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# Network closure's impact on firms' competitive advantage: The mediating roles of knowledge processes

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### ABSTRACT

This study draws on the knowledge management and social network disciplines to examine the effect of network closure on organizations' competitive advantage. We hypothesize that the level of network closure affects an organization's capability of knowledge identification, knowledge transfer, knowledge protection and knowledge institutionalization; these capabilities in turn affect an organization's competitive advantage. Thus, we model network closure as indirectly affecting an organization's competitive advantage. A Partial Least Square (PLS) analysis of the survey data of 78 Chinese petrochemical firms shows that network closure can both enhance and decrease an organization's competitive advantage. Network closure enhances an organization's competitive advantage by facilitating knowledge protection and transfer (via institutionalization), but decreases competitive advantage by hindering knowledge identification. Environmental dynamics that the organizations encounter are observed to moderate the effect of network closure. Combining our results with the findings from the literature, we propose that organizations operating in a dynamic environment, where the domain knowledge is in a state of flux, need to place great importance on knowledge identification; such organizations should choose a sparse network that allows them to receive diverse knowledge. In contrast, organizations operating in a stable environment should opt for a dense network to protect their knowledge and facilitate transfer of required knowledge.

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## Introduction

Increasingly, organizations have resorted to partnering with external firms to procure the knowledge required to deal with product complexity, to share risks and to realize scale economies (Hamel, 1991). Consequently, organizations, especially small medium enterprises (SMEs), operate in “networks” in order to compete with vertically integrated multinational companies (MNCs). Operating in such a network environment raises the need for management to address the issue of managing the organization’s proprietary knowledge.

Though researchers such as Nonaka (1991) and Drucker (1993) have recognized that an organization’s knowledge is one of its most important rent-generating resources, this view is true only insofar “that a firm can protect its knowledge from appropriation or imitation by its competitors” (Liebeskind, 1996, p. 95). Organizations in a network environment, where the knowledge can potentially be widely dispersed beyond the organizational boundaries, are vulnerable to having their knowledge expropriated by other firms in the network (Schilling and Steensma, 2001; Powell et al., 1996); these organizations risk failing to protect and deploy the unique knowledge that sustains their competitive advantage (Barney, 1991).

A number of recent studies have examined the difficulties of managing knowledge within a dyadic relationship. Larsson et al. (1998) model a strategic alliance between two partners as a non-cooperative game to show how selfish partners may exploit the alliance. Kale et al. (2000) suggest that an organization balance its need for knowledge with the desire to protect its own knowledge in a dyadic relationship by developing relational capital that supports the appropriate conflict management approaches. Oxley and Sampson (2004) observe that some firms restrict the scope of their alliance activities to protect their core knowledge in dyadic relationships. All these dyadic level studies, however, do not account for attributes of the multiparty network that are important in the knowledge management context. One such attribute is network closure, that is, the extent to which organizations are connected to each other in the network. Brass et al. (2004), in their review of extant research on the antecedents and consequences of networks, discover some studies which find that a high degree of network closure is salient to innovativeness, while other studies view a low degree of network closure as salient. Some light is thrown on the issue by Obstfeld (2005) who observes that a dense network facilitates incremental innovation but not radical innovation. A more detailed study is thus needed to address the question of *how network closure affects organizations’ competitive advantage from a knowledge perspective*.

We address the question by studying a sample of organizations that are part of a network to examine how network closure impacts knowledge identification, transfer, institutionalization and protection and the subsequent effects on their competitive advantage. In this study network closure refers to the degree of inter-connectivity of the focal organizations’ close partners. A network with high closure implies that organizations in the network are well connected with each other. In contrast, a network with low closure means the connectivity among the organizations is low; such a network is known as a sparse network. We focus on the technical relationships between the focal organizations and their partners, as well as the technical relationships among these partners. Our fine-grained analysis revealed the positive as well as the negative effects of network closure on organizations’ competitive advantage. By taking a knowledge perspective, our work sheds light on how organizations may gain knowledge from their partners but at the same time protect their hard-earned knowledge (Sorenson and Wagepack, 2005).

## Review of the literature

Some researchers have examined the influence of network characteristics on an organization’s access to knowledge based on the assumption that such access is the key to superior organizational performance. Tsai (2001, p. 997) argues that network centrality allows an organization to access external information and knowledge helpful to a business unit’s innovativeness and business performance. Baum et al. (2000, p. 270) have found that the size of the alliance network for biotechnology startups is indicative of the ‘efficiency’ of the network in achieving high performance. A large network provides “access to strategic and operational know how ... with minimum costs of

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