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Supplier innovativeness, organizational learning styles and manufacturer performance: An empirical assessment

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ABSTRACT

Suppliers have become an increasingly important source of product and process innovation. While case studies have documented how supplier innovation can benefit a manufacturer, this relationship has not been empirically validated, nor have contingencies been explored. Using organizational learning theory we posit that the link between supplier innovativeness and manufacturer performance is moderated by the "fit" between the learning styles of the manufacturer and supplier. We empirically test our hypotheses using hierarchical linear modeling of survey responses from 148 manufacturers concerning 592 suppliers. Results indicate that supplier innovativeness has positive impacts on multiple dimensions of manufacturer performance. Results show that when the outsourced activity involves low levels of design responsibility by the supplier, it is more beneficial for the two partners to have contrasting learning styles. However, when the outsourced activity is design-intensive, it is more beneficial to have a supplier with an explorative learning style.

1. Introduction

As products and services continue to grow in complexity, much potentially useful knowledge will necessarily reside outside of the firm (Bercovitz and Feldman, 2007). Bill Joy, co-founder of Sun Microsystems, talks to this challenge (Howells et al., 2003; p. 10): "No matter who you are, most of the smartest people work for someone else.". For this reason firms have moved to engaging in collaborative product development (Walter, 2003; Petersen et al., 2005), innovation alliances (Muller and Valikangas, 2002) and "open innovation" (Chesbrough, 2003) with their supply networks. Suppliers are being asked to take on greater responsibilities (Evans and Lindsay, 2005), to become design and development partners (Tyndall et al., 1998), and are increasingly held responsible for process enhancements and for new product introductions (Simpson et al., 2002).

It has been debated as to whether delegating more responsibilities to suppliers actually leads to benefits for the manufacturer. Some suggest that such "outsourcing" allows for manufacturers to better focus on their core competencies (Prahalad and Hamel, 1990; Quinn and Hilmer, 1994) thereby improving their performance (Egger and Egger, 2006). Others suggest that while there may be short term gains, in the long run outsourcing will erode the firm's internal capabilities (Doig et al., 2001; Kotabe and Murray, 2004; Colander, 2005). The debate seems even more pronounced when outsourcing of innovation is concerned (Dankbaar, 2007; Windrum et al., 2009). Given that innovation and innovativeness (the organizational capability behind innovations) are fundamental determinants of long term survival of firms (Christensen et al., 1998), the question has both theoretical and practical relevance.

Fundamentally, benefiting from external innovation requires the transfer of knowledge (Tsai, 2001). Literature suggests for two key considerations for knowledge transfer to be effective (Szulanski, 1996; Kotabe et al., 2003; English and Baker, 2005): (i) How much knowledge there is to transfer and (ii) how well the transfer takes place. Within the context of a manufacturer–supplier dyad, the first consideration depends on the innovativeness of the supplier. To the extent that a firm can extend its capabilities by using innovative suppliers, that should also provide measurable benefit to the manufacturer. Thus our first research question is: *Do manufacturers benefit from their supplier's innovativeness?* The second consideration is how well the knowledge transfer occurs, which depends on how inter-organizational learning takes place. A manufacturer with a different mind-set (Gupta et al., 2006) or learning strategy (Bierly and Hamalainen, 1995) to that of the supplier may not understand or perhaps even recognize a supplier's innovativeness. As such, a proper fit between organizational learning styles of the manufacturer and the supplier may play an important role in the knowledge transfer. Thus our second research question is: *How do the learning styles of the manufacturer and supplier affect the impact of innovativeness by the supplier on performance of the manufacturer?*

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To answer our research questions we use organizational learning theory. In addressing the first research question we explore how manufacturers benefit from supplier innovativeness. To answer the second research question we first use March's (1991) suggestion that firms learn through the combination of two styles, exploration and exploitation. While it is ideal for firms to be able to learn in both ways (Levinthal and March, 1993), one of the styles tends to become dominant over time. As first outlined in Azadegan, Dooley, Carter and Carter (2008), we propose that a firm can partially achieve a balance between exploration and exploitation by selecting suppliers with complimentary learning styles. However, in situations where the need for innovation is quite significant, such as when the supplier has a high level of design responsibility, the balance of learning styles may not be as important as the ability to explore new solutions. Thus we will propose that the best "fit" of learning styles depends on whether the supplier has a low or high level of design responsibility.

This work contributes to supply chain management research in several ways. First, while a positive link between supplier innovativeness and manufacturer performance has been demonstrated in previous case studies (e.g. Chiesa et al., 2004; Stock and Tatikonda, 2004), this relationship has never been empirically tested using a large sample survey. Previous work has also not specified how supplier innovativeness may affect different dimensions of manufacturer performance. Second, existing research has ignored the possible role of manufacturer and supplier organizational learning styles as contingencies to the knowledge transfer process. Thus our theoretical examination of the topic moves us from a simplistic understanding of innovation (i.e. "innovation is good") to a more nuanced, complex model that is closer to reality. Third, our model could be used as a building block towards a configuration theory, as we suggest that the best fit of learning styles is dependent on the type of tasks being outsourced to the supplier. From a practical standpoint, this study identifies additional criteria for supplier selection. While we do not believe that a supplier's learning style will trump basic issues of cost, quality, and performance when a manufacturer is selecting a supplier, it may be an important consideration when capability between two or more suppliers is otherwise relatively undifferentiated.

The remainder of this paper is structured as follows. The next section provides our theoretical basis, related literature on organizational learning and the hypotheses of the study. The following sections detail the study methodology, our data collection, statistical analysis approach and results. Subsequent sections explain our findings, provide some theoretical and practical implications, study limitations, and suggestions for future research.

2. Background & hypotheses

2.1. Supplier innovativeness and manufacturer capabilities

Following past literature (Hult et al., 2004; Wang and Ahmed, 2004; Lee and Tsai, 2005) we define innovativeness as the capability to develop and introduce new products or processes. Among supply chain literature, there is an underlying assumption that supplier innovativeness is beneficial to the manufacturer. For example, Handfield et al. (1999) suggest that a thorough assessment of suppliers allows for better benefiting from their innovativeness. Wynstra et al. (2003) examine cases where exploiting supplier's innovative capabilities can highlight purchasing's role in product development. Following a conceptual model from Tatikonda and Stock (2003), Stock and Tatikonda (2004) test an empirical model that highlights the importance of fit and information processing capabilities that hinges on benefiting from supplier innovativeness. These authors find that a match between inter-organizational interactions and the uncertainty associated with an external technology leads to improvements in its internal adoption.

Innovativeness implies more receptivity to change and more willingness to face new challenges (Hurt et al., 1977; Parsons, 1991; Garcia et al., 2003). This enables the manufacturer to leverage the capabilities of innovative suppliers and thereby better respond to environmental changes (Swink and Mabert, 2000). Additionally, sharing tasks with innovative suppliers provides opportunities for enhanced learning through inter-firm division of labor (Takeishi, 2002), since it allows the manufacturer to learn from the suppliers' specialty (King et al., 2003). As such, it seems reasonable to presume that supplier innovativeness positively affects manufacturer performance. This positive effect may be manifest in multiple dimensions of capabilities including cost, quality, product development, delivery dependence and flexibility performance.

For example, we know that organizational learning leads to productivity and cost improvements (Hatch and Mowery, 1998). Literature has labeled this relationship as the "learning curve" or the "productivity curve" (Argote, 1999). Given that organizational learning is not solely derived from internal sources (Argote et al., 2003; Salomon and Martin, 2008), learning from innovative suppliers can enhance manufacturer cost performance. Naturally, factors related to negotiation and pricing may influence the outcome in cases where supplier's innovativeness leads to actual innovations. We also know that organizational learning enhances product quality (Fine, 1986; Linderman et al., 2004). As a manufacturer moves up on the productivity curve, it develops deeper learning which enhances its quality (Lapre et al., 2000). Supplier innovativeness, which includes acquired skills, increases the pool of available knowledge that manufacturer can use to enhance its own learning curve and thereby product quality.

Learning from suppliers also allows for a manufacturer to better understand mechanisms behind developing new products. Involving suppliers in product development has shown to enhance product development outcomes (Petersen et al., 2003, 2005). As such, working with innovative suppliers can positively affect product development efforts. Supplier innovativeness also impacts delivery requirements. First, innovativeness may allow for the supplier to proactively tackle lead time variations. Second, by learning from the skills and practices of the supplier, a manufacturer can recognize the underlying causes in its own lead time issues. Lastly, supplier innovativeness may lead to enhanced flexibility. Flexibility, portrayed as a buffer between environmental uncertainty and capabilities (DeGroote, 1994), is enhanced by developing alternative solutions. Innovativeness provides a supplier with organizational expertise and practices that can be used for developing alternative solutions. Such alternatives may be used by the manufacturer to enhance its own internal flexibility.

Note that one does not have to assume that all benefits from supplier innovativeness accrue through knowledge spill-over. The simple fact that the outcomes of the supplier's work (i.e. components) are embedded within the manufacturer's product implies that supplier's innovativeness gets transferred, even in situations where supplier innovativeness leads to proprietary knowledge that the supplier may maintain as a secret. For instance, if an innovative supplier reduces the cost or improves the quality of a supplied component, then the overall cost or quality of the product is also improved. Likewise, if a supplier becomes more timely in completing their design task, or in the delivery of manufactured parts through the use of advanced manufacturing technologies (AMT; Swink and Nair, 2007) then the manufacturer's cycle time in design or production may also benefit.

In sum, we posit that innovativeness by the supplier provides the manufacturer with additional knowledge resources that may enhance one or more of the five dimensions of manufacturer capa-