# Information Sharing in Innovation Networks

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## BACKGROUND

*Innovation networks* help members develop new products at a faster rate with lower investment commitments. The R&D consortium named Semiconductor Manufacturing Technology (SEMATECH), with member firms such as Motorola, Texas Instruments, and others, is an example of such a network. In a study of this network, Lim (2000) found that the network members were able to develop an innovative copper-based semiconductor that rivaled a similar product developed by (at the time) an independently operating IBM. The SEMATECH consortium experienced a significantly abbreviated time line and collectively invested significantly less money than did IBM with almost identical results. Lim attributed the innovative success of SEMATECH to the "connectedness" of the firms.

Researchers engaged in studies examining interorganizational alliances generally agree with the findings of Lim and others that innovation network alliances represent a potential solution to mitigate environmental uncertainty, in part through the sharing of information (e.g., Gulati & Gargiulo, 1999). Van de Ven (2005) refers to this strategy for dealing with environmental uncertainty as "Running In Packs." The basic logic is that as a network grows in membership, the amount of information any individual firm can access grows, and the value of membership in that network grows. Consequently, firms engaged in networks typically realize superior economic gains from their increased access to information relative to independent or nonaligned firms (e.g., Carlsson, 2002; Van de Ven, 2005).

Since organizations join networks to mitigate costs and uncertainties, the question of how network characteristics affect (or not) the transfer of information is relevant to both practitioners as well as researchers in knowledge management and/or organizational learning. For instance, some innovation networks are composed of members engaged in similar activities while other networks are composed of members engaged in very different activities. Some networks tolerate more competition among their members than others. Finally, some networks are more centrally governed than others. These differences in how an innovation network is formed and governed raises an important question—Given that firms embedded within organizational networks experience greater exchange of information relative to firms operating outside of a network, how do the different characteristics of these networks impact the movement of that information?

In this chapter, we will first review the two primary factors that have been demonstrated to influence the transfer of information—*absorptive capacity* and *causal ambiguity*. We then review three characteristics of *multi-organizational networks—governance structure, scope of operations,* and *intensity of competition*—with particular attention to the issue of information transfer. We develop six testable propositions regarding how these network characteristics would be expected to affect absorptive capacity and causal ambiguity among networked firms. Finally, we discuss future and emerging trends related to the transfer of information among networked firms.

## INFORMATION SHARING

Economic theories such as the *knowledge-based view of the firm,* view information as an asset that will move unencumbered and without cost within and among organizations; although information is recognized as an asset, unlike other assets, its transferability has no associated costs. However, some authors have suggested that this may not be the case (e.g., von Hippel, 1994). In fact, the transfer of information is not necessarily frictionless and has even been described as "sticky"and the organizational implications associated with transfer "stickiness" can reach beyond issues of cost and simple inefficiencies (Szulanski, 1996). Information is increasingly recognized as the engine of economic growth and a source of competitive advantage, and where its transfer is difficult, the implications are more strategic and may threaten a firm's long-term competitiveness, including, new enterprise formation; the exploitation of technological know-how; and the successful development and commercialization of new products and services (Teece, 2001).

### Absorptive Capacity

An organization's absorptive capacity has been described as the organization's ability to first recognize and then realize any value from the external information to which it is ex-

posed (Cohen & Levinthal, 1990). Such exposition arguably increases when a firm becomes a member of a network. As a result, if absorptive capacity is low, the transfer of information is less likely to occur. In a networked context, the absorptive capacity of the recipient organization is integral to the success of *information sharing*. The ability to identify new, relevant information and have the processes in place to then bring it internal to the organization quickly becomes a competitive advantage when translated into economic rents. However the paradox of absorptive capacity is that an organization that does not have it may not understand that they need it; organizations with low absorptive capacity will be less likely to value external information (Mosakowski, 1997).

## Causal Ambiguity

Unlike absorptive capacity, which is considered to be an enabler of information sharing, the presence of causal ambiguity has been identified as an isolating mechanism of information, impeding its movement within and among organizations (Knott, 2003). The concept of causal ambiguity is centered around the organizational inputs and the causal factors used in combination to generate known outcomes. Organizational inputs can be the raw materials used to manufacture a product, and the causal factors can be viewed as the processes used. When an organization is successful in benefiting from an innovative process but does not know what combination of inputs and process factors generated the final outcome, their knowledge is, at best, causally ambiguous.

Causal ambiguity as an inhibitor of information transfer has been recognized across much of the research in organizational learning. Mosakowski (1997) developed a useful typology through which to examine the effects of causal ambiguity on decision making. Extending the work of Lippman and Rumelt (1982), Mosakowski determined that although increased causal ambiguity has the potential to increase competitive advantage by increasing the difficulties associated with imitation by competitors, increased causal ambiguity has the impact of decreasing information transferability by associating its application.

# CHARACTERISTICS OF ORGANIZATIONAL NETWORKS

In this chapter, we approached the examination of networks using two established perspectives. The first, *transaction cost economics*, recognizes that exchange agreements between and among firms must be governed and contingent on the transactions to be organized; some forms of governance are better than others (Williamson, 1973, 1975). Specifically, this includes examination of centralized and decentralized governance. The second perspective, *social network theory*, examines the individual *nodes* and *linkages* within a network to explain how organizations (or individuals) will interact (e.g., Westlund, 1999). Using these well-established perspectives as a basis, we discuss the three primary characteristics of an interorganizational network that would be expected to have particular influence on the transfer of information—governance structure, scope of operations, and intensity of competition.

## Governance Structure

Networks of organizations represent an organizing principle residing between pure market-based transactions and complete organizational self-sufficiency (Thorelli, 1986). However, once "within" the network, the question of governance structure remains to be determined. In his work on transaction cost economics, Williamson (1973, 1975) identifies the preferred governance structure for providing authority to address issues related to opportunistic behavior, information impactedness and bounded rationality as centralized or hierarchical. This governance structure would also be expected to have the ability to mandate standardization of operations, language, policies, and so forth. Conversely, a decentralized governance structure is described as one of peer group associations, without subordination, involving collective and usually cooperative activities, but deficient in its ability to address opportunism and free-rider abuses. A decentralized governance structure has been suggested as preferable to facilitate innovation and new knowledge creation, where the former structure has been suggested to better facilitate the transference of existing information (e.g., Adler, 2001; Chen & Edgington, 2005).

## Scope

Researchers engaged in social network theory and organizational alliances have stated that the degree to which the members of a multi-organizational network or of a dyadic alliance demonstrate operational homogeneity affects the likelihood of information transfer (e.g., Westlund, 1999). Specifically, operational similarity has been used to explain, in part, when information does or does not transfer between or among alliance partners (e.g., Simonin, 1999). For the purposes of this chapter, we will refer to this network characteristic of member similarity as the *scope of operations*, where a high scope network will have operationally dissimilar members while a low scope network will have operationally similar members.

## Intensity of Competition

The concept of linkages among the nodes or members in a network has been identified to have significant impact on