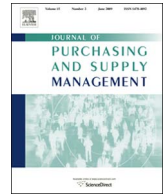




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A theory of supplier network-based innovation value

Tingting Yan^{a,*}, Sophie Yang^b, Kevin Dooley^b^a Department of Marketing & Supply Chain Management, School of Business Administration, Wayne State University, 5201 Cass Ave., Detroit, MI, 48202, USA^b Department of Supply Chain Management, W. P. Carey School of Business, Arizona State University, 300 E Lemon St, Tempe, AZ 85287, USA

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ABSTRACT

To understand how a supplier helps a buying company create value through innovations, studies have focused on a supplier's internal resources or its relationship with a buying company. Building upon this body of literature, we develop a theory of supplier network-based innovation value in this conceptual paper. This theory explains how a supplier's upstream and downstream value network can be a source of competitive advantage for a buying company. Specifically, it proposes that the levels and types of supplier innovation value is contingent on the configuration of a dual-ego value network, characterized by the locus and degree of buyer-supplier structural equivalence. This theory also explains how a supplier's ties with a buying firm's competitors can pose both opportunity and risk to buying company innovation. This theory contributes to the literature by showing when "seemingly undesirable" suppliers, due to a lack of technical capability or strong relationship with a buying company, might still be valuable to a buying company's innovation.

1. Introduction

Buying firms increasingly rely on the competencies and resources of their suppliers to better innovate (Calvi, 2012; Narasimhan and Narayanan, 2013). Suppliers can create value for customers by providing or bringing awareness of creative solutions that satisfy customers' needs (Johnsen, 2009; J. Kim et al., 2014). In a recent survey, 83% of responding companies either had or are planning to have formal supplier innovation programs in place so as to capture valuable ideas and information from suppliers (Jennings, 2015). Given the limited relational resources that a firm has, it is important to know which suppliers have more potential to provide innovation value (Schiele, 2006; Smals and Smits, 2012; Tracey and Neuhaus, 2013; Wynstra et al., 2003).

The resource-based view (RBV) has been used to suggest that a supplier's innovation value comes from its internal firm resources (Sjoerdsma and van Weele, 2015). Extending this RBV perspective to a dyadic context, the relational view suggests that a supplier could be valuable due to its particular type of relationship with the buying firm (Dyer and Singh, 1998). In the natural RBV model (Hart, 1995), a supplier could provide value due to its access to natural, physical resources such as water or land. A network-based RBV perspective argues that both shared and non-shared resources in alliance networks can produce competitive advantages for alliance partners (Lavie, 2006). In sum, these studies suggest that when searching for innovation partners, buying firms to look for suppliers who are technically capable,

who are similar to them, and with whom they have strong relationships.

However, as recent research indicates, suppliers with whom the buying firm has a weak-tie relationship may be valid or even preferred sources for innovative ideas (Kim and Choi, 2015). A network embeddedness perspective suggests that economic transactions are influenced by other social ties that the exchange parties possess (Uzzi, 1997). Because inter-firm interactions are embedded in the broader inter-organizational networks (Choi and Kim, 2008; Rowley et al., 2000), it is important to go beyond a single node or a dyad and adopt a network perspective for studying innovation (Arlbjørn and Paulraj, 2013; Arlbjørn et al., 2014; Narasimhan and Narayanan, 2013). A network perspective suggests that innovation value can be created by the supplier's value network, composed by its downstream demand network and its upstream supply network. As the saying goes, you don't just marry your partner, you marry their family too.

Therefore, this study attempts to answer one research question: *How does a supplier's value network influence a buying company's innovation?* To answer this question, we develop a theory of supplier network-based innovation value, which proposes a supplier's network as an innovation resource for a buying company. The theory is developed in a context of a dual-ego network, where a supplier and a buying company are the two egos with ties to their customers and suppliers. In this case, we are able to (1) consider supplier ties both within and outside a buying firm's supply network, and (2) focus on the interrelationships between the buying company and supplier value networks (Bellamy et al., 2014; Gao et al., 2015; Yan et al., 2014). In this dual-ego network context, we

* Corresponding author.

E-mail addresses: Tingting.Yan@wayne.edu (T. Yan), Yang.Yang2@asu.edu (S. Yang), kevin.dooley@asu.edu (K. Dooley).<http://dx.doi.org/10.1016/j.pursup.2017.02.002>Received 7 March 2016; Received in revised form 7 December 2016; Accepted 21 February 2017
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develop a two by two typology of supplier innovation value, which differentiate suppliers by both *levels* and *types* of innovation value to a buying company.

Theoretically, this paper contributes to the literature in several ways. First, our theory contributes to the inter-organizational innovation literature by defining and categorizing supplier innovation value, a concept that is not well understood. Second, in a dual-ego network context, we identify buyer-supplier structural equivalence as a factor, in addition to firm- and dyad-level factors, that affects the supplier's innovation value. Finally, our theory contributes to the interorganizational value creation literature by explaining how buyer-supplier structural equivalence could be associated with different types of innovation value that a supplier could contribute to a buying company (Ulaga, 2003; Walter et al., 2001). Managerially, our theory suggests that, when selecting suppliers for innovation, a buying company need to evaluate a supplier's relationships with other organizations, besides considering supplier internal resources and its relationship with the supplier. When developing suppliers, a buying firm may also consider incentivizing a supplier to establish new ties, and/or prune, graft and close existing ties to increase supplier innovation value (Hernandez et al., forthcoming). Understanding that suppliers could differ both quantitatively and qualitatively in innovation value, a buying company needs to ensure a match between supplier innovation value and its innovation needs in order to maximize value creation through supplier involvement in innovation.

The paper is organized as follows. In the next section, we review literature concerning how a firm's ego network influences its own innovation performance. Then, we present a couple of real-world examples, which lead to our definition of supplier innovation value and also motivate a network view of supplier innovation value. We then develop propositions explaining *why* a supplier's value network can be a source of sustained competitive innovation advantage for a buying firm's innovation. Next we develop propositions concerning that different types of buying company innovation are likely to emerge depending upon different locus and degrees of buyer-supplier structural equivalence. We also develop propositions to explain how a supplier's ties with a buying firm's competitors can pose both opportunity and risk. Finally, we conclude the paper with discussion of theoretical and practical implications, limitations and future research opportunities.

2. Literature review and theoretical foundation

2.1. Ego network and firm innovation

The inter-organizational network literature has extensively studied how a firm's ego network influences its own innovation performance (Ahuja, 2000a; Oerlemans et al., 1998; Ritter and Gemünden, 2003; Tsai, 2001). When the knowledge base of an industry is both complex and the sources of expertise are widely dispersed, the locus of innovation will be found in inter-organizational networks rather than in individual firms (Powell et al., 1996). For this reason, a firm's network location can become a type of resource, thereafter influencing its strategic decisions and ultimately its innovation performance (Gulati, 1999).

Along this line, an emerging stream of supply chain literature examines how a buying firm's supply network, a special type of ego network, influences its innovation performance (Bellamy et al., 2014). In their conceptual paper, Autry and Griffis (2008) proposes that the structural configuration and relationship content of a firm's supply chain network should influence the firm's innovation performance through supply chain knowledge development. Similarly, Bellamy et al. (2014) shows that supply network accessibility and connectivity influence the focal buying company's innovation performance. Gao et al. (2015) show that technological diversity in a supply network is positively associated with the focal buying firm's new product creativity. Adopting a network perspective, Yan et al. (2014) introduced new

types of critical suppliers, one of which (the “informational nexus supplier”) can provide early market and technological information to the focal buying company because of its diverse downstream ties in its ego network. This stream of work alludes to the possible positive influences of a supplier's value network, composed of its supply and demand networks, on supplier innovation (Choi and Kim, 2008). However, the literature is not clear regarding whether a supplier's value network can influence its customers' innovation performance.

More recent network studies have also started to look at potential drawbacks of inter-organizational ties on innovation. For instance, a firm might be less motivated to form new ties due to being overly embedded in existing ties or being exposed to risks of competitive information leakage through intermediaries that connect with a firm's competitors (Hernandez et al., forthcoming; Pahnke et al., forthcoming). These findings are very relevant for understanding the potential negative influence of a supplier's value network on a buying firm's innovation.

The buyer-supplier value creation literature has shown various ways that the buyer-supplier relationship could create value for both firms. For instance, from a supplier's perspective, a customer firm could bring value to the supplier by performing both direct (i.e. profit, volume and safeguard) and indirect (i.e. innovation, market, scout and access) functions, where the latter rely on a customer's central positions in business networks (Walter et al., 2001). Similarly, from a customer's perspective, a supplier creates relational value through good performance in eight aspects, two of which: supplier know-how and new product time-to-market, are mostly closely related with a supplier's innovation value. It is also shown that the types of value created in a buyer-supplier context: core value production, value-adding relational value and future oriented relational value, rely on the interactions between competences possessed by the two firms (Möller, 2006). Therefore, value creation does not happen in isolated relationships, but instead, in an extended business network where the focal buyer-supplier dyad is embedded (Lindgreen and Wynstra, 2005; Tsai and Ghoshal, 1998). However, this stream of work does not offer a definitive answer regarding how the extended network context influences the creation of innovation-related value in a buyer-supplier dyad (Lindgreen and Wynstra, 2005).

Studies in supplier-driven innovation have identified factors that influence a supplier's innovation value to a buying company at the firm, the buyer-supplier dyad, and the network levels. A summary of literature in supplier innovation at the firm-, dyad- and network-level is provided in Table 1. At the firm level, a supplier's internal traits, such as financial health, organizational structure, technical capability, corporate culture, country of origin, etc., have been shown to be indicators of innovative suppliers (Hagedoorn and Schakenraad, 1994; Kotabe and Scott Swan, 1995; Krause et al., 2001; Lawson et al., 2014; Mowery et al., 1996; Petersen et al., 2005; Song and Di Benedetto, 2008; Valencia et al., 2010). At the dyadic buyer-supplier relationship level, a collaborative relationship, indicated by high level of trust, power balance, capability complementarity, partner-specific absorptive capacity, homophily, goal congruence and relationship-specific investment, is also advocated as a prerequisite for positive supplier innovation value (Azadegan and Dooley, 2010; Azadegan et al., 2008; Kim and Choi, 2015; Mowery et al., 1996; Wagner, 2010, 2012; Wagner and Bode, 2014; Walter, 2003). At the network level, the literature has shown the supply network structure, dynamics and strategy of a buying company influence its innovation performance (Autry and Griffis, 2008; Bellamy et al., 2014). All of these factors, although at different levels, have been shown to interact to influence firm innovation performance (Bellamy et al., 2014; Gao et al., 2015; Möller and Törrönen, 2003; Rothaermel and Hess, 2007). Together, these studies demonstrate that firm- and dyad-level factors are embedded in, and thus influenced by, the network environment, which indicate the importance of taking a network view to study supplier innovation value.

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