Journal of Operations Management 32 (2014) 51–63

Contents lists available at ScienceDirect

Journal of Operations Management

journal homepage: www.elsevier.com/locate/jom

Do a country's logistical capabilities moderate the external integration performance relationship?

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ARTICLE INFO

Article history:
Received 13 July 2012
Received in revised form 28 June 2013
Accepted 2 July 2013
Available online 20 July 2013

Keywords:
Supply chain management
Supply chain integration
Logistics
Performance

ABSTRACT

Companies have reacted to the opportunities and threats of globalization through numerous production practices that have increased supply chain complexity. One of the ways companies have been able to manage this increased level of complexity is by integrating their supply chains. Logistical capabilities at the company level play a key role in integrating global supply chains, but logistical capabilities need not be company specific. In this study we explore the role of a country's logistical capabilities in external supply chain integration. Our results indicate that plants situated in countries with superior levels of logistical capabilities adopt significantly lower levels of external supply chain integration. Additionally, plants situated in countries with superior logistical capabilities do not gain the same performance benefits from external integration as plants situated in countries with relatively low levels of logistical capabilities.

1. Introduction

Increasing levels of globalization have resulted in increased complexity in supply chains. This is evidenced by high levels of cross-border trade and the increasing number of multinationals operating subsidiaries, warehouses or production plants on multiple continents and in numerous countries (Rodrigues et al., 2005). It is suggested that to successfully manage this supply chain complexity companies should tightly integrate their supply chains (Flynn et al., 2010).

Previous literature has suggested that companies can gain significant performance benefits through integrating their supply chain (Frohlich and Westbrook, 2001; Lee et al., 1997; Narasimhan and Jayaram, 1998; Sanders, 2007, 2008; Shin et al., 2000; Vereecke and Muylle, 2006; Vickery et al., 2003). It has been established that integration between functions and organizations can lead to increased performance (e.g. Pagell, 2004), whereas a lack of integration can have negative effects on performance (Forrester, 1961; Frohlich and Westbrook, 2001; Lee and Billington, 1992).

However, many studies have failed to link integration to performance (see Flynn et al., 2010 and Schoenherr and Swink, 2012 for recent comprehensive reviews) and the more is better view of integration is not universally accepted. Since the early work of Kraljic (1983) on buyer–supplier relationships, a contingent view of supply chain integration has emerged which considers the moderating role of environmental factors on the supply chain integration and performance relationship. Researchers have considered environmental uncertainty, the competitive environment and other business conditions as important contingencies impacting on the performance benefits of supply chain integration (Fynes et al., 2004; Gimenez et al., 2012; van Donk and van der Vaart, 2004). Most of this literature has focused on factors internal to the chain, such as the strategic nature of the goods or services transacted, or factors in the chain's business environment such as competitive intensity and uncertainty. We extend this literature by considering how country-level factors can affect the need and efficacy of supply chain integration. Specifically, we study the effect of country-level logistical capabilities on firm level supply chain integration with customers and suppliers and investigate whether this country-level factor affects how firms integrate their supply chain.

Previous research has applied the Resource Based View (RBV) to justify the benefits of integration. RBV based arguments have been extended to include resources and capabilities that a firm may not own but has access to whether they lie in another firm or elsewhere (Dyer and Singh, 1998; Madhok, 1996). Firms have access to infrastructural and institutional resources of their host countries; resources that traditionally have not been studied by supply chain researchers.

We add to the existing understanding of external supply chain integration and logistics by focusing on country wide logistical

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http://dx.doi.org/10.1016/j.jom.2013.07.001

capabilities. Kinra and Kotzab (2008) have argued that in the age of global supply chains and international trade, infrastructural differences between countries have important implications and that these differences remain under-studied in the supply chain and logistics literature. We believe that globalization and the inherent cross-border trade make a country's logistical capabilities even more important for successful supply chain integration. Subsequently, this research sets out to investigate the following research questions:

1. Are plants choosing their degree of external supply chain integration based on their country's logistical capabilities?
2. Does a country's logistical capability moderate the impact of external supply chain integration on performance?

To explore the role of a country's logistical capabilities on supply chain integration and its efficacy we utilized multi-country data collected by the *International Manufacturing Strategy Survey* (IMSS). This data set was combined with data on countries' logistical capabilities based on the "*Logistical Performance Index*" (LPI) developed and measured by the International *Trade Department of The World Bank* (Arvis et al., 2010). The findings of this study are discussed in terms of policy, managerial and theoretical implications.

2. Theoretical background and hypotheses development

Recent studies show that researchers sometimes use the integration construct imprecisely (e.g. Flynn et al., 2010; van Donk and van der Vaart, 2004; van der Vaart and van Donk, 2008) which causes confusion since integration can be categorized along multiple dimensions (Flynn et al., 2010; Frohlich and Westbrook, 2001) and aspects (van der Vaart and van Donk, 2008; van der Vaart et al., 2012). First, integration has been subdivided into multiple dimensions, with many authors delineating between internal and external integration (e.g. Flynn et al., 2010). And external integration can be further divided into integration with customers and integration with suppliers (e.g. Frohlich and Westbrook, 2001). While some early research did not differentiate between internal and external integration, today most studies do (e.g. Flynn et al., 2010; Frohlich and Westbrook, 2001; Pagell, 2004; Schoenherr and Swink, 2012).

Integration has also been examined in terms of what aspects, practices or activities are engaged in (van der Vaart and van Donk, 2008; van der Vaart et al., 2012). van der Vaart and van Donk's (2008) review of the integration literature notes that integration research has covered a broad array of practices that range from the tactical sharing of delivery information to strategic activities such as new product development. Ahmed and Pagell (2012) further refine these ideas by noting that partners in a supply chain can engage in coordinative and/or collaborative integration activities. Coordinative integration includes synchronization, planning, and alignment of activities involving the production and flow of goods and services while collaborative integration involves shared action to improve processes and exploit resource complementarities allowing partners to benefit from each other's knowledge bases by jointly creating new knowledge and innovations (Ahmed and Pagell, 2012).

Vereecke and Muylle (2006) and van der Vaart et al. (2012) are two of the few empirical papers that explicitly divide integration into specific aspects. Vereecke and Muylle (2006) examine information exchange and structural collaboration while van der Vaart et al. (2012) examine "planning information" and "joint improvement". The information exchange/planning information aspect of integration involves *coordinating* the flow of materials, money and information along the supply chain while the structural collaboration/joint improvement aspect is much more about *collaborating* to make improvements in products and processes. Coordination of flows tends to be what most previous research measured (e.g. Frohlich and Westbrook, 2001) with Flynn et al.'s (2010) measure of internal integration being one of the few that captures both coordination and collaboration.

Not only is integration a multi-dimensional construct, but the relationship between integration and performance is context dependent (Wong, 2011). Previous research has tended to look at business factors (van der Vaart et al., 2012; Welker et al., 2008) and country-level factors have been neglected. However, a close analysis of the results of different papers seems to show that country-level factors could explain previous mixed results. Flynn et al. (2010) and Robb et al. (2008) found support for the customer integration–performance relationship in China while Swink et al. (2007) and Devaraj et al. (2007) did not in U.S. samples. Flynn et al. (2010) commented, "although their research provided some interesting findings about the relationship between supply chain integration and performance in China, it is not clear whether these relationships will be the same in other countries" (Flynn et al., 2010, p. 67).

Operations management and supply chain research has often considered the impact of country culture on global operations and supply chains (Cai et al., 2010; Naor et al., 2010; Power et al., 2010). However culture is not the only important difference between countries. As the global competitiveness report from the World Economic Forum points out, different countries' investments in infrastructure and institutions lead to differences in the supporting environment for firms in those countries (The Global Competitiveness Report, 2011).

In this paper, we study the effect of country-level logistical capabilities on the integration–performance relationship. Logistical capability is generally defined in terms of managing flows of materials and information (Mentzer et al., 2004; Stank et al., 2005; Zhao et al., 2001) and does not include activities related to product, process or supply chain design, joint innovation, new knowledge creation, or the creation of supply chain strategy. Logistical capability is then concerned with coordinative (planning information) not collaborative (joint improvement) integration activities.

Our study then only covers the coordinative aspects of integration and not the collaborative aspects. In addition, while some studies (Flynn et al., 2010; Schoenherr and Swink, 2012) suggest that it may be the interaction of internal and external integration that explains performance, our data set is limited to only measures of external integration which is a limitation, though not a major one since logistical flows tend to be between chain members.

In this study supply chain integration is defined as the extent to which a company interconnects and aligns its supply chain with its partners (Jayaram et al., 2010; Schoenherr and Swink, 2012) to manage supply chain flows to reduce costs, improve on-time delivery, reduce lead-times and improve flexibility. Our specific interest is in the coordinative aspect of external integration, interconnecting and aligning with suppliers and customers to manage flows of materials and information. To be clear as to what aspects of integration this study does/does not cover, for the remainder of the paper we will use the term coordinative external integration (CEI) when discussing our specific area of study and the more generic integration when discussing general results from other papers.

2.1. Supply chain integration and performance – the traditional view of integration as a universal best practice

Integration between members of a supply chain requires the adoption of practices such as joint planning and forecasting (Frohlich and Westbrook, 2001) as well as investments in the relationship (e.g. Johnston et al., 2004) and technology (Das et al., 2006).