Title: An investigation into the factors influencing Supply Chain Quality Management processes.

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Summary

Given that Supply Chain Quality Management (SCQM) seems to be the key for future competitiveness it is crucial to understand how to control quality throughout the whole Supply Chain (SC). The extended and globalised SC generated “co-ordinating” problems as the more extended the supply network is, the harder it becomes to control and coordinate quality while also building effective on-going supply chain relationships. Hence, this paper proposes to identify SCQM components, focusing upon the management of the collaborative relationships between members of the SC. By conceptualizing SCQM through Social Exchange Theory and Social Network Theory, it is argued that an efficient SC requires more than a simple dyadic relationship with mutual benefits. As a result, a Supply Chain Quality Relationship Management (SCQRM) framework is introduced, demanding for a broader approach and a more inclusive perspective of quality than the one offered by the conventional buyer-supplier approach.
INTRODUCTION

Long-established Supply Chain Management (SCM) techniques are proving increasingly ineffective (Flynn and Flynn, 2005:3421) due to continuous society demands. Increased pressure from buyers to work with companies that are, not only, sustainable, socially responsible and increasingly effective, but that also fit their quality expectations and philosophy (Fynes, Burca and Voss, 2005), leads to a refocus of SCM studies towards Quality Management (QM). As a fundamental aspect of intra-integration (Theodorakioglou, Gotzamani and Tsiolvas, 2006:155), QM proved to be a “cumulative capability” (Flynn and Flynn, 2005:3424) which constitutes the basis for SCM (Theodorakioglou, Gotzamani and Tsiolvas, 2006:151) (cf. Figure 1). As a result of this “scientific revolution” (Kuhn, 1996) in the field, researchers stopped considering two initially opposite areas as a trade-off (Flynn and Flynn, 2005:3423), focusing on “QM practices in the supply chain setting” (Lin et al., 2005:356). The combinations of these concepts was facilitated by the similarities between them, in elements such as information sharing, establishment of long-term and trusting relationships with suppliers, internal integration, mutual dependence and commitment (Theodorakioglou, Gotzamani and Tsiolvas, 2006:148).

As a fairly recent concept, the designation Supply Chain Quality Management (SCQM) refers to the “systems-based approach to performance improvement that leverages opportunities created by upstream and downstream linkages with suppliers and customers” (Foster, 2008:461). There has not been yet a consistent framework or specific empirical proof of SCQM effects, but it has been widely discussed that the key element for this process to occur is the establishment of collaborative relationships (e.g. Cousins, 2002; Emberson and Storey, 2006; McClellan, 2003; Mentzer et al., 2001; Nyaga, Whipple and Lynch, 2010; Kwon, 2008; Wu and Choi, 2005, 2009; Wu, Choi and Rungtusanatham, 2010).

Therefore, in order to attempt to clarify SCQM system components (as suggested as future research by Lin et al., 2005; Foster, 2008; Zhao and Lee, 2009), this developmental paper intends to discuss the nature and depth of the relationships established between parties involved in SCQM processes and their implications for QM and SCM assumptions. Moreover, rather than focusing on partnerships, alliances or joint ventures, as researched so far, a broader perspective on relationships is assumed under the designation Supply Chain Quality Relationship Management (SCQRM) to refer to the management of the triadic relationships established between buyer-supplier-supplier and their quality implementation systems.

As a result, the first section of this paper shall consider the conceptual frameworks which contribute to the understanding of SCQRM, followed by a discussion of their implications. Finally, based upon previously studied collaboration variables and SCQM discussions, a SCQRM research framework and hypothesis are suggested.

![Figure 1: QM as a cumulative capability of SCM](Ferdows and DeMeyer Sand Cone Model (1990); Adapted from: Flynn and Flynn, 2005:3424).
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THEORETICAL BACKGROUND

Several theories have been applied in the context of supply chain (SC) and QM research. For the purposes of this developmental paper we shall consider Social Exchange Theory, Social Network Theory and Cousins (2002) Relationship Model.

Social Exchange Theory (SET)

Social exchange is analogous to economic exchange (Mackintosh, 1998:565) since individuals or corporate groups interact for reward or with the expectation of a reward from their interaction with others (Homans, 1958; Thibaut and Kelley, 1959; Emerson, 1976; cited by Narasimhan, et al., 2009:375). SET recognizes the “interdependencies among related transactions” (Schimmelpfennig, 2008: 10), distinguishing two key elements: Procedural Justice (PJ), which refers to the “perceived fairness of the process and decision-making procedures” and Distributive Justice (DJ) that refers to the “perceived fairness with the decision outcome” (Sheppard et al., 1992 and Konovsky, 2000; cited by Griffith et al. 2006:87).

Social Network Theory (SNT)

According to this approach, a network is a set of actors connected by a set of ties (Borgatti and Foster, 2003:992; Jack, 2010:121). Described as “collective actors” (Emerson 1981; cited by Iakovaki, Srai and Harrington, 2009:3), organisational networks can benefit from social capital (Granovetter, 1985; cited by Bernardes, 2010:45), that is the access to a wider pool of resources which remain outside the focal company (Borgatti and Li, 2009; Weber and Weber, 2009). These networks may also benefit from social influence through comparison (imitation, social desirability or cohesiveness), power and persuasion mechanisms (Fattore et al., 2009:142). Inter-organizational networks are then formed on the basis of formal and informal relationships (Knight and Harland, 2005) of varying strengths, which involve the study of network size, structure, interactional processes, influences, behaviours and skills (Coviello, 2005; cited by Jack, 2010:121). These networks are linked through concrete personal relations (relational embeddedness) and the structure of the collective arrangement of those relations (structural embeddedness) (Granovetter, 1985; cited by Bernardes, 2010:45). This integration between actors is facilitated by the presence of common goals, shared risk and rewards, network synchronization, collaborative resources and knowledge sharing (cf. figure 2) (Iakovaki and Srai, 2009; cited by Iakovaki, Srai and Harrington, 2009:5). Hence, stronger ties between nodes (known as network relational embeddedness or social capital) may generate network-shared cognition and customer responsiveness, resulting in similar organizational behaviour and decision-making patterns (Bernardes, 2010:47-48).

However, the limitations of this approach must not be ignored such as accusations of rigidity (Burt 1992; cited by Weber and Weber, 2009:3) and non focus on the network processes (Parkhe et al., 2006:562) as well as increasing concerns about the operationalization of the network concept (Jack, 2010:121). These criticisms must be addressed once applying this theory to SCQRM.
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Relationship Management Model (RMM)

Contesting partnership, joint-ventures and alliances studies, Cousins (2002:71) proposes a more general Relationship Management Model in which the type of established relationship varies with perceived risk and company dependency (cf. figure 3).

This model accepts the *discrete transactions* and *relational exchanges* continuum (Schimmelpfennig, 2008: 7) wherein the degree of trust, commitment and opportunism with each established relationship varies over time. As a result, in order to avoid opportunistic behaviours, buyers are expected to stimulate strategic collaboration, where both buyer and supplier benefit from the exchange, adding value or creating competitive edge to their processes (Cousins, 2002:76).
Theoretical implications

Several studies analyzed the social exchange elements of supply networks, such as long-term orientation, trust, relational behaviour, commitment, power, information sharing, etc (e.g., Autry and Golici, 2010; Benton and Maloni, 2005; Griffith et al. 2006; Ireland and Webb, 2007; Kwon, 2008; Narasimhan, et al., 2009; Yeung et al., 2009; Zhao et al., 2008, Zhou and Benton Jr, 2007). According to these studies, social capital is the result of communication’s mediating effect between trust and commitment and its role is crucial in successful inter-firm relationships (Kwon, 2008:560). As a result, the study of supply chains as networks (following SNT assumptions) implies superior complexity, involving the management of multiple variables and sometimes contradictory interests (Iakovaki, Srai and Harrington, 2009:3) as portrayed by the RMM.

Following these assumptions, suppliers relationship management seems to be critical for SCQM given that it “affects product specifications and innovation, delivery performance, cost and quality” (Iyer, Seshadri and Vasher, 2009:87), thereby having the potential to increase or decrease efficiency and effectiveness levels (e.g. Choi and Hartley, 1996; Shin et al., 2000; Sahin and Robinson, 2002; Johnston et al., 2004), hence the focus on SCQRM.

Supply Chain Quality Relationship Management (SCQRM)

From the aforementioned becomes clear that SCQRM encompasses generating and strengthening trust and commitment through effective communication and information sharing throughout the whole chain, increasing visibility, transparency and sharing benefits as a means to improve overall performance (Boonstra and Vries, 2008; McClellan, 2003; Nyaga, Whipple and Lynch, 2010; Kwon, 2008). Therefore, even though it seems obvious from SET that the ultimate goal of relational exchanges “is to maximize profits” in the long-term (Iyer, Seshadri and Vasher, 2009:23), this aim will not be fulfilled unless effective collaboration exists between the different members of the SC (Cousins, 2002; Emberson and Storey, 2006; Mentzer et al., 2001; Nyaga, Whipple and Lynch, 2010; Kwon, 2008).

The usual focus of collaboration studies tends to be the dyadic relationships (buyer-supplier) (Autry and Golici, 2010; Borgatti and Li, 2009). Nevertheless, buyer-supplier relationships are not independent from the remaining network members (Bernardes, 2010:46). Therefore, besides this, triadic sourcing (Dubois and Fredriksson, 2008: 170) and co-opetition (Choi et al., 2002; Wu and Choi, 2005) are also considered to acknowledge the interference of a third echelon and the simultaneous competition between suppliers within the network (Choi and Wu, 2009).

As a result, though controversial (e.g., Dubois, 2009), triadic relationships (buyer-supplier-supplier) portray the essence of the network approach here considered (Choi et al., 2002; Choi and Wu, 2009; Wu and Choi, 2005; Wu and Choi, 2009) and reveal essential when considering SCQRM variables in order to recognize the complexity of the quality network.
SCQRM Framework

Controlling quality throughout the whole SC is a complex task involving many suppliers and many times several product/service combinations which can, at any stage, compromise the promise of quality made to customers/consumers. Ignoring this complex nature, companies often fail to take a holistic approach to SC (Seitz, 2006:11), but SCM requires a collaborative and integrative concept which implies suppliers relationship management and a whole set of activities which go beyond the focal supplier (Borgatti and Li, 2009). By extending the collaboration concept throughout the SC, organizations are defined as a network of interlinked partners (Mentzer et al., 2001) where collaboration leads to mutual cost reductions and enhanced performance (Christopher, 2005; Fynes, Burca and Voss, 2005; Gattorna, 2009; Lambert, 2008; Narasimhan and Mahapatra, 2004). Through this network, benefits are shared with extended nodes thereby establishing resilient relationships. It is then accepted that the type of relationships developed among members of the network will depend on the desired results as well as on the perceived trust (versus risk) and power relationships established (Cousins, 2002:78).

Given the complexity of the concept, a framework is presented to summarize the main assertions of this paper (cf. figure 4).

![Figure 4: A research framework of Supply Chain Quality Relationship Management](Based on: Bernardes, 2010; Boonstra and Vries, 2008; Chen and Paulraj, 2004; Chen, Paulraj and Lado, 2004; Choi and Wu, 2009; Choi, Wu, Ellram and Koka, 2002; Cousins, 2002,2008; Christopher, 2005; Dale, 2003; Dubois, 2009; Flynn and Flynn, 2005; Foster, 2008; Gattorna, 2009; Goetsch and Davis, 2006; Griffith et al. 2006; Holland, 1995; Iakovaki, Srai and Harrington, 2009; Iyer, Seshadri and Vasher, 2009; Kelemen, 2003; Kwon, 2008; Lin et al., 2005; McClellan, 2003; New and Westbrook, 2004; O’Toole and Donaldson, 2002; Reed, et. al., 2000; Schimmelpfennig, 2008; Senior, 1997; Soltani, Lai and Phillips, 2008; Soltani, Lai, Van Der Meer and Williams, 2004, 2008; Wu and Choi, 2005, 2009; Wu, Choi and Rungtusanatham, 2010).
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Considering the theoretical background and implications previously described, the main assumptions of this framework are presented as follows:

- Effective relationship management facilitates quality implementation and improves quality performance as well as SC performance (being quality an element of performance assessment);
- Collaborative relationships between triads enhance quality control through the SC and operational performance;
- It is expected that each element in the chain influences the other and is influenced by the Quality Systems best practices;
- The success of the established relationships will depend on the information technology systems available and their compatibility (since sharing of accurate, reliable and real-time information is required to ensure visibility and transparency in the SC, which in turn leads to flexible, adaptable and quicker to react SCs).

**HYPOTHESIS**

From the presented framework, three hypotheses are formulated:

1. The implementation of effective quality systems is associated with the type of relationship (collaborative VS competitive) established between the elements of the triad.

2. The implementation of quality systems within every sub-system of the triad will positively influence the overall SC performance

3. The level of buyer’s quality performance is mediated by supplier-supplier co-opetition and influenced by the suppliers’ quality performances.
CONCLUSIONS

Studying SCQRM processes is pertinent given that companies are no longer seen as one, but as an interconnected network that influences overall performance. Consequently, the establishment of collaborative relationships is determinant in the generation of a quality self-reinforcing cycle, as companies influence each other to adopt such policies.

The aim here is not to discuss quality practices by means of individual dyads. Instead it is argued that in order to understand how to control quality throughout the SC, it is crucial to identify how triads affect product quality and which variables must be controlled within this framework. More specifically, we hope to understand how the type of relationships established within triadic arrangements (buyer-supplier-supplier) influences the implementation of consistent and effective Quality Systems throughout the Supply Chain and its ultimate impact on Supply Chain Performance.

Nevertheless, several topics require further attention, such as the determination of SCQM critical points, the understanding of triadic exchanges and the operationalization of the suggested framework given the criticisms of SNT previous empirical focus.

FUTURE DEVELOPMENTS

Further developments to this paper shall deepen the discussion of SCQRM variables and hypothesis, followed by the development of a survey-based methodology.

Focusing upon collaborative relationships, the aim of future research is to understand the impacts of triadic dynamics upon product/service quality.
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