

The Influence of Network Position on Innovative Capabilities

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ABSTRACT

The purpose of this study is to discuss how a focal firm's network position influences its innovative capabilities. This study takes the focal firm's perspective in a supply chain context and develops propositions. We focus on a focal firm's network position as a critical factor that may affect the level of innovation capabilities. In this study, innovative capabilities are classified into incremental innovative capability and radical innovative capability. This study extends social network theory by delineating how a focal firm's network position leads to improving the capability for incremental innovation and radical innovation.

INTRODUCTION

Scholars have argued that sources of innovation exist in relationships beyond organizational boundaries (Keith et al., 2017; Kiss & Barr, 2017; Powell et al., 1996). A firm's access to diverse knowledge sources in networks can drive its innovative output and provide technical advantages (George et al., 2008). Specifically, researchers have offered the explanation that a firm's network position represents an opportunity to leverage the external knowledge and resources necessary to generate promising new ideas and products (Tortoriello, 2014). The network position serves as a proxy for knowledge and information heterogeneity and functions as a distinctive competency to address complex problems and create unique solutions (Rodan & Galunic, 2004; Gargiulo et al., 2009). Kleinbaum and Tushman (2008) argue that company executives must consciously manage a firm's network position to exploit resources and promote innovations, because unmanaged networks tend to inhibit innovation activities. Dyer et al. (2009, p. 65) suggest that "devoting time and energy to finding and testing ideas through a network of diverse individuals gives innovators a radically different perspective." Therefore, it is important to investigate the role of a firm's position in a network when reconfiguring existing products and discovering new opportunities.

Researchers have explored several aspects of the network position, such as the structural hole (Ahuja, 2000; Hernandez & Shaver, 2018; Kim, 2014; Paruchuri & Awate, 2017; Rodan & Galunic, 2004; Tortoriello, 2014), the density (Gargiulo et al., 2009; Phelps, 2010; Mahmood et al., 2011), the proximity (Gibson, 2004; Lahiri, 2010; Funk, 2014), and the centrality (Kim & Zhu, 2018; Soh & Roberts, 2005; Peng & Mu, 2011; Nan & Kumar, 2013; Wang et al., 2014). Most studies, however, are silent about how a firm may attempt to leverage its structural position in order to gain access to unique knowledge and to develop innovative capabilities. Further, previous

research has mainly focused on a single type of innovation, namely product innovation, without recognizing that many firms are pursuing innovations in an incremental or radical way.

The purpose of this study is to discuss how a focal firm's structural position influences its innovative capabilities. This study takes the focal firm's perspective in a supply chain context and develops propositions. We focus on a focal firm's network position as a critical factor that may influence the level of innovation capabilities. In this study, the innovative capabilities are classified into incremental capability and radical capability, since innovative products are typically generated by firms that exploit existing knowledge or explore unique knowledge (Katila & Ahuja, 2002). In the following sections, we will first review the definitions of network position, incremental innovative capability, and radical innovative capability. We will then discuss how a focal firm's network position affects its innovative capabilities and will summarize the literature into two propositions. Finally, our conclusions will be presented.

DEFINITION

Network position refers to a focal firm's position in a network that helps to develop cooperative relationships with prominent network partners and boosts its social standing (Shipilov & Li, 2008). This definition highlights the potential of a network position, which is described as the value of a focal firm's structural position. The positional perspective suggests that information and knowledge travel through the structure of a network itself as well as through direct ties (Gulati, 1998). The value of the network position encompasses properties of inter-firm ties and clarifies the boundaries of a network and the overall patterns of interactions among firms (Simsek et al., 2003). The network position is also based on a controlling and monitoring mechanism in which firms use norms to facilitate cooperative behavior and impose sanctions against opportunistic behavior (Coleman, 1988). A focal firm's network position reflects their motivation to join or maintain a network as well as their conduct, lowering the possibility of misinterpreting a potential partner's behavior and future performance (Zaheer & Bell, 2005). Further, focal firms that monitor an extended network tend to have an opportunity to learn about new product functions and designs (Ozer & Zhang, 2015). Searching and monitoring activities allow a focal firm to access a variety of essential information, to recombine familiar and well-known knowledge, and to explore unfamiliar knowledge (Phelps, 2010).

Innovation refers to the introduction and application of new processes, procedures, and products to the relevant unit of adoption in a way that is intended to benefit an organization (West & Anderson, 1996). Research on innovation suggests that firms are able to meet changing customer needs and improve performance by exploiting existing knowledge or exploring new knowledge domains. The way a firm innovates can be described as either incremental innovative capability or radical innovative capability. Following Subramaniam and Youndt (2005), Tzabbar (2009), and Anand et al. (2009), we define incremental innovative capability as the capability to refine, reinforce, and improve existing processes, components, and technologies. By contrast, radical innovative capability is defined as the capability to significantly transform existing technological trajectories and develop novel products and processes.

Incremental innovative capability, also called exploitative innovation, is a firm's ability to identify the limitations of existing products, to engage in a local search, and to reconfigure existing knowledge (George et al., 2008; Subramaniam & Youndt, 2005). Since incremental innovative capability relates to the use of well-known information via experiential refinement and local searches, firms tend to learn from their own knowledge and experience and increase the predictability of outcomes (Anand et al., 2009). Possible benefits include improving established designs, broadening existing knowledge, and meeting the needs of current customers (Jansen et

al., 2006). Incremental capability also enables firms to utilize efficient processes and routines and to sustain their current focus, which allows them to manage efficiently production processes and reduce variation and risk (Zhou & Li, 2012). In a network context, firms with incremental capability tend to favor existing partners, instead of new partners with potential merits, and to facilitate the transfer of and access to knowledge already existing in a network (Lavie & Rosenkopf, 2006).

Radical innovative capability represents a firm's capability to depart from existing knowledge and build new channels for distributing information (Dewar & Dutton, 1986; Subramaniam & Youndt, 2005). Radical capability requires an application of new components from distant technological domains beyond organizational boundaries. A firm with the capability for radical innovation can access diverse knowledge sources and has the potential to formulate highly novel re-combinations and to access unfamiliar knowledge, although this increases both costs and uncertainty (Phelps, 2010). Radical capability is not designed for pursuing minor changes in current knowledge domains, but for significantly transforming existing products and extending technological boundaries (Tzabbar, 2009). A firm with this capability can respond to a new market opportunity quickly and reshape the competitive landscape (Zhou & Li, 2012). The capability for radical innovation, however, often leads to enormous uncertainties and unpredictable outcomes, and it is difficult to ensure that a firm will finally realize a substantial new idea and discover a breakthrough product (Anand et al., 2009). A relationship with a new partner is a form of exploration that promotes the search for new ideas and diminishes the value of existing products (Beckeman et al., 2004; Paruchuri & Awate, 2017). Firms that are connected to competitive partners effectively generate radical innovation by identifying external opportunities and broadening knowledge bases (Lavie & Rosenkopf, 2006). According to an empirical study by Nagji and Tuff (2012), firms allocate about 70% of their innovation activity to incremental initiatives and about 10% to radical initiatives. They noted that incremental initiatives contribute 10% to cumulative return on investment whereas radical initiatives can be credited for 70% of the return.

PROPOSITIONS

Network Position and Incremental Innovative Capability

A focal firm's network position is likely to positively influence its capability to reinforce established skills and meet the needs of existing markets. The development of a network position entails a process of evaluating and identifying potential partners, which serves as a conduit to other companies with technological and innovative resources (Choi & Kim, 2008). This process enables a focal firm to access the novel knowledge and information that are the key components in developing a new product (Li et al., 2013). As a focal firm develops a sense of how other firms act as a conduit, it can identify a competitive partner and intentionally cooperate with that partner.

More importantly, the network position is the extent to which a focal firm is exposed to other firms with innovative ideas and technologies (Gnyawali et al., 2006). The network position has been shown to provide informational benefits in obtaining inventive ideas for use in exploiting new products (Wang et al., 2014). It gives a focal firm an ability to access the desired strategic resources and external knowledge that are often unevenly distributed in a network (Tsai, 2001). Such network prominence serves as a significant source of power to influence different degrees of access to creative ideas and to predict the success or failure of technical innovation (Ibarra, 1993). When a focal firm occupies a central position in a network, it plays a role as a gatekeeper or regulator of resource flow and holds a comprehensive view of a network structure (Balkundi & Harrison, 2006). A focal firm with a central position is eager to establish efficient infrastructures for innovative activities and generate improvements in existing products (Mahmood et al., 2011).

A focal firm with a central position can also scan and monitor other partners, which gives the firm an opportunity to work with a supplier that is closely connected to competitive firms. The understanding of possible interdependencies helps a focal firm to manage multiple and simultaneous ties efficiently and to increase the operating synergies of their network ties (Ozcan & Eisenhardt, 2009). When a focal firm is embedded in a tightly coupled network, it can share diverse perspectives and experiences with other firms (Choi & Kim, 2008). As Phelps (2010) suggested, a close relationship with other firms has been viewed as an engine that promotes reciprocity exchanges and sharing of privileged resources. When all network participants are densely intertwined, they tend to share detailed and proprietary information derived from other industries and thus discover unique solutions (Mahmood et al., 2011).

The benefits of a network position also include learning activities, facilitating intense social interaction and reducing the risks in knowledge transfer (Gargiulo et al., 2009). The learning activities encourage a focal firm to develop recurrent alliances, representing a form of exploitation (Lavie & Rosenkopf, 2006), and to use routines to access promising information and implement fast and efficient flows of information (Gnyawali & Madhavan, 2001). The ongoing use of the routines leads to a focus on incremental change and promotes incremental innovation (Benner & Tushman, 2002). Singh et al. (2016) found that the more valuable the combinatory knowledge among a firm's direct contacts in a network, the higher the firm's innovation performance was. Thus, a focal firm with a central position is likely to exploit the familiar technological trajectory and extend existing competencies. These arguments suggest the following hypothesis:

Proposition 1: The extent to which a focal firm has a central network position is positively related to the level of its incremental innovative capability.

Network Position and Radical Innovative Capability

A focal firm's network position is likely to influence its capability for developing radical innovation. Lavie and Rosenkopf (2006) and Paruchuri and Awate (2017) suggest that focal firms engaged in prior search activities in external networks reinforce the tendency to explore new opportunities. The synthesis of different perspectives in a network allows a focal firm to have an enhanced understanding of new technical ideas and procedures, leading to radical innovation (Dewar & Dutton, 1986). As a focal firm uses its network position and scans a network structure, it will be aware of a supplier that accesses non-redundant and diverse information. A focal firm may work strategically together with a supplier with divergent perspective and information, and this helps to increase the focal firm's capability for radical innovation.

The network literature highlights that an adequate understanding of the network position relies on the efforts of a focal firm to manage and control the flow of diverse information. The capability for radical innovation evolves from interactions with network partners, which creates the diverse information and flexibility necessary to generate novel ideas and methods (Tortoriello, 2014). A firm's network position prescribes a focus on the diverse and novel information available through a network with no common contacts (Burt, 1992). To achieve this diverse perspective, a focal firm needs to learn about different knowledge domains and varied problem-solving approaches from other firms that may serve as a knowledge spillover in collaboration linkages (Ahuja & Lampert, 2001; Kim & Jung, 2017). Exposure to new ideas and diverse knowledge is an essential requirement for significantly transforming existing products and recombining traditional elements (Burt, 1992). Anand et al. (2009) found that focal firms with a central network position often observe and analyze diverse patterns of network partners in order to reduce the uncertainties and risks of exploratory activities. A focal firm that bridges relationships between unconnected

partners can construct an efficient and information-rich network and thus gain access to different flows of information (Ahuja, 2000). Therefore, we propose:

Proposition 2: The extent to which a focal firm holds a central network position is positively related to the level of its radical innovative capability.

CONCLUSION

This study underscores the importance of a focal firm's network position as a driver to improve innovative capabilities. We argue that a focal firm with a central network position may have an opportunity to identify a competitive supplier and have access to different types of information. The information can be used to experiment with new products and extend existing competencies. Perhaps a focal firm with a central position could serve as a bridge that inspires the firm to join partnerships with other suppliers in multiple tiers and prompts insights on how to introduce minor changes in existing products. The application of new knowledge obtained in a supply network is likely to be useful to industries that concentrate primarily on mature products and build competitive advantage from reconfiguring and recombining existing technology components. Thus, it can be argued that the capability for incremental innovation increases with a firm's network position and ability to evaluate and monitor the quality and overall architecture of an extended network.

Based on the literature, we hypothesize that a focal firm's network position could shape the firm's ability to search for highly novel combinations and radical solutions. The network position may increase the likelihood that the focal firm will cooperate with a new partner beyond a local network and create novel and divergent solutions. This means that a focal firm can benefit from intentionally observing the positional value of a supply network that is a source of the introduction of an unrecognized demand. Without utilizing the benefits of a network position, a focal firm may not be able to effectively respond to revolutionary change in technology and demand.

This study makes noteworthy contributions to the literature of social network. First, this study extends social network theory by delineating how a focal firm's network position leads to improving the capability for incremental innovation. Our discussion is valuable for researchers and practitioners who are interested in the causal logic that explains the influence of the network position on innovative activities related to simple adjustments and minor improvements of existing technologies. The focus of most existing studies in the literature has been on the link between product innovation and a network position. Second, this study theorizes the significance of the network position of a focal firm to develop its radical innovative capability. We explicate how a focal firm gains access to new knowledge in supply networks and how the focal firm can change an existing technological trajectory in a novel manner. Few studies have explored the importance of the network-based perspective in developing and deploying the capability for radical innovation (Phelps, 2010; Wang et al., 2014). Finally, we hope this work will encourage future studies of innovation and supply networks.

REFERENCES

Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study, *Administrative Science Quarterly*, 45(3), 425–455.

- Ahuja, G. and Lampert, C.M. (2001). Entrepreneurship in the large corporation: a longitudinal study of how established firms create breakthrough inventions, *Strategic Management Journal*, 22(6-7), 521–543.
- Anand, J. Mesquita, L.F. and Vassolo, R.S. (2009). The dynamics of multimarket competition in exploration and exploitation activities, *Academy of Management Journal*, 52(4), 802–821.
- Balkundi, P. and Harrison, D.A. (2006). Ties, leaders, and time in teams: Strong inference about network structure's effects on team viability and performance, *Academy of Management Journal*, 49(1), 49–68.
- Beckman, C.M. Haunschild, P.R. and Phillips, D.J. (2004). Friends or strangers? Firm-specific uncertainty, market uncertainty, and network partner selection, *Organization Science*, 15(3), 259–275.
- Benner, M.J. and Tushman, M. (2002). Process management and technological innovation: a longitudinal study of the photography and paint Industries, *Administrative Science Quarterly*, 47(4), 676–706.
- Burt, R.S. (1992), *Structural holes: the social structure of competition*, Harvard University Press, Cambridge, MA.
- Choi, T.Y. and Kim, Y. (2008). Structural embeddedness and supplier management: a network perspective, *Journal of Supply Chain Management*, 44(4), 5–13.
- Coleman, J.S. (1988). Social capital in the creation of human capital, *American Journal of Sociology*, 94, 95–120.
- Dewar, R.D. and Dutton, J.E. (1986). The adoption of radical and incremental innovations: An empirical analysis, *Management Science*, 32(11), 1422–1433.
- Dyer, J.H. Gregersen, H.B. and Christensen, C.M. (2009). The innovator's DNA, *Harvard Business Review*, 87(12), 60-67.
- Funk, R. (2014). Making the most of where you are: Geography, networks, and innovation in organizations, *Academy of Management Journal*, 57(1), 193–222.
- Gargiulo, M. Ertug, G. and Galunic, C. (2009). The two faces of control: Network closure and individual performance among knowledge workers, *Administrative Science Quarterly*, 54(2), 299–333.
- George, G. Kotha, R. and Zheng, Y. (2008). Entry into insular domains: A longitudinal study of knowledge structuration and innovation in biotechnology firms, *Journal of Management Studies*, 45(8), 1448-1474.
- Gibson, D.E. (2004). Network structure and innovation ambiguity effects on diffusion in dynamic organizational fields, *Academy of Management Journal*, 47(6), 938–951.
- Gnyawali, D.R. and Madhavan, R. (2001). Cooperative networks and competitive dynamics: a structural embeddedness perspective, *Academy of Management review*, 26(3), 431–445.

- Gnyawali, D.R. He, J. and Madhavan, R. (2006). Impact of co-opetition on firm competitive behavior: An empirical examination, *Journal of Management*, 32(4), 507–530.
- Gulati, R. (1998). Alliances and networks, *Strategic Management Journal*, 19(4), 293–317.
- Hernandez, E. and Shaver, J. M. (2018). Network Synergy. *Administrative Science Quarterly*, 0001839218761369.
- Ibarra, H. (1993). Network centrality, power, and innovation involvement: Determinants of technical and administrative roles, *Academy of Management Journal*, 36(3), 471–501.
- Jansen, J.J. Van Den Bosch, F.A. and Volberda, H.W. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators, *Management Science*, 52(11), 1661–1674.
- Katila, R. and Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction, *Academy of Management Journal*, 45(6), 1183–1194.
- Keith, M., Demirkan, H. and Goul, M. (2017). The Role of Task Uncertainty in IT Project Team Advice Networks. *Decision Sciences*, 48(2), 207–247.
- Kim, D.Y. (2014). Understanding supplier structural embeddedness: A social network perspective, *Journal of Operations Management*, 32(5), 219–231.
- Kim, D.Y. and Jung, J. (2017). Cultural attributes and risk perception: the moderating role of different types of research and development, *Journal of Risk Research*, 1(1), 1–16.
- Kim, D.Y. and Zhu, P. (2018). Supplier dependence and R&D Intensity: The moderating role of network centrality and interconnectedness.” *Journal of Operations Management*, 64(1), 7-18.
- Kiss, A. N. and Barr, P. S. (2017). New product development strategy implementation duration and new venture performance: A contingency-based perspective.” *Journal of Management*, 43(4), 1185-1210.
- Kleinbaum, A.M. and Tushman, M.L. (2008). Managing corporate social networks, *Harvard Business Review*, 86(7), 26-27.
- Lahiri, N. (2010). Geographic distribution of R&D activity: How does it affect innovation quality?” *Academy of Management Journal*, 53(5), 1194–1209.
- Lavie, D. and Rosenkopf, L. (2006). Balancing exploration and exploitation in alliance formation, *Academy of Management Journal*, 49(4), 797–818.
- Li, Q. Maggitti, P.G. Smith, K.G. Tesluk, P.E. and Katila, R. (2013). Top management attention to innovation: The role of search selection and intensity in new product introductions, *Academy of Management Journal*, 56(3), 893–916.

- Mahmood, I.P. Zhu, H. and Zajac, E.J. (2011). Where can capabilities come from? Network ties and capability acquisition in business groups, *Strategic Management Journal*, 32(8), 820–848.
- Nagji, B. and Tuff, G. (2012). Managing your innovation portfolio, *Harvard Business Review*, 90(5), 66–74.
- Nan, N. and Kumar, S. (2013). Joint effect of team structure and software architecture in open source software development, *Engineering Management, IEEE Transactions on*, 60(3), 592–603.
- Ozcan, P. and Eisenhardt, K.M. (2009). Origin of alliance portfolios: Entrepreneurs, network strategies, and firm performance, *Academy of Management Journal*, 52(2), 246-279.
- Ozer, M. and Zhang, W. (2015). The effects of geographic and network ties on exploitative and exploratory product innovation, *Strategic Management Journal*, 37(7), 1105-1114.
- Paruchuri, S. and Awate, S. (2017). Organizational knowledge networks and local search: The role of intra-organizational inventor networks.” *Strategic Management Journal*, 38(3), 657–675.
- Peng, G. and Mu, J. (2011). Network structures and online technology adoption, *Engineering Management, IEEE Transactions on*, 58(2), 323–333.
- Phelps, C.C. (2010). A longitudinal study of the influence of alliance network structure and composition on firm exploratory innovation, *Academy of Management Journal*, 53(4), 890–913.
- Powell, W.W. Koput, K.W. and Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in Biotechnology, *Administrative Science Quarterly*, 41(6), 116-145.
- Rodan, S. and Galunic, C. (2004). More than network structure: How knowledge heterogeneity influences managerial performance and innovativeness, *Strategic Management Journal*, 25(6), 541–562.
- Shipilov, A.V. and Li, S.X. (2008). Can you have your cake and eat it too? Structural holes’ influence on status accumulation and market performance in collaborative networks, *Administrative Science Quarterly*, 53(1), 73–108.
- Simsek, Z. Lubatkin, M.H. and Floyd, S.W. (2003). Inter-firm networks and entrepreneurial behavior: a structural embeddedness perspective, *Journal of Management*, 29(3), 427–442.
- Singh, H., Kryscynski, D., Li, X. and Gopal, R. (2016). Pipes, pools, and filters: how collaboration networks affect innovative performance, *Strategic Management Journal*, 37(8), 1649–1666.
- Soh, P.-H. and Roberts, E. B. (2005). Technology alliances and networks: an external link to research capability,” *Engineering Management, IEEE Transactions on*, 52(4), 419–428.

- Subramaniam, M. and Youndt, M.A. (2005). The influence of intellectual capital on the types of innovative capabilities, *Academy of Management Journal*, 48(3), 450–463.
- Tortoriello, M. (2014). The social underpinnings of absorptive capacity: The moderating effects of structural holes on innovation generation based on external knowledge, *Strategic Management Journal*, 36(4), 586-597.
- Tsai, W. (2001). Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance, *Academy of Management Journal*, 44(5), 996–1004.
- Tzabbar, D. (2009). When does scientist recruitment affect technological repositioning?" *Academy of Management Journal*, 52(5), 873–896.
- Wang, C. Rodan, S. Fruin, M. and Xu, X. (2014). Knowledge networks, collaboration networks, and exploratory innovation, *Academy of Management Journal*, 57(2), 484–514.
- West, M.A. and Anderson, N.R. (1996). Innovation in top management teams, *Journal of Applied Psychology*, 81(6), 680–693.
- Zaheer, A. and Bell, G.G. (2005). Benefiting from network position: firm capabilities, structural holes, and performance, *Strategic Management Journal*, 26(9), 809–825.
- Zhou, K.Z. and Li, C.B. (2012). How knowledge affects radical innovation: Knowledge base, market knowledge acquisition, and internal knowledge sharing, *Strategic Management Journal*, 33(9), 1090–1102.