



The impact of supply chain integration on responsiveness: The moderating effect of using an international supplier network

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ABSTRACT

This study reveals that in supply networks both external and internal integration practices have a significant and positive impact on responsiveness. The use of an international supplier network acts as a contingency factor on the relationship between external integration practices and responsiveness, as in an international context the effect on performance is amplified. Conversely, the impact of internal integration on responsiveness is not moderated by the use of international suppliers. These evidences suggest managers how to properly tune the level of adoption of integration practices according to the degree of supplier network internationalization.

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1. Introduction

The concept of supply chain integration (SCI) is a pivotal issue in supply chain management (SCM) literature. Though most scholars recognize that SCI can contribute to improving supply network performance (Frohlich and Westbrook, 2001; van der Vaart and van Donk, 2008), the debate is still open in the literature about how to maximize this impact. For instance, Swink et al. (2007) note that the simultaneous integration of customers and suppliers is considered a necessary condition to assure the achievement of significant benefits. However, Mouritsen et al. (2003) point out that similar levels of implementation of SCI practices do not bring about equal improvements whatever the context, hence, it is essential to investigate the conditions under which SCI can be more beneficial. In the same vein, van Donk and van der Vaart (2005) demonstrate that in certain conditions a low level of integrative practices could be the best strategy to pursue.

From the above it seems to emerge that some factors which are exogenous to the relationship between SCI and performance may act as moderators of this causal link. It is interesting to note that, as stated by Vickery and Dröge (2011), only a few research studies have been conducted on interactions between integration mechanisms and other external factors, such as environmental turbulence. Also Wong et al. (2011) lament that academic knowledge on the moderating effect of environmental uncertainties on the SCI–performance relationships still remains inadequate, due to the mixed findings obtained by the recent studies.

Among the exogenous factors affecting the SCI–performance relationship, supplier network internationalization plays a key role as it is recognized as a disruptive source of uncertainty that forces companies to cooperate with customers and suppliers to efficaciously managing procurement, production and delivery plans in order to sustain cost, quality and delivery performances (Handfield and Nichols, 1999; Vachon and Klassen, 2002; Camuffo et al., 2007). Nevertheless, despite being a timely issue, we did not find quantitative studies investigating the interactions between SCI practices and the degree of

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supplier network internationalization. Instead, as [Bozarth et al. \(2009\)](#) point out, there is the need to assess how internationalization of the supplier network influences the impact of SCI practices on performances, especially on time-related ones. In fact, the authors argue that though most of the research on the impact of SCI on performance has concentrated on cost-issues, the focus of supply network performances is moving from criteria which are exclusively based on cost to criteria related to responsiveness, such as delivery reliability, speed and flexibility. In an international supply network context, problems due to responsiveness (e.g. delays in deliveries, long lead times) can quickly generate further problems that cascade forward through the chain. Hence, it can be argued that it is in the international context that SCI practices such as enhanced communications with customers and suppliers can better support supply network responsiveness. This paper aims to investigate whether supplier network internationalization positively moderates the relationship between the adoption of SCI practices and responsiveness performance. This means that when companies rely on international suppliers the benefit on responsiveness of implementing SCI is expected to be greater.

The present study contributes to the advancement of theory by providing better understanding on the implementation of SCI practices in an international supply context, on the relationship between SCI and responsiveness performance and, in particular, on the conditions in which the implementation of SCI practices guarantees higher performance improvements. From a managerial perspective, this paper underlines the importance for organizations to understand that SCI integration can be a powerful approach to improving responsiveness, and that it is essential especially in case of international supplier networks. This represents the key contribution of the paper to the literature because, as pointed out by [O'Leary-Kelly and Flores \(2002\)](#) and [Wong et al. \(2011\)](#), the costs required to implement SCI create an urgent need to understand the conditions to maximize performance improvements. Therefore, this paper can be positioned in the research stream that refers to the seminal papers by [Cooper et al. \(1997\)](#), [Fisher \(1997\)](#), [Stock et al. \(2000\)](#) and [Choi and Hong \(2002\)](#), who suggest the adoption of a contingency approach to studying SCI practices, because the relationship between supply chain practices and performance is contingent upon how supply networks have been designed.

2. Literature review and research hypotheses

2.1. SCI definition

Over the years the attention of practitioners and scholars on integration practices between supply chain partners has significantly grown ([Olhager and Selldin, 2004](#); [van der Vaart and van Donk, 2004](#); [Wong and Boon-itt, 2008](#)). The intensification of global competition and the demand for better customer service have considerably increased the need for integration between companies. Consequently, SCI practices, aimed at coordinating processes along the supply chain, nowadays are considered important to maintain competitive advantage ([Selim et al., 2008](#)).

SCI is a broad concept related to the coordination across the network of production planning, inventory management and distribution activities ([Li et al., 2009](#)). The aim of integration is to create “seamless” supply chains with fully integrated upward information and downward material flows ([Towill, 1997](#)). Linking internal processes to external suppliers and customers is a prerequisite for success and a consensus among researchers exists concerning the strategic importance of integrating intra- and inter-organizational activities ([Vickery et al., 2003](#)). As underlined by [Stevens \(1989\)](#), SCI can be only achieved by progressing through various stages, as internal integration usually precedes external integration. In fact, to maximize companies' performance, it is not enough simply to coordinate the activities of different functional areas and internal structures within companies. Impressive results can be achieved by linking internal processes to external suppliers and customers along the supply network ([Sridharan et al., 2005](#)). For this reason upstream and downstream integration with suppliers and customers respectively has emerged as a crucial issue in manufacturing strategy ([Frohlich and Westbrook, 2001](#)).

In previous studies, researchers have advanced different definitions of SCI and measured it using different variables ([Nur-milaakso, 2008](#); [van der Vaart and van Donk, 2008](#); [Kannan and Tan, 2010](#)). Some authors have focused their analysis only on integration with customers ([Closs and Savitskie, 2003](#); [Fynes et al., 2005](#); [Sahin and Robinson, 2005](#)) or suppliers ([Humphreys et al., 2004](#); [Corsten and Felde, 2005](#); [Scannell et al., 2000](#); [Das et al., 2006](#)) in order to ascertain their distinct contribution to performance. Alternatively, in other studies, authors have taken a broader perspective by considering integration with both customers and suppliers ([Lee et al., 2007](#)), or defining SCI as a unique concept that includes both upstream and downstream integration ([Vickery et al., 2003](#); [Kim, 2006](#)). Integration with both customers and suppliers is commonly referred to as external integration. Finally, besides external integration, several studies consider also internal integration, which focuses on integration of activities within a firm ([Narasimhan and Kim, 2002](#); [Pagell, 2004](#); [Campbell and Sankaran, 2005](#); [Gimenez and Ventura, 2005](#); [Zailani and Rajagopal, 2005](#)).

Thus we argue that SCI can be ultimately described by two dimensions: external and internal integration. They are both important concepts to measure SCI that, although strictly connected, play different roles in the context of SCI ([Flynn et al., 2010](#)). External integration (EI) is the degree to which a manufacturer develops collaborative relationships and intimacy, exchanges information and jointly plans and coordinates supply chain activities with both suppliers and customers. This definition highlights the three key areas of activities scholars identified as underlying the external integration construct: i.e. customer–supplier cooperation/partnership, cross-organizational information sharing and inter-company coordination of plans/activities ([Narasimhan and Kim, 2002](#); [Gunasekaran et al., 2004](#); [Sahin and Robinson, 2005](#); [Swink et al., 2007](#)). Inter-

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