



Antecedents to supplier integration in China: A partial least squares analysis

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ABSTRACT

The aim of this paper is to identify antecedents to supplier integration in China. A deductive approach was deployed by building on a qualitative pre-study and various strands of SCM literature. All in all, 14 hypotheses were derived and subsequently tested by drawing on an empirical sample collected from 88 manufacturing firms operating in China. The data was then analyzed using partial least squares (PLS) analysis. The results indicated that supplier integration was positively influenced by collaborative supplier capabilities, continuous supplier development, and supplier quality mindset. These in turn proved to be sequentially influenced by supplier top management support, buyer-side leadership effectiveness and internal support.

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1. Introduction

Without doubt, China has become the most important supplier market in the world over the last decades. The high political stability, comparatively low economic uncertainty, and low comparative price levels have all contributed to attractiveness of the country (Eltschinger, 2007; Qu and Brocklehurst, 2003). At the same time, the degree of outsourcing in most industries has increased over time, leading to an increased dependency on supplier's for value creation (Quesada et al., 2006; Tiemann et al., 2000; Wagner et al., 2008). Besides freeing up resources, reducing assets on the balance sheet and creating a more flexible and agile organization, product complexity today makes it virtually impossible for individual firms to possess all the technical expertise and capabilities needed to develop and produce products and services (Binder et al., 2007; Wagner et al., 2008; Wolters and Schuller, 1997). In order to avoid excessive transaction costs when outsourcing business activities, companies nowadays try to get the best from both worlds by creating "a virtually integrated enterprise" (Browne and Zhang, 1999) where relatively independent parts of the value chain can work in sync. In the quest for synchronization of business processes, supplier integration has become a critical element. In order to better tap into the Chinese supplier base, companies increasingly try to integrate more domestic suppliers into their global supply chains.

However, both anecdotal and empirical evidence (Lockström et al., 2010; Murray et al., 2004; Pyke et al., 2000; Wilkinson et al., 2005) indicate that many foreign companies in China are experiencing difficulties in sourcing strategic supplies from domestic suppliers and in forming long-term partnerships with them. In China, these difficulties seem to be more frequent in industries that are characterized by high requirements on quality, delivery and intellectual property protection (Holweg et al., 2005; Zhang and Chen, 2006).

The goal of this paper is to test and validate existing theory on supplier integration within the specific context of the Chinese business environment by analyzing empirical data gathered through a quantitative research methodology. More in-depth, the paper aims at answering the following research questions:

- How can buyers and suppliers operating in China collaborate more effectively?
- What are the antecedents to supplier integration in a Chinese business context?
- How do buyer- and supplier-related factors interplay as antecedents?

2. Literature review

This paper adheres to several existing theories relative to *supplier integration* (SI) and *supply chain integration* (SCI) (Bowersox et al., 1999; Malhotra et al., 2008).

2.1. Definitions of central terms

SCI is defined by Bowersox et al. (1999) as the simultaneous orchestration of four critical flows: product/service, market

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accommodation, information, and cash within and across companies. For this paper, SI is defined as a subset of SCI specifically focusing on the upstream part of the supply chain. Moreover, SI is defined as a practice that links externally performed work of the supplier into a seamless congruency with internal work processes (Bowersox et al., 1999). The unit of analysis in this paper is represented by collaborative buyer-supplier relationships, within which supplier integration is manifested and observed.

2.2. Problem definition and motivation of research

Many industries today are characterized by a high degree of value added by suppliers in manufacturing (Quesada et al., 2006; Tiemann et al., 2000; Wagner et al., 2008), which strongly suggests the implementation of collaborative approaches (Goffin et al., 2006; Paulraj and Chen, 2007; Takeishi, 2001; Zhang et al., 2009). In many industries, key suppliers have taken on an increasing level of responsibility for developing and producing components rather than simply making predesigned parts (Petersen et al., 2004; Pil and Holweg, 2004; Quesada et al., 2006). As a consequence, the purchasing function in a company has become increasingly strategic and capable of generating competitive advantage through effective supplier management (Möller and Törrönen, 2003; Narasimhan and Das, 2001; Ulaga, 2003; Watts et al., 1995).

Furthermore, earlier research has shown that factors such as cost, quality, and innovation are determined very early in the product development phase (Binder et al., 2007; Zirpoli and Caputo, 2002). A high degree of collaboration during the product development phase is needed in order to manage complexity which in turn affects quality, cost, innovativeness, and product variety (Takeishi, 2001; Tang and Qian, 2007). Furthermore, a common rule of thumb suggests that 80 percent of product costs are locked in during the first 20 percent of the product life cycle (Buchta et al., 2007). As a result, companies manufacturing complex products in particular (e.g., automotive, airplane, electronics) have deployed joint product development (Binder et al., 2007; Hsuan, 1999; Quesada et al., 2006) and joint production planning activities with suppliers (Bennett and O'Kane, 2006; Doran, 2003; Holweg and Pil, 2007) as a means to increase the competitiveness of their own companies as well as that of the whole supply chain networks within which they exist.

Collaborative production planning processes with suppliers lead to reduced inventory, capacity costs and shortened lead times (Doran, 2003; Parker et al., 2008; Tu et al., 2004). Furthermore, as a shift from make-to-stock to make-to-order strategies can be recognized in many industries such as automotive (Gunasekaran, 2004), synchronized production processes across the supply chain have shown to deliver high efficiency and operational performance (Bennett and O'Kane, 2006; Doran, 2004; Reichhart and Holweg, 2007). In order to facilitate these concepts, the material flow must be anticipated by a flow of highly accurate, timely, and reliable planning information (Cachon and Fisher, 2000; Krajewski and Wei, 2001; Stefansson, 2002). Finally, as more and more product parts are developed by suppliers independently or jointly between the buyer and supplier, the involvement of suppliers in this area is of high importance (Wagner et al., 2008). Put simply, supplier integration is a way for companies to reduce production cost and increased flexibility through outsourcing, while reducing transaction costs through stronger supply chain relationships—in other words, minimizing the trade-off between transaction costs vis-à-vis production costs as stipulated by transaction cost theory (Coase, 1937; Williamson, 1975, 1979, 1985).

As of today, researches on supplier integration have mostly been of descriptive nature in a Western context (Paulraj et al.,

2008). Hence, this research has failed to explain how to drive supplier integration, especially in countries like China where Confucianism has a strong impact on the nature of relationships and their pivotal role in society. Lee and Humphreys (2007), Yeung et al. (2009). Although most prior researches have been conducted through empirical data based on case studies or surveys, the topic still largely remains unexplored or is not supported by reliable empirical evidence (Goffin et al., 2006). In sum, research on supplier integration in the Chinese automotive industry is relatively scarce. An overview of existing related literature is shown in Table 1. Hence, this motivates the development of a novel framework that can capture idiosyncratic aspects of China, without overly relying on existing theories.

Cai and Yang (2008), Robb et al. (2008), Pyke et al. (2000), Zhao et al. (2008), Lockström et al. (2010) are some examples of studies that have focused on supply chain related topics in China in the past.

3. Conceptual framework and hypotheses

The research model in this paper is based on several existing theories relating to *supply chain integration* (SCI) of which SI is defined as a subset belonging to the upstream part with respect to a focal firm. As discussed earlier, SI can be derived from the concept of supply chain integration (Bowersox et al., 1999; Malhotra et al., 2008; Zaheer and Venkatraman, 1995). In analogy to Möller and Törrönen (2003), buyer-supplier relationships affect the *efficiency* function, i.e., the efficacious use of current resources and the *effectiveness* function, i.e., a buyer's and supplier's ability to collaboratively invent and produce solutions that provide more value to customer than existing offers. In this paper, a taxonomy similar to earlier studies by Malhotra et al. (2008) and Bowersox et al. (1999), comprising operational, strategic, and financial integration was adopted after deployment of a pre-study to examine the applicability in China.

Operational Integration (OI) is the linkage of systems and operational interfaces (Bowersox et al., 1999) and relates to what Möller and Törrönen (2003) call the core value of a product, i.e., the transaction-oriented production and delivery of products and services, process excellence and short-term flexibility. OI has a short-term focus and captures day-to-day business activities such as information sharing. Activities related to OI interlink with the collaborative production planning processes through the exchange of accurate, relevant and timely information (Wilson and Viosky, 1997). Its importance has been acknowledged in earlier studies, with improvements in long-term cost, delivery and quality (Cousins and Menguc, 2006; Das et al., 2006; Lawson et al., 2006; Paulraj and Chen, 2007).

Strategic Integration (SI) implies strategic alignment of value creation processes with supply chain partners and to collaborate with them at a strategic level (Bowersox et al., 1999). In order to elaborate this definition in the context of this paper, SI is defined as joint activities in the field of product development, supply chain network and capacity planning, but also the ability of the buyer and supplier to share new ideas and facilitate innovations leading to solutions that provide more value to the customer than existing ones (Malhotra et al., 2008; Moser, 2007; Teece et al., 1997).

Financial Integration (FI) is defined as the extent to which buyers and suppliers jointly invest into common projects (Malhotra et al., 2008). It is argued that by these investments into relationship-specific assets, a higher level of commitment can be achieved (Stank et al., 2001). According to some researchers, commitment is usually manifested as the investment into

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