



## How social capital and knowledge affect innovation<sup>☆</sup>

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### ABSTRACT

This research analyzes the effects of interorganizational links on radical innovation using a comprehensive framework that integrates three research streams: social capital, the knowledge-based view and innovation. Incorporating data from 143 companies of innovative manufacturing and service industries, our results show that while knowledge complexity per se exerts a clear influence on radical innovation, the effect of knowledge tacitness appears only in combination with social capital. Similarly, the mere existence of strong cooperation agreements (relational social capital) does not guarantee more radical innovations, only when combining high levels of social capital with tacit knowledge does this antecedent produce more radical innovation.

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### 1. Introduction

Fundamental changes in regulation, global competition, and technology make it increasingly difficult for firms to compete successfully. Across different industries, firms are increasingly reliant on external collaboration in securing competitive advantage and enhancing their innovative capabilities (Goes and Park, 1997; Powell et al., 1996). In fact, the conventional wisdom is that innovation processes are interactive processes (Edquist, 1997). The word “interactive” here means “social” in the sense that scientists, technologists, marketing personnel, designers and end-users are likely to be involved in a specific innovation project, working from different organizational bases. Communication across firm boundaries is a profoundly social and interactive process that provides firms with opportunities for shared learning, the transfer of technical knowledge, legitimacy and resource exchange (Nohria and Eccles, 1992; Norman, 2004).

The social capital framework provides an interesting perspective from which to explain the effect of interorganizational relationships on innovation (Subramaniam and Youndt, 2005) in terms of magnitude of change, degree of novelty, or innovativeness (Gatignon

et al., 2002). Social capital is the sum of the actual and potential resources embedded within, available through and derived from the networks of relationships by an individual or social unit (Nahapiet and Ghoshal, 1998). Research on social capital highlights two main dimensions of the interorganizational relationships: the structural dimension and the relational dimension (Granovetter, 1992; Nahapiet and Ghoshal, 1998). The first one refers to the overall pattern of connections between actors, that is, who you reach and how you reach them (density, connectivity and hierarchy are measures of the structural dimension). The second one describes the kind of personal relationships people develops with each other through a history of interactions (respect, trust and friendship are usual aspects included in this dimension).

Social capital approach suggests that factors relevant to the generation of innovation include not only the number of partners and the structure of the network but also the level of commitment, cohesiveness and trust embedded in the interorganizational relationships (Adler and Kwon, 2002; Mu et al., 2008; Tidd, 1995). Even more, the relational dimension could better explain innovation performance (Moran, 2005), given that innovation mostly depends on the quality of relationships established between the people involved (relational dimension), rather than on the density, connectivity and hierarchy of such relationships (structural dimension). Our research focuses on this relational side of social capital.

However, empirical support for the effects of interorganizational links on innovation is scarce (Faems et al., 2005), and other relevant topics should be incorporated into the analysis of such a relationship. According to Hansen (1999) and Levin and Cross (2004), among others, there is a need to include several knowledge types in order to achieve a better understanding of the effect of interorganizational relationships on innovation. Indeed, knowledge transference among

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companies provides opportunities for mutual learning and inter-organizational cooperation, which stimulate the creation of new knowledge and, at the same time, contribute to the organizational ability to innovate (Nielsen, 2005; Tsai, 2001). In addition, the relational side of social capital is more important for innovation when knowledge is tacit and complex, and thus is sticky and difficult to spread (Szulanski, 1996). Tacit knowledge has a personal quality that makes its formalization and communication difficult (Nonaka, 1994). Complex knowledge has a high number of parameters needed to be defined (Pringle, 1951).

The present paper discusses the way in which the effect of the type of knowledge (in terms of tacitness and complexity) on radical innovations will depend on the level of social capital.

The following question is important. How can organizations combine their social capital and internal knowledge to increase radical innovation? To address this question, this paper includes three objectives. The paper analyzes the effect of external social capital on radical innovation, analyzes the influence of knowledge tacitness and complexity on radical innovation, and explores the moderating role of social capital in the relationship between knowledge (tacitness and complexity) and radical innovation.

This paper makes several contributions to research. First, at least three separate bodies of literature – on social capital, innovation, and the knowledge-based view – have addressed aspects of these questions. However, researchers have rarely considered the connections between these bodies of literature, a point that is the principal focus of this paper. In this vein, the paper proposes and tests a theoretical model that links these streams. That is, we analyze both the independent and joint effect of social capital and knowledge-based view on radical innovations. Second, this research examines and explains the influence of the relational dimension of external social capital on radical innovation. This is important because, traditionally, the literature has analyzed the structural side of social capital. However, the relational side of social capital may exert a stronger effect on innovation (Moran, 2005). Third, whereas previous research analyzes knowledge tacitness as a broad construct that includes tacitness and complexity (e.g., Subramaniam and Venkatraman, 2001), our research conducts an individualized study of each of these types of knowledge with the aim of a better understanding of their different effects on radical innovation. Fourth, this article focuses on radical innovation rather than innovation in general. This is important because radical innovations offer greater product advantage and opportunities for differentiation (Calantone et al., 2006; Gatignon and Xuereb, 1997; Kleinschmidt and Cooper, 1991), and has a positive effect on firm performance (Nijssen et al., 2006; Salomo et al., 2008; Zhou et al., 2005).

The paper proceeds as follows. The first section presents the theoretical background that led to the establishment of the hypotheses. The second section describes the empirical testing of such relationships. Last, the discussion includes findings and presents further conclusions, contributions, limitations and ideas for future research directions.

## 2. Theoretical background

### 2.1. Social capital and radical innovation

The literature on innovation broadly discusses the positive effect of interorganizational collaboration on innovation and highlights a number of reasons that explain why these interorganizational relationships stimulate innovation (De Man and Duysters, 2005; Nielsen, 2005). Most of these arguments rest on the potential of interorganizational collaboration to facilitate knowledge-sharing and interactive learning processes among participating firms (Capaldo, 2007). Adler and Kwon (2002) state that the interorganizational network's primary direct benefit involves access to additional sources of information and improved information quality, relevance and

timeliness. Also, these links help firms to acquire new skills and knowledge.

In industries that are facing rapid technological change, a single company rarely commands the full range of expertise that is needed to create timely and cost-effective new product innovation. Strategies used to reduce development costs, lessen the inherent risks of product introduction, and access technology or know-how that is otherwise unavailable internally have led firms to establish alliances and cooperative agreements. In this context, organizations can exchange resources for mutual benefit, counteracting technological specialization and resource scarcity and decreasing the risk associated with major research projects (De Man and Duysters, 2005; Kotabe and Swan, 1995). Literature supports that social capital enhances not only innovation but radical innovations. Firms with complementary knowledge can combine their specific strengths and develop new technologies or products that any single partner would not have been able to create on its own (Gerpott, 1995). Furthermore, alliances may increase radical innovations because they act as searchlights that allow firms to scan their environment for promising new technologies at low cost (Duysters and De Man, 2003).

The reasoning regarding the advantages of interorganizational relationships with regard to radical innovation may lead to the conclusion that direct and indirect links among individuals and groups facilitate innovative activities (Adler and Kwon, 2002). In order to increase innovation, a firm should focus on the diversity of its contacts, with more contacts by definition increasing the probability of network diversity (Capaldo, 2007). Nevertheless, the number and diversity of connected entities alone do not explain the advantages of interorganizational relationships for innovation or even more for radical innovations. It seems that how these inter-organizational relationships are in terms of quality (relational dimension of social capital) rather than the number of partners in terms of density or connectivity of the network (structural dimension) is crucial to provide cohesion and thereby facilitate the pursuit of collective goals (Adler and Kwon, 2002). As Collins and Clark (2003) explain when defining social capital, it is important not only the network size and range but the strength of these ties, in terms of the interaction frequency, relationship duration, and the emotional intensity or closeness of a bond.

Long-lasting, repeated and trusted relationships often characterize this relational dimension of social capital in which we focus this research; thus, such social capital relates to the concept of strong ties between partners (Levin and Cross, 2004). As Capaldo (2007) suggests, when strong ties exist, the network develops a high degree of trust and it encourages partners to make greater resource commitments to the relationships. In similar terms, Tidd (1995) suggests that a firm's ability to develop and commercialize new products by building on novel forms of innovation requires strong interorganizational linkages.

To date, several advantages of this relational side of external social capital have come to light. Solidarity is an important benefit of interorganizational networks; the existence of strong relationships (Holmen et al., 2005), that is "mutually oriented interaction between two reciprocally committed partners" (Häkansson and Snehota, 1995: 25) favors strong social norms and beliefs that encourage compliance with local rules and customs and reduce the need for formal controls (Adler and Kwon, 2002). Because of this solidarity, a trust network can transmit more sensitive and richer information than can other types of networks (Krackhardt and Hanson, 1993). In a similar vein, Mu et al. (2008) suggest that external social capital developed via inter-firm interactions, especially trust-based-ties, accelerates knowledge flow and acts as an informal governance mechanism between firms.

Capaldo's (2007) research shows how manufacturers and external designers in strong, trust-based relationships are willing to pool their assets and share their knowledge with partners, secure in the awareness that the parties with whom they are sharing will not

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