements [33]. To develop supply chain competence, continuous learning is important [34], with everyone committed to be in a constant mode of self-assessment in order to achieve continuous improvement and to develop supply chain competence [34, 35].

The continuous improvement mindset must be cultivated in the minds of all the different members of the supply chain. Thus, there should be put in place procedures for chain members to voice their suggestions or to combine their efforts to further improve their operations. Improvements may require joint planning and discussion among members [24].

Companies can involve their suppliers and customers in product development and continuous improvement by focusing their supply chains on the requirements of the final customers [36], and by creating an environment, enabling innovation. Identifying areas of potential cooperation between supply chain partners can deliver value and innovation to customers [37, 38]. Hence we propose the following:

P3. Increasing involvement of members of the supply chain in joint improvement activities, increases the level of influence of SCQM integration on continuous improvement.

P4. Greater involvement of suppliers and customers in product development, increases influence of innovation on SCQM integration.

Sustainability. A supply chain will be sustainable if it improves the social, environmental and economic impacts of the raw materials and service flows that link suppliers, manufacturers and end users [5]. With regards to social issues, quality is not perfectly integrated, if, for example, buying companies seek to gain an advantage in the purchase of supplies from countries with poor working conditions [39]. According to Jabbour et al. [40], environmental management practices have a positive impact on quality management practices, producing knowledge that is acquired and facilitating the adoption of good environmental practices. From an economic perspective, quality is associated with sustainability, if the organization is able to maintain and develop its performance over a longer period. Based on this theoretical discussion we propose:

P5. A greater impact of the actions of suppliers and customers on social, environmental and economic issues produces a greater influence of sustainability on SCQM integration.

Involvement and commitment of stakeholders. Intensive cooperation of stakeholders can coordinate and promote QM in a collaborative way [35, 41]. Organizations should participate actively in their immediate environment in worthy causes that are important to the stakeholders [42]. However, the degree of stakeholders' participation in SCM and QM is quite different: SCM focuses more on relationships with external business partners, while QM places more emphasis on internal participation by employees [3]. A negative perception of a company's product/service quality can result in an erosion of trust of all stakeholders [23]. For this reason, a Chinese company requires its employees to taste every batch of milk leaving its factory not only for quality control but also to contribute to the long-term processes of improving informational visibility and building trust among all the internal and external stakeholders in the company's supply chain [43]. Stakeholders should be integrated and included to enhance mutual understanding and eventually to make attempts to eliminate gaps in implementation of SCQM [28], and to coordinate the flow of information between the proposed supply chain network and stakeholders [44]. Thus, we propose:

P6. Greater collaboration and trust among supply chain stakeholders increases the contribution of stakeholder involvement and commitment for SCQM integration.

Information. Buyers and sellers in SC usually possess asymmetric information about product quality [45]. Therefore, it is important that buyers get and analyze as much information as possible about the capabilities and performance of suppliers. This can give insight into the ability of the seller to meet the expected quality requirements, and whether control operations and management are carried out properly [25]. To facilitate obtaining relevant information both upstream and downstream, the existence of an efficient information system is required. The lack of information technology and captured knowledge causes a hand-off along the supply chain, and opens the door for deception and other opportunistic behaviors [46]. Partnerships with suppliers are also important and can bring results in the exchange of information. Enterprise Resource Planning (ERP) systems can improve transparency and traceability by systematically monitoring and controlling the material and information flows along the SC [43]. Effective information sharing in supply chain quality management has been and will be supported by advances in information technology [47]. Therefore, we propose:

P7. Lower the information asymmetry between SC members increases the contribution of information to SCQM integration.

P8. Greater use of information system for sharing information in the SC increases the contribution of information to the SCQM integration.

Management and strategic planning. Strategic planning is the key enabler of SCQM. One of the key requirements of SCQM is to find the weakest link in the company/supply chain [31]. When a SC has many suppliers, it can face quality management and control problems. Working with a few high quality suppliers and developing close strategic planning processes are the main characteristics of a strategic SC [6]. On the other hand, it is necessary to learn how to manage a few high-quality suppliers [27, 48]. Quality management culture, leadership, sustainability, information technology management, supplier participation, SC configuration design and strategic planning are important strategic enablers. The success of the SCQM will depend on how well they are introduced and managed [28]. Thus, we propose:

P8. Greater utilization of strategic planning increases the influence of management and strategic planning on SCQM integration.

4 Conclusions

The integration of different management systems has presented managerial and practical challenges. The integration of quality management to supply chain management has experienced similar problems. In this study, we conducted a literature survey to review existing knowledge of supply chain quality management and possibilities for integration. However, the literature on the integration of SCQM is still scarce. From this research, it was possible to develop a theoretical framework for performance measurement of supply chain quality management integration. In this process we have been identified nine possible performance measures that are aligned to the six integration areas identified in the literature. This study extends the understanding of the integration of SCQM, presenting a proposal for a set of performance measurements.

It fills out a gap in the current body of knowledge. Applications of the proposed theoretical, empirical structure are shown as an important extension of the research carried out so far. We hope the findings of this study will provide a comprehensive basis for future studies in the area of supply chain quality management integration.

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