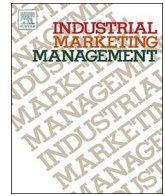




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## The effects of buyer-supplier's collaboration on knowledge and product innovation

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### ABSTRACT

Drawing on marketing and management literature, this study investigates integration mechanisms between channel members. Specifically, the research framework is built upon the buyer-supplier gray-box integration approach, knowledge-based view, and agency theory. This study identifies and compares the effects of two gray-box integration mechanisms, namely supplier task involvement and joint planning, on two kinds of knowledge acquisition. I find that both supplier task involvement and joint planning positively influence manufacturers' product knowledge acquisition and end customer knowledge acquisition. Supplier task involvement has a stronger effect on knowledge acquisition than joint planning. The relationships between integration mechanisms and knowledge acquisition are contingent upon supplier incentives. Furthermore, this study also extends the literature by comparing the effects of two different kinds of knowledge on product innovation performance. Even though both product and end customer knowledge lead to better product innovation performance, end customer knowledge has a stronger effect than product knowledge on product innovation performance. Theoretical and managerial implications are discussed at the end.

### 1. Introduction

Channel collaboration is a topic of interest to both management and marketing researchers. Closely integrated relationships between manufacturers and their channel partners enable firms to gain competitive advantage (Hoegl & Wagner, 2005) and help foster innovation (Inemek & Matthyssens, 2013). Manufacturers can reduce costs and product cycle times as well as improve product quality by working closely with their suppliers (Ragatz, Handfield, & Petersen, 2002; Ragatz, Handfield, & Scannell, 1997). Recently, suppliers, like customers, have come to be regarded as key to successful innovation (Inemek & Matthyssens, 2013). Companies gain competitive advantages by using suppliers' resources, skills, capabilities, and especially their design acumen. Past research on interfirm collaboration and innovation has been well established. For example, different governance mechanisms such as relationship norms have been found to influence interfirm innovations (Mooi & Frambach, 2012). Other factors, such as unilateral governance (Wang, Bradford, Xu, & Weitz, 2008), behavior and output control (Sivakumar, Roy, Zhu, & Hanvanich, 2011) and alliance portfolio (Cui & O'Connor, 2012) have been found to influence interfirm innovation generation. However, there are some research gaps in regarding supplier integration and new product innovation.

First, prior research on supplier integration has focused primarily on operational performance, linking supplier integration with operational

achievement (Hoegl & Wagner, 2005; Rothaermel, Hitt, & Jobe, 2006). However, in many industries, manufacturers have given suppliers increasing responsibility for product design, development, and engineering techniques (Wynstra, Van Weele, & Weggemann, 2001). One study showed that automobile manufacturers were able to bring new cars to market faster, with more innovative features, and with less effort by working closely with their suppliers (LI, 2009). Collaboration between business partners is key to knowledge maximization and product innovation because acquiring external resources and knowledge helps firm survive and grow (Batt & Purchase, 2004). For example, Toyota has formed a supplier association to encourage information sharing, and the company holds social events to bring its suppliers together (Gulati, Wohlgezogen, & Zhelyazkov, 2012). The auto manufacturer encourages its suppliers to make frequent small-lot deliveries in order to promote the exchange of production, technical and logistics information (Marksberry, 2012). Toyota's collaboration with its suppliers fosters strong long-term supplier relationships and contributes to the company's reputation as a preferred partner. Yes, the relationships among integration mechanisms, knowledge acquisition and product innovation are unclear.

Second, relationships between manufacturers and suppliers require special attention when manufacturers attempt to integrate with their suppliers (Gulati, 2013). The integration literature suggests that there are gray-box and black-box integrations between manufacturers and

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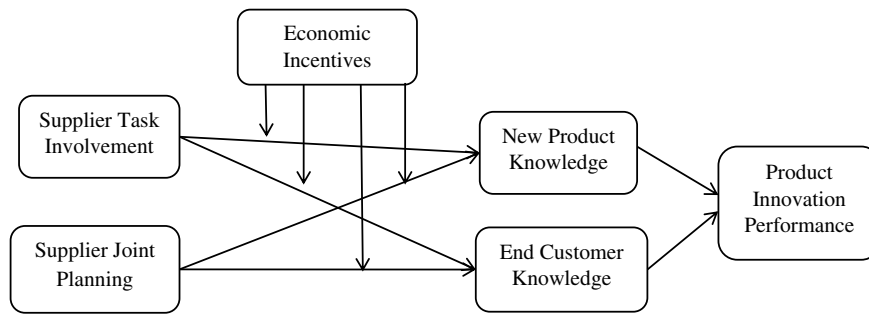


Fig. 1. The benefits of supplier coordination.

suppliers in the new product development (NPD) process (Koufteros, Cheng, & Lai, 2007; Petersen, Handfield, & Ragatz, 2005). In the gray-box integration, suppliers work with the manufacturer's team members on joint product development and joint decision making. In a black-box integration, suppliers work on their own to fulfill the manufacturer's specifications. The gray-box integration mechanism has been found to facilitate knowledge transfer and product innovation; however, the effect of black-box integration is negligible (Koufteros et al., 2007; Le Dain & Merminod, 2014). Prior studies addressed only the difference between gray-box and black-box integration (Koufteros et al., 2007; Petersen et al., 2005) and there is little extant research that looks into the integration mechanisms within the gray-box realm. Such that research did not identify and differentiate the integration mechanisms within the gray-box realm which might lead to different types of knowledge acquisition.

Third, even though prior research studies have established the links between supplier integration and innovation and performance, the results are mixed. Some studies found that supplier integration can facilitate the speed of product development, improve product quality, and reduced production costs (Lau, Tang, & Yam, 2010; van Echtelt, Wynstra, van Weele, & Duysters, 2008). Other research study found that supplier integration may incur coordination cost and put the firms' valuable knowledge at risk (Wagner & Hoegl, 2006). The mix results may due to some boundary conditions.

This study makes a few contributions by filling the research gaps mentioned above. First, even though prior studies have linked the gray-box integration with knowledge transfer, they did not differentiate the integration mechanisms. In this study, I identify and differentiate two types of integration mechanisms in the gray-box domain, i.e., supplier task involvement and joint planning, that can help manufacturers in the areas of knowledge acquisition and product innovation. Supplier task involvement refers to upstream suppliers that are invited to participate in manufacturers' product development processes (Petersen, Handfield, & Ragatz, 2003). Supplier joint planning is the proactive collaborative setting of goals and tasks with respect to manufacturers' product planning processes (Claro & Claro, 2010).

Second, this study compares and tests the effects of the two collaboration mechanisms on product and end customer knowledge acquisition. Although prior research indicates that gray-box integration facilitates knowledge transfer or sharing (Koufteros et al., 2007; Le Dain & Merminod, 2014), it does not differentiate the varying effects on different kinds of knowledge acquisition. Because supplier task involvement is relatively general in nature and joint planning is usually quite specific, they affect the acquisition of different kinds of knowledge in varying ways.

Third, prior research studies have not endeavored to differentiate the effects of product and end customer knowledge on product innovation performance. Only a few studies have investigated the differing nature of customer and product knowledge (De Luca & Atuahene-Gima, 2007; Rindfleisch & Moorman, 2001), and none has differentiated their effects on new product development. This study empirically tests and compares the effects of product knowledge and

end customer knowledge on product innovation performance. Product innovation performance refers to a firm's ability to adopt new ideas, product and processes successfully (Paladino, 2008). I investigate and compare the effects of product and end customer knowledge on product innovation performance.

Fourth, this study incorporates economic incentive as a formal governance mechanism and investigates how it interacts with supplier integration mechanisms on knowledge acquisition. Traditionally, by working with upstream suppliers, manufacturers endeavor to cut costs and improve delivery performance (Hoegl & Wagner, 2005; Rothaermel et al., 2006). However, suppliers are increasingly being regarded as important sources of innovation both in academic research and in business practice (Fließ & Becker, 2006). Therefore, it is important to identify the circumstances under which suppliers are most willing to collaborate with manufacturers in the product development process.

This research framework (Fig. 1) is built upon three theoretical foundations, i.e., the gray-box supplier integration literature, the knowledge based view (KBV) and agency theory, and investigates the effects of two distinct manufacturer/supplier integration mechanisms on two different kinds of knowledge acquisition. It also looks at the contingent effects of economic incentives provided by manufacturers to suppliers. Importantly, this study distinguishes between the effects of product knowledge and end customer knowledge on product innovation performance.

## 2. Theoretical background

### 2.1. Gray-box integration and innovation

New product development (NPD) is a firm's ability to introduce new products or features and is a key competitive advantage (Koufteros et al., 2007). NPD increasingly relies on knowledge and technical skills acquired from external resources, such as upstream suppliers and downstream customers (Le Dain & Merminod, 2014). By involving suppliers in product development, manufacturers can maintain focus on building their own core capabilities while depend on the complementary resources of their suppliers (Handfield & Nichols, 2002). As manufacturers turn more and more to their suppliers for knowledge (Wang, Li, & Chang, 2016), supplier integration becomes a critical factor for product innovation performance as well as knowledge acquisition. An intense competitive environment forces firms to continuously innovate and innovation requires firms to integrate internal and external resources to create new knowledge. A firm's capabilities and resources, as well as its organizational learning, influence its innovation processes and outcomes (Crossan & Apaydin, 2010). This study focuses on how manufacturers can acquire knowledge from suppliers by working with them through two gray-box integration mechanisms.

The gray-box approach is a basic form of supplier involvement in product development, and it requires suppliers and manufacturers to work together (Koufteros et al., 2007; Petersen et al., 2005). In this approach, suppliers contribute information and suggestions to the

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