



Network connectedness in vertical and horizontal manufacturing joint venture formations: A power perspective



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ABSTRACT

In the supply chain management (SCM) domain, research has been advanced to understand the role of network structure in buyer-supplier relations. Yet, while there has been a substantial body of work investigating supply chain networks, little research has paid attention to how the network structure affects the power balance between manufacturers and suppliers. This study investigates, from a power perspective, the role that network connectedness plays in new equity based joint venture formations. As such, we further the understanding of supply chain networks by examining network structure as a mechanism from which firms derive power. We articulate several hypotheses rooted in both network and power theories by specifically examining, from a power perspective, factors such as eigenvector centrality, closeness centrality, and weak components centrality. Further, we differentiate between horizontal and vertical joint venture configurations and elucidate the moderating effect it has in engendering new manufacturing joint venture formations. Empirical results show that structural network based power is a significant explanatory mechanism in new joint venture formation, and specifically, that power is, and should be a primary consideration in supply chain partnership decisions.

1. Introduction

As supply chain collaborations between several parties continue to dominate modern supply networks, firms increasingly face significant issues with respect to who holds power over whom. In the context of purchasing power in buyer supplier relationships, buyers derive power “from a combination of the attractiveness of their own resources and the supplier’s freedom to obtain resources from other organizations, while a supplier’s power derives from the attractiveness of their own resources and the buyer’s freedom to obtain resources from other organizations” (Ramsay, 1996:129). Other scholars suggest that, firms that hold significant power might not see value in forming a “win–win alliance since it can achieve its own profitability and effectiveness through control of its suppliers” (Benton and Maloni, 2005:2). Consequently, understanding power in the context of purchasing and supply chain management has drawn significant attention from researchers. Research rooted in resource dependency theory has shown that resource accumulation can be beneficial to the bargaining power of the firm (Crook and Combs, 2007). Other research has studied the role

that power has in mitigating the effects of uncertainty (Ireland and Webb, 2007) which is a significant issue in new partnership formation (Chellappa and Saraf, 2010).

Furthermore, recent research has transitioned from a dyadic perspective to a more holistic, network based approach for viewing supply chains (Autry and Griffis, 2008; Bernardes and Zsidisin, 2008; Borgatti and Li, 2009; Carnovale and Yeniyurt, 2014, 2015b; Finne et al., 2015; Skilton and Bernardes, 2015; Carnovale et al., 2016). These studies ground their approach, theoretically, in network theory. Network theory “refers to the mechanisms and processes that interact with network structures to yield certain outcomes for individuals and groups” (Borgatti and Halgin, 2011:1168). As a basic premise, network theory holds the view that the connections, between and among entities, are the basis for understanding ongoing relational dynamics (Borgatti et al., 2009). In the SCM domain, recent research has looked at the role of network theory in understanding supply relationships (Kim et al., 2011), the network as a mechanism to understand power balances/imbalances in network relationships (Choi and Wu, 2009; Bastl et al., 2013), the extent to which a firm is embedded within the

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network (or perhaps multiple intersecting networks) (Choi and Kim, 2008) as well as the role of using network theory to aid in designing their global sourcing strategies (Carnovale et al., 2016) and for risk management (Garvey et al., 2015).

While there is considerable amount of research that studies supply chain relationships from the network and power perspectives, relatively few studies incorporate both to study inter-firm relationships. Some research has juxtaposed the two. For example, Finne et al. (2015) raise the level of analysis up to the network and examine how firms seek to gain power in their interactions with the rest of the network. Bastl et al. (2013) advance a conceptual model of triadic coalitions in order to further understand the role that buyer/supplier power has in network relationships. Olsen et al. (2014) utilize a case study methodology to investigate the power mechanisms in a concentrated business network. Terpend and Ashenbaum (2012) indicate that network size moderates the relationship between power and supplier performance. Additionally, research has studied the structural sources of power within business networks, and findings suggest that the network, as a source of power, plays a significant role in buyer supplier dynamics (Kähkönen and Virolainen, 2011).

While there has been a substantial body of work either articulating the antecedents of, or consequences from power, there is a significant gap in the literature dealing with the role that structural network power (i.e. that power derived from a firm's position in, and ability to leverage, their network structure) plays in the development of new sourcing arrangements; particularly the role that power plays in the case of a new joint venture. Joint ventures (JVs) are collaborative partnership formations wherein an autonomous third entity is formed with the equity of two or more organizations (Kogut, 1988). Such arrangements are typically executed so as to increase control (Hennart, 1988) and reduce the firm's transaction costs of arms length market based transactions (Coase, 1937). Accordingly, this research seeks to close this gap and provide a framework for understanding the power implications of a firm's network position, and structural network power, and the role it plays in new supply chain joint ventures. Therefore, we investigate the following research questions: (1) What role does a firm's structural network power have in engendering new JV formations; and (2) How does this effect differ in horizontal vs. vertical JV formations?

This study contributes to the extant supply chain management literature in several ways:

- We contribute to the existing body of work that conceptualizes supply chains as networks (e.g. Choi and Hartley, 1996; Choi et al., 2001; Choi and Yunsook, 2002; Bernardes and Zsidisin, 2008; Choi and Kim, 2008; Choi and Wu, 2009; Kim et al., 2011; Bastl et al., 2013; Skilton and Bernardes, 2015) by investigating the power implications of a firm's network position for both the focal firm and the potential partner.
- We build upon the network and power theories to develop specific hypotheses regarding the effect of a firm's network connections on new JV formations.
- We differentiate between horizontal and vertical JV formations (and their respective power dimensions) and investigate their moderating effect on the relationship between network characteristics and new JV formations.
- We test these hypotheses using an event history analysis with time varying covariates and a manufacturing JV database from the automotive industry.

The rest of this research is organized as follows. First a review of the relevant literature surrounding power, network theory, and joint ventures is provided. Then, theoretically driven hypotheses are advanced. Next, the empirical context of this study is detailed, complete with description of our methodology and data. Finally, a discussion of the results and the implications thereof are discussed; followed by the

limitations and future research directions.

2. Theoretical framework

2.1. Joint venture networks

Generally speaking, any partnerships that exist along the supply chain fall into one of two categories: non-equity based partnerships vs. equity based partnerships or joint ventures (JVs). In the general sense, an alliance is a collaborative inter-organizational arrangement that uses more than one organization's resources (Inkpen, 2008). In the context of an alliance there is a notion of shared responsibility or mutual interdependence, wherein there exists vulnerability and accountability between both parties (Adler, 1966). Such vulnerability generally arises because firms engaging in such a partnership will lever resources from autonomous organizations (Inkpen, 2008). A point to note, which will be contrasted in subsequent sections, is that the partners in a non-equity based alliances remain independent; this is not necessarily the case in other, more equity driven partnerships such as JVs. That is to say, in a non-equity based alliance there are two or more organizations cooperating rather than one newly formed organization acting autonomously. Given this potentially hierarchically ambiguous management structure, decision-making can become burdensome; a common issue in alliances, generally.

On the opposite end of the continuum, equity-based partnerships, also referred to as Joint Ventures (JVs), are a popular form of organizational arrangement in the manufacturing industry. A JV occurs when two or more independent firms band organizational resources together to form a third entity for the production or delivery of goods or services (Desai et al., 2004; Tokman et al., 2007). Of course, as contrast to the above definition of an alliance, we see that with a JV there is, necessarily, the creation of a third entity. Generally, such transactions have high levels of equity and high levels of relationship specific investments (Klein et al., 2007) given their long term outlook (Pearce, 2001). Of course, because purchasing and supply management is principally focused on the production and delivery of goods and services (Ellram and Tate, 2015), studying the composition and development of JVs within a firm's network is a useful perspective. Additionally, research has shown that as firms form multiple JVs over time, these organizational arrangements collectively form a network of firms (Carnovale and Yenyurt, 2014, 2015b; Carnovale and Yenyurt, 2015; Carnovale et al., 2016).

Early work on theorizing the antecedents of internalization (i.e. the degree to which the firm moves from arms length, market transactions to more internal equity driven control structures like JVs) can be traced to leveraging hierarchy in order to minimize transaction costs (Coase, 1937). Essentially, this view examines “the factors which induce a shift of transactions from market to internal organization” (Williamson, 1973:316) or “the economizing efforts that attend the organization” (Williamson, 1985: 1). In addition, such governance mechanisms have been shown to reduce the risk in new partnerships (Lee and Johnson, 2010). Numerous industry examples of JVs are available to highlight their practical relevance. For example Tata Motors and Fiat recently formed engaged in a JV wherein Tata will produce Fiat's premium product line (Behl, 2007).

JVs are not only practically relevant to study, but also an important area of academic research, as a properly executed partnership, can have a significant impact on the firm. Strategic collaborations in supply chains have been shown to have a positive effect on supply chain responsiveness and market performance (Kim and Lee, 2010). Furthermore, a firm's ability to enhance its inter-firm collaborations has been shown to mediate conflict and improve performance in supply chain relationships (Allred et al., 2011). Research has also examined the link between inter-firm cooperation and JV performance and found that various behavioral dimensions such as flexibility and cooperation mediate the relationship between power and performance (Pearce,

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