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Do resource differences between manufacturers and suppliers help or hinder product innovation of manufacturers? The moderating role of trust and contracts☆

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ABSTRACT

It is a common practice of manufacturers to involve suppliers in new product development (NPD). Extant literature indicates that supplier integration has mixed effects on manufacturers' NPD and the contradicting findings result from either the external contingent factors or the tactical integration practices. We argue instead that the mixed effects are rooted in resource differences between manufacturers and suppliers. Further, we examine the functions of trust and contracts as the resource integration and coordination mechanisms to manage the effects of resource differences on product innovation of manufacturers. Based on a survey among 189 manufacturing firms, our research shows that resource differences follow an inverted U-shaped effect on product innovation of manufacturers and that trust strengthens while contract complexity attenuates the curvilinear relationship. As such, our research extends the existing body of literature to account for the divergent outcomes of supplier integration from the perspective of resource differences. Moreover, it demonstrates the double-edged effects of trust and contracts as devices of resource integration and coordination. Our research offers useful research and managerial implications.

1. Introduction

Product innovations, the hallmark of value creation (Cooper, 2011), build on a variety of firm resources. Integrating suppliers' resources is a common approach adopted by manufacturers to develop innovations (Song & Di Benedetto, 2008). As manufacturers routinely involve suppliers in new product development (NPD), extant literature has observed increasing research attentions to this popular strategy in supply chain. Some studies report an array of benefits accruing from extensive collaboration with the right suppliers, which facilitates manufacturers to shorten NPD time and reduce costs, and improve new product quality and performance (Handfield, Ragatz, Petersen, & Monczka, 1999; Petersen, Handfield, & Ragatz, 2003; Song & Di Benedetto, 2008; Wynstra, van Wheele, & Weggemann, 2001). However, others uncover either relatively little influence or even a negative effect of supplier involvement, thus questioning the unconditional benefits of involving suppliers in NPD of manufacturers (Das, Narasimhan, & Talluri, 2006; Eisenhardt & Tabrizi, 1995; Koufteros, Cheng, & Lai, 2007; Primo & Amundson, 2002).

To resolve the inconsistent findings, scholars propose the contingency approach and explore a set of contingent factors to account for the differential effects of supplier integration, such as technological uncertainty, supplier integration modes, costs of integration practices, and internal integration of manufacturers (Das et al., 2006; Koufteros, Vonderembse, & Jayaram, 2005; Koufteros et al., 2007; Perols, Zimmermann, & Kortmann, 2013; Petersen, Handfield, & Ragatz, 2005; Primo & Amundson, 2002; Wagner & Hoegl, 2006). While prior research yields rich insights that help us better understand the functions of supplier integration and the conditions of its success, several closely related, important strategic issues remain to be solved.

First, resource differences constitute the source of a tension in supplier integration that influences the outcomes of involving suppliers. On the one hand, manufacturers must integrate complementary resources of suppliers in order to create value. But, resource complementarity requires adequate resource differences between alliance partners in the first place (Das & Teng, 2000; Kim & Finkelstein, 2009). On the other hand, resource differences foment conflicts and create impediment to value creation in alliances (Lavie, Haunschild, & Khanna, 2012; Parke, 1991). For example, the differences in organizational system, structure, and culture between GM and Toyota prevented the former from transferring and implementing the lean manufacturing

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system of the latter (Inkpen, 2005). The mixed role of resource differences in value creation creates a trade-off in integrating suppliers, which could possibly account for the divergent impacts of supplier involvement. However, extant literature primarily focuses on those contingent variables that are either external to supply chain transactions (e.g. technological uncertainty) or occur *ex post* from the transactions (e.g. integration practices); relatively little attentions have been directed to the intrinsic forces of resource differences that exist *ex ante* but can affect the effectiveness of integrating suppliers in manufacturers' NPD. This gap raises our first research question: Do resource differences between manufacturers and their suppliers help or hinder manufacturers' product innovation?

Second, successful supplier integration requires governance mechanisms that structure a quality relationship and manage the transaction between manufacturers and suppliers (Burkert, Ivens, & Shan, 2012; Liker & Choi, 2004; Monczka, Handfield, Scannell, Ragatz, & Frayer, 2000; Wynstra et al., 2001). Trust and contracts are the regularly used mechanisms representing the informal and the formal approaches respectively to counteract opportunism and minimize transaction costs (e.g. Dyer & Chu, 2003; Lui & Ngo, 2004; Poppo & Zenger, 2002). Extending this traditional view, an emerging research stream brings attentions to functions of trust and contracts in resource exchange between buyers and suppliers (Cousins & Menguc, 2006; Mellewigt, Madhokb, & Weibel, 2007; Villena, Revilla, & Choi, 2011; Zhou, Zhang, Sheng, Xie, & Bao, 2014). For example, while previous studies emphasized the benefits of trust in facilitating resource sharing (Kale, Singh, & Perlmutter, 2000; Uzzi, 1997), Zhou et al. (2014) argued that a high level of trust reduces buyers' incentive and cognitive capabilities to search and process useful information from suppliers. Also, Mellewigt et al. (2007) theorized that contracts serve as a coordination device to integrate resources for value creation across organizational boundaries, whereas Faems, Janssens, Madhok, and Van (2008) found in a case study that complex contracts resulted in strict task division that limits inter-firm resource sharing.

Therefore, the evidence is not quite so clear as to whether trust and contracts are instrumental or detrimental for manufacturers to manage the resource differences with their suppliers in value creation. Extant literature with a narrowed focus on the tactical integration approaches in supply chain, such as adoption of information systems and joint meetings with suppliers (Das et al., 2006; Petersen et al., 2003), neglects the role played by trust and contracts as the resource integration and coordination mechanisms in supply chain. This gap raises the second research question: How do trust and contracts regulate the effects of resource differences on manufacturers' product innovation?

This paper seeks to address these questions and advance knowledge regarding the relationships between resource differences, trust and contracts, and value creation in supply chain.[1] Our study contributes to extant literature in two major ways. First, we find that resource differences between suppliers and manufacturers follow an inverted U-shaped effect on product innovation of manufacturers, suggesting that resource differences have differential impacts on the effectiveness of involving suppliers in manufacturers' NPD. In this sense, our research weighs in on current debate about supplier integration and account for the divergent outcomes of integrating suppliers from the perspective of resource differences. Second, we find that trust magnifies whereas contract complexity attenuates the inverted U effect of resource differences on product innovations, revealing the boundary conditions for the curvilinear effect of resource differences and demonstrating the double-edged role of trust and contracts in managing resource differences for value creation.

[1] It is worth noting that our study does not focus on the specific practices of supplier involvement per se or examine how the level of supplier involvement influences manufacturers' product innovation. Instead, this paper focuses on the effects of resource differences between the two parties *given* that suppliers are involved in the manufacturers' NPD.

2. Theoretical background and hypotheses

According to the resource-based view of alliances, each partner firm represents a bundle of distinctive resources, which can be classified into property-based and knowledge-based resources and capabilities, such as financial assets, physical resources, human resources, management skills, operational routines, knowledge, culture, and so on (Das & Teng, 2000). In supply chain, successful collaboration between suppliers and manufacturers requires sharing of these physical and intellectual assets (Faems et al., 2008; Petersen et al., 2003; Ragatz, Handfield, & Scannell, 1997). The integrative bundle of resources forms an inseparable, holistic organizational system (Miller, 1996). Therefore, we consider firm resources as a holistic bundle comprised of distinctive components, and examine the differences between resource bundles of supply chain partners, instead of differences between individual resource components.

Resource differences between partners are the imperative condition for creating the synergy of complementarity from inter-firm collaboration (Das & Teng, 2000; Sarkar, Echambadi, Cavusgil, & Aulakh, 2001). Resources of partner firms are considered complementary if the return on resources of one firm increases in combination with resources of its partner (Malhotra & Mackelprang, 2012; Milgrom & Roberts, 1995). Thus, a focal firm can create synergy based on resource complementarity by leveraging the strengths of a partner's resources to compensate for the weaknesses of its own (Dyer & Singh, 1998; Fang & Zou, 2009). Resource complementarity essentially derives from differences in resource bundles between alliance partners (Harrison, Hitt, Hoskisson, & Ireland, 1991; Kim & Finkelstein, 2009). When resource bundles of partner firms are similar, an alliance is formed primarily to achieve economy of scale, share costs, or reduce excess capacity, without much resource acquisition and synergy to happen (Dussauge, Garrette, & Mitchell, 2000). As resource differences grow, it is more likely that resources of partner firms are complementary to each other (Das & Teng, 2000; Harrison et al., 1991; Kim & Finkelstein, 2009).

On the other hand, resource differences set up barriers to recognition and integration of complementary resources as needed for synergy creation (Fang, 2011; Madhok & Tallman, 1998), because it requires certain degree of overlap in resource bundles to recognize and integrate complementary resources. Given that a resource bundle evolves from organizational experiences, it embodies knowledge that informs the value of individual resource components when used in connection with others (Miller, 1996; Sigglekow, 2002). A similar resource base provides a frame of references or a shared basis of understanding that enables comprehension and appreciation of the value of different resources (Ho & Ganesan, 2013). For example, Lane and Lubatkin (1998) found that the similarity between partner firms' knowledge bases, organizational structures and compensation practices enables recognition and assimilation of valuable knowledge resource of partners. With overlapping resources and capabilities, firms share experience and expertise related to usage of common resources; thus, they can communicate in common languages, which facilitate them to understand the value of their partners' distinctive resources and capabilities connected with the shared resource base (Ho & Ganesan, 2013; Rindfleisch & Moorman, 2001).

When resource overlap is weak, it would be difficult to identify and assimilate complementary resources from partners. For example, Toyota and General Motors (GM) formed a joint venture in which GM attempted to learn Toyota's lean manufacturing but encountered difficulty to transfer and implement the cost-efficient production routine that was embedded in Toyota's integrated system, because the enormous differences between Toyota and GM (such as in organizational culture, system, and structure) inhibited understanding of why lean manufacturing would work and how GM could benefit from this technique. Later, GM built the requisite redundancy into its learning process, which enabled frequent dialogue to achieve collective understanding of the value of lean manufacturing (Inkpen, 2005).

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