



How do networks matter? The performance effects of interorganizational networks

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Abstract

A growing body of research suggests that an organization's ties to other organizations furnish resources that bestow various benefits. Scholars have proposed different perspectives on how such networks of ties shape organizational behavior and performance outcomes, but they have paid little attention to the underlying mechanisms driving these effects. We propose reach, richness, and receptivity as three fundamental mechanisms that jointly constitute a parsimonious model for explaining how network resources contribute to organizational performance. *Reach* is the extent to which an organization's network connects it to diverse and distant partners. *Richness* represents the potential value of the resources available to the organization through its ties to partners. *Receptivity* denotes the extent to which the organization can access and channel network resources across interorganizational boundaries. Whereas reach specifies how wide-ranging and heterogeneous the organization's network connections are, richness characterizes the value of the combinations of resources furnished by its partners. Receptivity in turn portrays how organizational capabilities and the quality of ties to partners facilitate flows of network resources. We propose that the interplay of these three mechanisms determines the benefits that the organization obtains from its network: reach and richness jointly determine the potential value of the network, while receptivity is crucial in realizing that potential.

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Contents

1. The effects of interorganizational networks	209
2. Reach, richness, and receptivity.	210
2.1. Network resources and the origins of the three mechanisms	211
2.2. Reach of network resources	211
2.3. Richness of network resources	214
2.4. Receptivity of network resources	215
3. The interplay of reach, richness, and receptivity	217
3.1. The interaction of reach and richness	217
3.2. The interaction of richness and receptivity	218
3.3. The interaction of reach and receptivity	218
4. Discussion and implications	219

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5. Future research	221
Acknowledgement	222
References	222

Social network perspectives have gained much attention among scholars studying interorganizational relationships. This rich body of research has extended ideas developed in the study of interpersonal networks and applied them to the study of networks that emerge from interorganizational ties. Hence, scholars have proposed that organizations can be viewed as actors embedded in webs of social relations, and sought to investigate the antecedents and consequences of organizations' embeddedness in interorganizational networks (e.g., Gulati, 2007; Kilduff & Tsai, 2003). Some scholars underscored the structural properties of networks (e.g., Burt, 1992; Coleman, 1988), while others concentrated on the attributes of interorganizational ties (e.g., Granovetter, 1985; Granovetter, 1992). A third growing body of research has portrayed interorganizational ties as conduits of "network resources" that in turn shape organizations' behavior and performance (Gulati, 1999; Gulati, 2007; Gulati, Nohria, & Zaheer, 2000; Lavie, 2006). Most studies have exclusively relied upon only one of these lenses when researching interorganizational networks, leading to the blurring of underlying mechanisms that drive the performance effects of these networks. We discuss the weaknesses of the prevalent approaches for network research, identify the fundamental mechanisms that drive the performance effects of interorganizational networks, and discuss their interactions and implications.

Although networks research has evolved considerably and gained methodological sophistication, several salient shortcomings persist. First, scholars have witnessed the proliferation of dueling constructs, notably social embeddedness and social capital. The social embeddedness perspective holds that the context of social relationships in which actors are embedded influences organizational behavior and economic outcomes (Granovetter, 1985; Granovetter, 1992; Uzzi, 1996; Uzzi, 1997). By contrast, the notion of social capital emphasizes the ability of some actors to benefit from their positions in particular social structures (Adler & Kwon, 2002; Burt, 1997; Coleman, 1988; Portes, 1998; Putnam, 1993). Despite their different origins, the social capital and embeddedness perspectives exhibit many similarities, in part because of their shared broad scope and cross-pollination.

In addition, the networks literature has suffered from an unduly narrow focus, to the virtual exclusion of other aspects of networks, on the structural properties of actors as the sole determinants of performance. Consider, for instance, its neglect of actor attributes or characteristics as determinants of organizational performance. In most network studies, such factors are viewed as exogenous constraints or controls. This is particularly egregious in that some studies have shown not only that the attributes of organizations may have an independent effect on organizational performance, but also that they may interact with structural attributes in shaping performance (e.g., Gulati, 1999). Approaches that focus exclusively either on network structure, relational properties of ties, or organizational attributes offer incomplete theoretical and empirical treatment. A related issue is the misapplication of theory across levels of analysis. Applying interpersonal reasoning to the study of the implications of interorganizational networks can be inappropriate in that the mechanisms that drive interorganizational relationships differ in most part from those salient in interpersonal exchange.

As the study of interorganizational networks matures, it is useful to revisit its foundations. It is also imperative to move away from the tendency to underscore structural properties of networks and to correct any misidentification of factors that may emanate from the straightforward application of constructs drawn from the context of interpersonal relationships. In order to rectify these shortcomings, we identify the mechanisms that underlie the performance effects of interorganizational networks. Our study isolates three such mechanisms: reach, richness, and receptivity. *Reach* is the extent to which an organization's network connects it to diverse and distant partners; *richness* is the potential value inherent in the organization's network resources; and *receptivity* is the extent to which the organization can channel and leverage the available network resources via its ties to partners.

Reach is implicit in the structure within which an organization is embedded, but it is more than the simple outcome of any given structural property, such as centrality. In particular, reach derives from network ties that enable the organization to connect with distant and diverse partners. In turn, richness is the potential value of the network resources available to the organization. This value is derived not only from individual resources belonging to or deployed by the organization's partners, such as their financial assets or trained personnel, that become available via its ties to them, but also from the various combinations of these resources. Finally, receptivity captures the relational quality of the organization's ties as well as its capacity to leverage resources available via its network that together

enable it to realize the value of network resources. Hence, receptivity encompasses both the motivation to engage in exchange and the capacity to do so. To study these three mechanisms, we integrate disparate facets of networks and identify corresponding organizational capabilities that play distinct roles in enhancing the value of networks to organizations. We posit that the value that the organization derives from its interorganizational network results from complex interactions of its reach, richness, and receptivity. This parsimonious conceptualization sheds light on the multifaceted ways in which an organization's network resources shape its performance.

Our study contributes to the networks literature in several ways. First, we expand on the core mechanisms underlying the performance effects of interorganizational networks. Second, by focusing attention on the organization's ability to extract benefits from its network, we complement established taxonomies that have implicitly assigned a passive role to the organization (e.g., Burt, 1992; Coleman, 1988; Granovetter, 1985; Granovetter, 1992), and highlight the value of network resources as a primary attribute of organizations in networks. Third, our framework elucidates novel mechanisms that have been merely implicit in the networks literature and that merit more explicit integration (Kilduff & Brass, 2010).

Our conception of reach, richness, and receptivity goes beyond the traditional distinction between structural and relational aspects of networks or the more recent conceptualization of networks as pipes or prisms (Podolny, 2001). Extant frameworks fail to consider actor attributes that may shape organizational performance, and thus have tended to confound structural and relational properties of the networks with the value of network resources. By bringing network resources to the foreground, our framework underscores the distinctive mechanisms that may drive the performance effects of networks. More importantly, it reminds us that the ultimate purpose of building interorganizational networks and nurturing ties to partners is to access, integrate, and leverage partners' resources. These processes are not passive but rather entail proactive action whose nature may vary across organizations, leading to varying outcomes. By introducing this framework, we seek to encourage the development of more comprehensive theory that acknowledges proactive action by organizations and complements recent methodological advances in social network research.

1. The effects of interorganizational networks

Recent research has paid increasing attention to the benefits that accrue to organizations from their networks of ties to other organizations. Some scholars have referred to the resources furnished by such networks as "network resources" and contrasted their benefits with those ascribed to internal resources (e.g., Gulati, 1999; Gulati, 2007; Lavie, 2006). This emerging research complements the social embeddedness perspective (e.g., Granovetter, 1985) and the related social capital perspective (e.g., Adler & Kwon, 2002; Portes, 1998; Putnam, 1993).

The social embeddedness perspective asserts that the context of social relationships in which an organization is situated influences organizational behavior and economic outcomes (Granovetter, 1985). In developing this perspective, researchers have distinguished two facets of embeddedness: relational embeddedness and structural embeddedness. *Relational embeddedness* is a characteristic of dyadic ties (Granovetter, 1985; Granovetter, 1992). Originating in traditional analyses of solidarity and cooperation (Durkheim, 1933; Durkheim, 1951), relational embeddedness encompasses cohesive direct ties that reinforce collaboration by providing trusted channels for knowledge and information. *Structural embeddedness*, by contrast, considers the implications of the overall network structure in which an organization is situated, encompassing not just its direct ties but also its position in a larger network (Granovetter, 1992). Such research stresses "the nature of actors' ties not to one another, but to third parties" (Emirbayer & Goodwin, 1994, p. 1422).

A related stream of research has viewed the network as a form of social capital. This research emphasizes the "ability of actors to secure benefits by virtue of membership in social networks or other social structures" (Portes, 1998, p. 6). For instance, Coleman (1988) and Burt (1992) have demonstrated that networks generate informational advantages that can in turn steer actors toward beneficial actions. Others have argued that social capital enhances organizational performance by nurturing intellectual capital (Nahapiet & Ghoshal, 1998) and by enhancing innovation (Ahuja, 2000a; Tsai & Ghoshal, 1998), knowledge transfer (Inkpen & Tsang, 2005), access to information (Burt, 1992; Koka & Prescott, 2002), network efficiency (Baker, 1990; Burt, 2000), and diversity (Baum, Calabrese, & Silverman, 2000; Lin, 2001).

Early research on networks focused on individuals' ties, examining how the interpersonal networks in which individuals are situated shape their behavior and performance. Over the past two decades, however, a burgeoning body of research has investigated similar dynamics among organizations (e.g., Ahuja, 2000b; Baum et al., 2000; Gulati,

1995a; Gulati, 1995b; Gulati, 1999; Gulati, 2007; Nohria & Eccles, 1992; Nohria & Garcia-Pont, 1991; Rowley, Behrens, & Krackhardt, 2000; Stuart, Hoang, & Hybels, 1999; Zaheer & Bell, 2005). Some accounts have sought to apply constructs developed for the study of individuals, whereas others have tried to develop novel approaches to studying interorganizational networks. Meanwhile, the type of networks studied has expanded from board interlocks to interorganizational alliances and a plethora of other network ties (Gulati, 1998; Gulati et al., 2000).

As scholars have extended network research from interpersonal to interorganizational ties, they have shifted from studying how networks shape individuals' behavior to how they impact organizational performance. In the course of this transformation, certain conceptual shortcomings become evident, notably *model sufficiency*, *model specificity*, and the *independence assumption*. Let us briefly consider each of these conceptual gaps.

First, by focusing exclusively on how the structural properties of an organization's network position influence its performance, prior research has neglected other plausible aspects of networks that may shape performance. One result has been reliance on incomplete models to explain behavior and outcomes. Much prior research assumes, for instance, that organizations occupying similar network positions can extract similar benefits from those positions, yet organizations differ in their abilities to do so (Gulati, 1999; Gulati et al., 2000; Gulati, 2007; Lavie, 2007). This overemphasis on the structural or relational properties of networks has led to neglect of heterogeneity in actor and alter attributes. Our model-sufficiency critique emphasizes that organizations with equivalent network structures may vary with respect both to the network resources available to them and to their abilities to leverage those resources.

Second, our model-specificity critique calls into question the overly broad definitions used to assess the role of networks in shaping performance. This vagueness has led in turn to conflicting interpretations and operationalizations. For example, some researchers view the distinction between relational and structural embeddedness as equivalent to direct versus indirect ties; others consider both types of embeddedness to be structural properties, and thus associate relational embeddedness with the overall quality of ties, regardless of their proximity. Furthermore, some scholars assert that "social capital comprises both the network and the assets that may be mobilized through that network" (Nahapiet & Ghoshal, 1998, p. 243), while others suggest that "social capital inheres in the structure of relations between actors and among actors. It is not lodged either in the actors themselves or in physical implements of production" (Coleman, 1988, p. S98). The former definition blurs the distinction between resources and the means for channeling them; the latter disregards the locus of resources. A parallel debate concerns competing portrayals of networks as "pipes" or "prisms": the former conceives of networks as conduits for the flows of information and resources, and the latter views network ties as constituent elements of status that differentiate actors (Podolny, 2001).

Our third critique of prior research has to do with the prevalent assumption that various aspects of networks are independent, a notion that has implications for the interdependence of different network features in shaping performance. Studying relational and structural aspects of networks independently is meaningful only if their effects are orthogonal. Some researchers have argued that structural embeddedness may substitute for relational embeddedness (DiMaggio, 1992; Rowley et al., 2000), while others have postulated a "paradoxical inverse relation" between relational and structural embeddedness (White, 1992). Both positions view relational and structural embeddedness as interdependent, but they disagree about the valence of interaction. Similarly, the social capital literature conflates actor attributes with social structure: some studies imply that social capital and human capital are relatively independent, while others associate network structure with personal characteristics (Burt, 1992; Burt, Jannotta, & Mahoney, 1998; Nahapiet & Ghoshal, 1998; Singh & Fleming, 2010). This debate leaves unresolved the question of whether key constructs such as relational and structural embeddedness are independent: for instance, does the cohesiveness of dyadic ties (a relational aspect) complement or substitute for a central network position (a structural aspect) in its attendant effect on organizational performance? These critiques call for more profound examination of the core mechanisms that underlie the performance implications of interorganizational networks.

2. Reach, richness, and receptivity

We propose that three distinct mechanisms—reach, richness and receptivity—serve as mutually reinforcing drivers of the value that an organization obtains from its network. The roots of scholarly thinking about the three mechanisms can be found in the scattered research on the consequences of networks. By introducing these core mechanisms we seek to bring some coherence to the fragmented research on networks.

2.1. *Network resources and the origins of the three mechanisms*

The emerging research on network resources suggests that valuable resources may be accessible not only within an organization's boundaries but also via its ties to other organizations. As Gulati (1999, p. 399) notes: "Network resources inhere not so much within the firm but in the interfirm networks in which firms are located." Network resources can be conceptualized as resources belonging to or deployed by an organization's partners and are accessible to it via its ties to those partners (Gulati, 1999; Gulati, 2007; Jensen, 2003; Lavie, 2006; Zaheer & Bell, 2005). Network resources can include the partners' intellectual property, marketing channels, manufacturing facilities, personnel, and a host of other resources. Recent work has begun to elucidate the precise locus of network resources and the role of interorganizational ties in channeling those resources (Gnyawali & Madhavan, 2001; Gulati, 2007; Lavie, 2006). Still, most research has continued to focus on the structural and relational properties of networks as proxies for the resources they provide, paying less attention to more direct and precise ways of assessing the resources channeled via network ties.

One stream of research has focused on the structural properties of networks as indicative of the benefits that organizations are likely to obtain from their networks (e.g., Ahuja, 2000a, 2000b; Baum et al., 2000; Gulati, 1995b; Gulati, 1999; Gulati, 2007; Provan & Milward, 1995; Provan & Sebastian, 1998; Rowley et al., 2000). This research underscores the performance implications of network properties such as structural holes (Burt, 1992), centrality (Bonacich, 1987; Freeman, 1979; Podolny, 1993), structural equivalence (Burt, 1987), and density (Coleman, 1988). Another stream of research has highlighted the importance of the quality of ties in shaping the benefits derived from networks. It has suggested that exchange relations are strengthened by mutual trust, the sharing of fine-grained information, and joint problem-solving, all of which enhance the organization's access to network resources (e.g., Dyer & Nobeoka, 2000; Dyer & Singh, 1998; Gulati & Sytch, 2007; Madhok & Tallman, 1998; Uzzi, 1997; Zaheer, McEvily, & Perrone, 1998). Both streams of research point to the differential ability of organizations to exploit the opportunities that their networks provide, albeit by different means. A separate stream of research has suggested that organizations have different levels of absorptive capacity for external resources (e.g., Lane & Lubatkin, 1998; Lane, Salk, & Lyles, 2001; Tsai, 2001). Accordingly, organizations are presumed to have differential capacities for valuing, assimilating, and applying resources acquired from their partners. Thus, an organization's ability to extract and apply network resources is as important as the nature of its network ties. Finally, some scholars have begun to consider how the quality of resources accessible via interorganizational networks shapes the performance implications of networks. Empirical research has furnished evidence on the contributions of network resources by demonstrating how organizations can benefit from affiliations with prominent partners (Carter & Manaster, 1990; Higgins & Gulati, 2003; Saxton, 1997; Stuart et al., 1999) and from direct access to partners' various resources (Lavie, 2007; Rothaermel, 2001; Stuart, 2000). Despite the growing body of theoretical and empirical research on these performance implications, the precise nature of network resources and the mechanisms that organizations use to access them have remained elusive.

Building on these separate streams of research, we propose that network resources create value via three mechanisms—reach, richness, and receptivity—that individually and collectively shape organizational performance (see Table 1). These constructs blend structural and relational properties, as well as organizations' associated capabilities, to explain the performance implications of networks in an integrated manner. Our framework provides not only a descriptive but also normative account of how organizations leverage their network resources.

2.2. *Reach of network resources*

Reach is the extent to which the organization's network of ties connects it to distant and diverse partners. The structural position of the organization is an important element of reach, but we expand this notion by explicitly including partners' organizational characteristics as well. Prior research has treated the partners in an organization's network as homogeneous, differing only in their structural attributes—an approach that overlooks differences in their other attributes that may shape the accessibility of network resources.

Our formulation of reach encompasses structural properties that describe the span of the network within which an organization is situated. Network structure influences economic action by enabling the organization to gain access to resources and information via its network of contacts (Granovetter, 1992). The conceptualization of the structural aspect of network reach is rooted in early research that emphasized distinctive facets of networks. Pioneers like

Table 1

Reach, richness, and receptivity: mechanisms and capabilities.

Mechanism	Key idea	Associated organizational capabilities
Reach: the extent to which the organization's network of ties connects it to distant, different, and diverse partners	<p>Indicates how wide-ranging and heterogeneous the organization's network connections are</p> <ul style="list-style-type: none"> - Distance: the distance between the organization and its partners with respect to structural properties of the network - Difference: how different the organization is from its partners with respect to organizational attributes - Diversity: the span of the network in terms of the structural and organizational heterogeneity of partners 	Scanning: the ability to search for desired network resources held by current and prospective partners, and to establish ties with such partners by leveraging prior relationships or third-party referrals
Richness: the value derived from the attributes of network resources available to the organization	<p>Indicates how the inherent attributes of individual network resources create benefits for the organization</p> <ul style="list-style-type: none"> - Utility and rarity: respectively, the premium that users are willing to pay for services that network resources support, and the ex-ante and ex-post limits on the capacity of competitors to access similar network resources - Appropriability: the extent to which network resources are accessible and transferable <p>Indicates how combinations of network resources create synergies for the organization</p> <ul style="list-style-type: none"> - Bilateral combinations integrate network resources with internal resources - Multilateral combinations integrate various network resources furnished by different partners 	Orchestrating: the ability to identify value-creation opportunities based on complementarity between an organization's own resources and its partners' resources, and to integrate partners' network resources with internal resources and configure them to create synergies
Receptivity: the extent to which the organization can channel and leverage network resources across interorganizational boundaries	<p>Indicates how the relational quality of ties facilitates resource flows</p> <ul style="list-style-type: none"> - Trust: the extent to which the organization and its partners can rely on each other to fulfill mutual obligations, behave predictably, and negotiate and act in good faith - Commitment: the extent to which the organization's leadership recognizes the importance of relationships, cares about their long-term prospects, sponsors them, and invests in their maintenance - Tie multiplexity: the extent to which ties to partners are based on contacts with multiple individuals and units in each organization, and involve multiple simultaneous agreements of various types 	<p>Contracting: the ability to devise agreements and establish governance mechanisms (including conflict-resolution processes) to establish the right to access network resources while protecting proprietary assets from leakage and improper use</p> <p>Absorbing: the ability to absorb external knowledge, direct network resources to appropriate users in the organization or network, and efficiently store them for future use</p>

Moreno (1934) and Bott (1957) respectively introduced sociometry to psychological research and the use of structural analyses to sociology in order to study the positions of individuals in social networks. The underlying intuition was that network structure enables an actor to reach particular alters, and that such patterned access in turn influences the actor's behavior and outcomes. For example, Brass (1984) provided early evidence on how network members could enhance their own decision-making by reaching connected alters. More recent work describes the span of the network by considering the typical path length—that is, the minimum number of ties that connected remote actors in the network before they established direct ties (e.g., Baum, Shipilov, & Rowley, 2003; Gulati, Sytch, & Tatarynowicz, *in press*; Watts, 1999). Another interesting observation is that an actor's advantage resides not merely in its own reach but also in its alters' lack of comparable reach (Burt, 1992). In the interorganizational context, reach indicates the scope of the network of connected partners that can furnish resources via their ties to the organization.

Our conception of reach, however, goes beyond the traditional notion of network structure to take into account the multi-dimensional ways in which the scope of the organization's network can be defined. The organization's network, as we conceive it, incorporates both structural properties (e.g., how distant a potential partner is in terms of path length) and organizational attributes (e.g., how different a partner is from the focal organization). Further, we need to consider which partners the organization is able to reach as well as the diversity of its partner set. Accordingly, reach encompasses three elements: distance, difference, and diversity.

Distance captures how far into its network an organization's ties enable it to reach—that is, the extent of its penetration into the network. From a structural standpoint, ties to distant actors provide greater reach than ties to proximate actors. When an organization's network is characterized by extensive distance, the organization explores opportunities by seeking partners beyond its local network and by bringing remote allies within reach. When an organization seeks partners that were not previously part of its network neighborhood, it extends its reach, thus increasing the potential availability of resources beyond those found in its immediate network (Gulati, 1999; Lavie & Rosenkopf, 2006).

However, reach is more than structural. The organization's partner set can also be characterized in terms of various organizational attributes that differentiate it from the organization, such as geographical location, cultural differences, and even institutional differences (Lavie & Miller, 2008). Therefore, reach also encompasses the differences in organizational attributes between the focal organization and its partner set. The core idea in prior research has been that such organizational differences are associated with the potential availability of distinctive network resources, which the organization's closer and more similar partners cannot necessarily provide (e.g., Gulati & Gargiulo, 1999). In turn, we distinguish the organizational attributes of partners from their resource attributes, and emphasize that the organization typically enjoys more straightforward access to the resources furnished by organizationally similar partners.

Whereas distance and difference capture the structural and organizational separation between the focal organization and partners in its network, diversity captures the range of structural and organizational properties of the organization's partners, irrespective of its own attributes. Prior research has often studied structural diversity (e.g., Burt, 1992) as a proxy for the ability of member organizations to access novel resources, but we distinguish structural diversity from the diversity of resources furnished by the organization's partner set. The diversity element of reach concerns variation in the organizational profiles and network positions of the organization's partners. It is a function of the degree of dissimilarity across the organization's partners with respect to organizational attributes such as industry focus, business lines, geographic location, and culture.

Thus, we contend that reach encompasses structural and organizational aspects of the organization's network and partner set. Distance, difference, and diversity jointly constitute reach, embodying, respectively, structure, organizational attributes, and heterogeneity. The value of such a conceptual distinction is illustrated by the fact that network density does not always mean homogeneity in the organizational context, as researchers who study interpersonal networks have implied. Even within a dense network (low distance), the heterogeneity of partners' industries, organizational forms, and countries of origin (high difference and diversity) can enhance the organization's reach.

Organizations are likely to differ in their abilities to expand their reach proactively. To do so, they must have the capacity to scan their environment for desirable network resources held by existing or prospective partners. Such scanning capability entails familiarity with potential partners and with the industry environment. Not only must organizations know how to scan the environment to identify and locate relevant partners; they also need the skills to establish ties to those partners. Thus, organizations need the capability to establish ties to the right partners—those

most likely to possess relevant network resources, adequate reliability and trustworthiness, and the capability to build productive relationships. For example, Eli Lilly relies on a due-diligence team that visits prospective alliance partners and evaluates their resources and capabilities, including their financial strength, technology, and research facilities. Eli Lilly can then leverage its dedicated alliance function to institute best practices and formal checklists for effectively contracting with those partners (Dyer, Kale, & Singh, 2001). This example illustrates how organizations can nurture capabilities for identifying and forming ties with the right partners. An organization's prior partnering experience can also enable it to discern suitable partners and guide its search via the direct contacts and third-party referrals that shape the trajectory of network evolution (Gulati, 1995b).

2.3. Richness of network resources

Richness is conceptualized as the inherent value of network resources available to the organization, as distinct from the lattice of connections in which it is embedded. That value depends on the specific configuration and attributes of the resources available from the organization's partners. For example, an organization may have an inferior network position, but its ties to partners with rich physical or intellectual capital can make its network more valuable than that of a rival with a superior network position but a relatively weak partner base. The former enjoys a richness-based advantage due to the high quality of the resources it can tap. Hence, richness stems from the inherent value of the network resources available to an organization, which depends in turn on the quantity and quality of those resources.

The benefits of richness arise not only from the potential utility of network resources to the organization but also from their rarity—that is, their relative unavailability to competitors (Barney, 1991). To the extent that there are *ex ante* and *ex post* limits to the capacity of competitors to access similar network resources (Peteraf, 1993), the contribution of these resources to organizational performance will be enhanced. The ease with which an organization can appropriate the value of network resources furnished by its partners may also impact the potential richness of those resources. If those resources are subject to property rights and proprietary asset protection that diminish their accessibility and restrict their use by the organization, the value that it can capture from them will be limited.

Jointly, the span of an organization's network of ties to partners (reach) and the resources that the organization can access via its partners (richness) determine the value that it can potentially extract from its interorganizational network. It is important to note that the richness of a particular network resource will differ across organizations, since value lies in the eyes of the beholder. The same resource may be of greater value to one organization than another. Hence, richness depends both on the organization's internal resource endowments and on the complementary nature of network resources available through its ties to partners. To fully assess the richness of an organization's network resources, one must take into account possible synergies that can emerge by combining its internal resources with those available via external ties to partners (Lavie, 2006). We thus conceive of richness as the value of external resources that complement or add scale to an organization's own internal resources. In fact, certain combinations of network resources may be accessible not only via the organization's ties to partners but also via those partners' ties to each other.

Of course, resources do not have intrinsic value only in their singular form; they also create second-order value through resource combinations. With respect to richness, a distinction must be made between bilateral and multilateral combinations of network resources. A bilateral combination integrates the resources of a single partner with the organization's own resources. A multilateral combination, by contrast, is an aggregation of multiple partners' resources accessible via simultaneous ties within the network. For example, a systems integrator that allies with both software and hardware partners increases the potential benefits that it can derive from its software partners' resources compared to those of a competitor that allies exclusively with software developers. Thus, the potential complementarity of its various partners' network resources increases the overall value of its own resources. To this end, the organization does not rely solely on its internal stock of resources; instead, it serves as a broker or coordinator to leverage the resources of its different network partners. For example, Dyer and Nobeoka (2000) describe how Toyota facilitates simultaneous direct exchange of knowledge and information among its various suppliers, which eventually enhance Toyota's own performance. Dyer et al. (2001) discuss how organizations can assimilate knowledge and best practices learned through alliances and then apply them to other partners. Hence, the richness of network resources cannot be determined directly from the aggregated value of individual network resources. Instead, the value of each network resource can only be determined in the context of

all other internal resources and network resources potentially available to the organization via its individual interactions and the collection of ties it forms.

Orchestrating is an important capability associated with richness. It entails the capacity to integrate the network resources of different partners with each other and with the organization's own internal resources, configuring or combining them to create synergies (Dyer & Singh, 1998). For example, Toyota has developed such a capability for sharing knowledge among partners in its supply network. This capability was built in conjunction with the supplier association, which has established a shared social community and norms for knowledge sharing among partnering suppliers and with Toyota. Furthermore, Toyota has also put in place cross-organizational learning teams and employee transfers across partners in the network as additional ways to ensure that network resources are distributed and shared (Dyer & Nobeoka, 2000). This capability complements the scanning capability associated with reach. The cycle begins with exploratory efforts for seeking prospective partners using scanning, continues with the channeling and integration of network resources, and ends with the effective exploitation of network resources by the organization. For these processes to create value, the partners must offer rich resources that are otherwise difficult to develop internally and that generate synergies when combined with internal resources and other network resources accessible by the organization (Lavie, 2006).

Richness entails mutual discovery that goes beyond mere scanning for ideal partners. It encompasses the capacity to identify potential value-creation opportunities based on complementarity between internally owned resources and partners' resources. Finding partners is one thing; successfully establishing novel ways to create value by engaging with them is another. Organizations frequently seek new collaborative projects only after establishing ties with partners. Thus potential (bilateral or multilateral) combinations of resources possessed by the organization and its partners may remain untapped in the absence of the capacity to conceive of such potential value-creation opportunities. Note that one partner's capacity to identify a potential combination may depend on its counterpart's decision to make relevant resources accessible (Gulati, Khanna, & Nohria, 1994; Hamel, 1991), underscoring the need for mutuality in nurturing this capacity.

An organization's capacity to influence the richness of its network resources is limited by its reach. The organization can seldom dictate which resources its partners will own, but it can decide, to some extent, who to partner with. Ultimately, the bundle of network resources available to an organization is determined by its inclination to enter into interorganizational relationships, the availability of partnering opportunities in the market, and its attractiveness to potential partners (Ahuja, 2000b; Gulati, 1995b). Still, richness is essential to performance because it sets an upper limit on the value that the organization can potentially extract from its network. Whether this value is fully realized depends on receptivity.

2.4. Receptivity of network resources

Receptivity is the extent to which an organization can channel and leverage its accessible network resources across interorganizational boundaries. Receptivity thus captures the extent to which an organization can realize the potential value of the resources available to it by means of its reach and the richness of network resources. By highlighting how effectively the organization can access and leverage network resources, our focus on receptivity shifts attention from potentially available resources to realizable resources. In other words, reach and richness indicate the network's potential value, whereas receptivity has to do with extracting actual value from the network.

Prior research, in its efforts to explain how interorganizational networks influence economic exchange and value creation, has focused primarily on the overall network structure, paying less attention to the actual resources exchanged. The fundamental assumption that interorganizational ties serve as channels for resource transfer has become so well ingrained that scholars often focus on network structures and relations without reference to the resources exchanged. There is no question that interorganizational ties provide an opportunity structure, but the value that networks ultimately create depends on the actual flow of resources. Few studies have examined the conditions that facilitate resource flows (Gupta & Govindarajan, 2000; Knott, Bryce, & Posen, 2003; Lavie, 2006); most have sidelined the question of how the network can furnish resources to its members.

An organization's receptivity to network resources depends first and foremost on the quality of its ties to partners. Greater trust enables flows of rich information and resources at the dyadic level (Gulati, 1995a). At a time when scholarship focused on structural properties, Granovetter (1973) was among the first to propose that the relational quality of network ties could also determine the benefits available to actors embedded in a network. His study suggests

that alters with whom an actor has weak ties are more likely to possess uniquely valuable information than are strongly tied alters.¹ In turn, most scholars contend that strong ties based on repeated and intensive interaction with partners are needed to nurture interorganizational trust, resolve organizational problems, overcome interorganizational conflict, and commit to making specific investments that are essential for value creation in networks (Dyer & Singh, 1998; Gulati & Sytch, 2007; Uzzi, 1996).

The notion that the quality of ties can also shape the extent of the benefits that actors may obtain from their networks is especially important for the study of interorganizational networks, in that the quality of ties, captured for instance by interorganizational trust, has a material impact on the value that the organization and its partners can extract from their ties (e.g., Gulati & Nickerson, 2008; Gulati & Sytch, 2007; Gulati & Sytch, 2008). Interorganizational trust defines the extent to which an organization and its partners can rely on each other to fulfill obligations, behave predictably, and negotiate and act in good faith (Gulati, 1995a; Zaheer & Venkatraman, 1995). Interpersonal trust complements interorganizational trust (Zaheer et al., 1998) but is distinct from it. Interorganizational trust facilitates resource exchange, which in turn contributes to organizational performance (Uzzi, 1997; Zaheer & Venkatraman, 1995).

Another aspect of tie quality has to do with the degree of commitment that partners exhibit in their relationship. To the extent that corporate managers on both sides are committed to the partnership and its objectives and willing to invest in maintaining and developing their collaboration, the accessibility of network resources improves. The capacity to mobilize resources to support a relationship contributes in turn to its likely success (Gulati et al., 1994; Doz & Hamel, 1998; Kale, Dyer, & Singh, 2002; Mohr & Spekman, 1994; Ring & Van De Ven, 1994).

The quality of ties between organizations is also a function of multiplexity, i.e., the extent to which ties between organizations are based on relationships between multiple individuals and units in each partner's organization and involve multiple types of simultaneous agreements. Tie multiplexity can reduce search costs and facilitate the flow of both tacit and explicit knowledge in a network (Dyer & Nobeoka, 2000; Gulati, 1995a).

Along with building and maintaining high-quality ties with partners, receptivity entails processes that enhance the effectiveness of resource flows across interorganizational boundaries. This can be achieved by means of contracting and absorptive capabilities that enhance the accessibility and utilization of network resources (e.g., Kale et al., 2002; Lorenzoni & Lipparini, 1999). Contracting entails ability to devise agreements and formulate governance arrangements, including conflict-resolution processes, to establish and exercise the right to access network resources while protecting the organization's own proprietary assets from leakage and improper use. By formulating appropriate governance structures, the organization can reduce coordination and monitoring costs and establish formal and informal arrangements for effective channeling of network resources (Dyer & Singh, 1998; Gulati, Lawrence, & Puranam, 2005; Gulati & Singh, 1998). Similarly, by reducing the hazards of opportunistic behavior and the undesirable spillover of network resources (Kale, Singh, & Perlmutter, 2000; Lavie, 2006; Parkhe, 1993), the organization can enhance the flow of network resources for which access rights have been granted.

Receptivity can also be enhanced by developing absorptive capability. This capability encompasses learning and internalizing external resources (Cohen & Levinthal, 1990; Lane et al., 2001), which enable the organization to direct network resources to appropriate users within the organization or its network, and to store and preserve such resources for future use with minimal erosion of value. This absorptive capability cannot be developed effortlessly. It is usually nurtured in the course of employing comprehensive organizational processes for assessing, codifying, and internalizing external resources (Kale et al., 2002). In some instances competitive dynamics among the partners may in turn make it imperative for the organization to learn and absorb more quickly from its partners (Khanna, Gulati, & Nohria, 1998).

In sum, receptivity derives from processes and capabilities that jointly shape the quality of an organization's ties and its ability to leverage network resources, which in turn determine whether the organization can in fact access targeted network resources and appropriate their value. The concept of receptivity is critical to explain why different organizations tied to the same partners and with access to the same network resources extract dissimilar benefits.

¹ In an ensuing debate, Burt (1992) argued that the effects proposed by Granovetter were a result not of the quality of the ties themselves but rather of the structural correlate of weak ties. Another interesting twist to the "weak-tie" argument is Krackhardt's (1992) demonstration that in tumultuous times network members tend to trust their strong-tie partners most.

3. The interplay of reach, richness, and receptivity

So far we have argued that the contribution of interorganizational networks to organizational performance depends on the three conceptually distinct mechanisms of reach, richness, and receptivity. Our delineation of these three fundamental mechanisms goes a long way toward addressing our critiques of the model sufficiency, model specificity, and independence assumptions of prior research on the benefits of interorganizational networks. We next explore how these mechanisms interact.²

3.1. *The interaction of reach and richness*

The benefits associated with reach are likely to be amplified by richness. That is, the performance implications of reach are partly determined by the richness of network resources, because distant, different, and diverse partners (elements of reach) benefit the organization primarily if they possess unique and valuable resources (elements of richness). For example, Burt (1992), who has argued that redundant ties are inefficient, suggests that an organization can economize on its tie-maintenance costs by forming ties to build a structurally sparse network laden with structural holes. This assertion assumes that new partners in an efficient network can offer non-redundant or, even better, complementary resources, and thus expand not just the organization's reach but also the richness of its network resources. This interpretation is akin to the notion of network efficiency, a quality that, according to Baum et al. (2000), characterizes networks that offer access to diverse information and skills. By making this assumption explicit, we assert that reach is more valuable to an organization to the extent that it makes available a set of heterogeneous, unique, and possibly complementary network resources (Reagans & Zuckerman, 2008). When network resources lack these features, the structural and organizational distance and diversity of partners become liabilities that can undermine organizational performance (Lavie & Miller, 2008).

The effects of reach are stronger in the presence of richness, but the implications of richness are in turn contingent on aspects of reach. Specifically, the performance impact of valuable and rare network resources may be limited if they can be reached only via indirect ties to partners. This assertion is supported by empirical research on the "small-world phenomenon" (e.g., Baum et al., 2003; Watts, 1999) showing that a short path length facilitates a greater flow of knowledge and information than do longer path lengths (Verspagen & Duysters, 2004). Researchers have found a negative association between path length and the capacity to generate new knowledge, as captured by organizations' patenting intensities (Schilling & Phelps, 2007). Thus, reach has more positive performance implications when the organization's partners possess valuable and rare resources than when they lack novel resources (Gulati et al., *in press*). Furthermore, channeling of network resources that cannot be easily mobilized due to proprietary asset protection or their intangible or tacit nature (Peteraf, 1993) requires unmediated ties to partners.

Another interaction between reach and richness can emerge when network resources are heterogeneously distributed so that some of an organization's partners possess more valuable resources than others. An organization that is able to leverage its partnering experience and referrals to locate those valuable resources enjoys greater benefits than it would if network resources were distributed homogeneously across partners. For instance, a study of the automobile industry has demonstrated that interorganizational ties are pervasive across groups of automakers that possess dissimilar strategic capabilities, such as one group possessing broad product lines and the other possessing technical sophistication in manufacturing (Nohria & Garcia-Pont, 1991).

Overall, the contribution of network resources to organizational performance depends in part on the interaction between reach and richness. Specifically, richness enhances the impact of network reach, while reach enhances the contribution of individual resources and resource combinations—elements of richness—to organizational performance. Hence, richness moderates the performance effect of reach (and vice-versa). A key implication is that a genuine understanding of the performance effects of networks entails considering the interplay of these different mechanisms.

² An important issue, which we leave for future research, is whether one of these mechanisms can serve as an antecedent for the others. For example, does reach come first or does receptivity? We acknowledge the importance of this potential endogeneity, but for our present purposes the interplay among the three mechanisms in shaping performance is more relevant than the causal sequence.

3.2. *The interaction of richness and receptivity*

The contribution of network resources to organizational performance depends in part on interaction between the richness of such resources and the organization's receptivity to them. Prior research on tie quality has often made the implicit assumption that partners with whom an organization has strong ties must necessarily be endowed with valuable resources. But this may not always be the case. For instance, though the relational embeddedness perspective (e.g., Granovetter, 1985) has long recognized relational attributes such as trust and knowledge sharing, its underlying assumption has been that ties characterized by such attributes necessarily exist between an organization and partners that possess valuable resources. But there has been little consideration of whether such ties are formed with desirable partners.

We thus examine closely the nature of ties between an organization and its partners, as well as the characteristics of those partners, paying equal attention to the relationships that connect organizations and to the resources channeled via those relationships. Our notion of receptivity implies, for instance, that an organization can competently access, absorb, and orchestrate the resources of its partners, while our conceptualization of richness calls for considering the attributes of those resources rather than treating them as fixed constants. Thus, the performance implications of relational capabilities are contingent on the richness of network resources. Even an organization that is capable of effectively scanning, contracting, orchestrating, and absorbing network resources, and that enjoys established ties characterized by mutual trust, commitment, and tie multiplexity (elements of receptivity), may still fail to benefit from those ties if its partners lack essential resources that it can effectively deploy and leverage. Receptivity implies that an organization is able to access and leverage network resources to their full potential, but this potential is limited by the richness of those resources.

The performance implications of richness may also be contingent on receptivity, because there is a likely link between the specific nature of network resources and the types of ties required for optimal channeling of those resources. Specifically, certain network resources may be most effectively channeled via strong ties, whereas other resources may be best transferred via weak ties (Gulati, 1995a; Gulati & Singh, 1998; Powell, 1990). Strong ties promote the emergence of relational attributes such as interorganizational trust, commitment, and tie multiplexity (Gulati & Sytch, 2007; Rowley et al., 2000). These attributes in turn ensure effective channeling of intangible resources, tacit knowledge, and sensitive proprietary assets, which requires keen understanding of the partner and coordination of more arduous and complex resource-transfer processes (Szulanski, 1996; Uzzi, 1996). Hence, effective channeling of intangible resources and tacit knowledge entails stronger receptivity. Whereas strong receptivity facilitates access to intangible and tacit network resources, a weaker form of receptivity may be sufficient to support the transfer of ordinary resources that are tangible, common, or easily transferable, such as information on novel market opportunities (Granovetter, 1973). This idea is consistent with the assertion that weaker receptivity adequately supports a sufficient flow of codifiable information, explicit knowledge, and tangible resources that are neither complex nor causally ambiguous, and that therefore require less sophisticated scanning, orchestrating, contracting, and absorbing of network resources. In sum, effective transfer of intangible resources and tacit knowledge requires strong receptivity, whereas common and tangible resources or explicit information can be efficiently channeled at reduced receptivity.

We posit, then, that strong receptivity contributes to organizational performance when the organization's ties channel network resources that are valuable, rare, and subject to a strong appropriability regime (elements of richness). Conversely, strong receptivity may impair performance by incurring inefficiencies and unnecessary costs when used to channel common, tangible, codified, and freely accessible resources that could be transferred as efficiently at lower levels of receptivity. In other words, the contribution of rich network resources increases when an organization has the appropriate capacity to channel these resources and vice-versa. Thus, the richness of network resources enhances the contribution of relational attributes and capabilities (i.e., receptivity) to organizational performance, and receptivity in turn enhances the contribution of richness. Stated differently, receptivity amplifies the effects of richness; that is, receptivity moderates the richness–performance relationship (and vice-versa). Accordingly, our framing calls for network research that simultaneously incorporates multiple mechanisms.

3.3. *The interaction of reach and receptivity*

The interaction of reach and receptivity is likely to contribute to organizational performance by creating access to a potent combination of diverse resources via disparate ties that the organization is in a position to leverage. Reach

determines through whom the organization can access network resources, and receptivity determines how effectively it can channel those resources. Since receptivity encompasses not merely motivation to engage in exchange but also the capacity to do so, network resources become accessible as a function of the quality of the organization's ties. The mechanism of reach, in turn, defines the range of opportunities for the organization by demarcating the set of partners with whom it can interact. Partners that cannot be reached cannot offer resource-access opportunities. In such cases, receptivity is insufficient to facilitate productive collaboration.

The extent of an organization's reach can clearly shape the efficacy of its receptivity and vice-versa. In the case of a partner not tied directly to the organization, for example, or one with a significantly different industry focus or culture, the organization's capacity to uncover that partner's relevant network resources, overcome incongruent governance systems, establish effective channels for resource transfer, and assimilate partner resources, becomes crucial to joint value creation. The diversity element of reach can also create challenges because of the difficulty of forming ties with a heterogeneous pool of partners that possess unique organizational characteristics. Under such conditions, effective resource transfer and coordination processes must be established to ensure receptivity of network resources. When an organization develops relationships with numerous heterogeneous partners, its capacities to discover relevant network resources and to identify their optimal transfer path become critical elements of receptivity that in turn shape the value extracted from the network.³ Overall, receptivity moderates the performance effects of reach (and vice-versa). This interplay, again, reinforces the need for considering multiple mechanisms when seeking to unpack the performance effects of networks.

Though the above discussion of the three sets of bivariate interactions of reach, richness, and receptivity has added some inevitable complexity to our narrative, our basic argument is straightforward: although the three mechanisms make distinctive direct contributions to performance, each mechanism also moderates the main effects of the other two mechanisms. Clearly, simultaneously addressing these multiple direct and moderating effects is likely to be an intractable task both conceptually and empirically. However, designing studies that address some subsets of these interactions is essential for unpacking the performance effects of interorganizational networks.

4. Discussion and implications

The performance implications of interorganizational networks have drawn considerable scholarly attention. In recent years, as researchers have subjected these ideas to greater scrutiny, several inconsistencies and ambiguities have come to light (e.g., Hirsch & Levin, 1999; Kilduff & Krackhardt, 1994; Portes, 1998). Among these shortcomings are reliance on all-encompassing concepts to characterize network benefits and overemphasis of structural properties at the expense of tie heterogeneity and unique partner contributions.

Our framework focuses on the organization and its partners in a network. It takes into account not only the structural and relational aspects emphasized by prior network research, but also the characteristics of the organization and its partners. By simultaneously considering structural, relational, and actor attributes as determinants of organizational performance, our framework offers unique insights. For instance, by acknowledging the heterogeneity of both network resources and organizations' abilities to leverage such resources, our framework can account for performance differences among organizations that occupy similar network positions.

Moreover, instead of simply integrating prior work, we have sought to uncover the underlying mechanisms that enable organizations to create value from their networks. Our framework discriminates between conceptually separable elements of networks and avoids the pitfall of conflating structure with relations or resources. To further delineate this process, we have introduced and elaborated on reach, richness, and receptivity, key mechanisms whereby network resources shape organizational performance.

As we indicated at the outset, our focus on reach, richness, and receptivity allows us to depart from the dominant distinction between structural and relational aspects of networks, as well as the more recent conceptualization of networks as pipes or prisms (Podolny, 2001). Both perspectives have failed to consider actor attributes that may shape organizational performance, and have confounded structural and relational properties of networks with the value of

³ Our discussion of two-way interactions can be extended to three-way interactions among reach, richness, and receptivity. Each of these mechanisms makes a distinctive contribution to the value derived from networks. Thus, strong reach does not compensate for low richness or receptivity, or vice-versa. Organizations ought to develop all three mechanisms rather than investing in some at the expense of others.

network resources. Thus, for example, while partner diversity has been used extensively as a proxy for resource diversity in prior research, our framework opens the way for understanding the distinction between these two concepts. It brings resources to the foreground and suggests that organizations do not automatically gain network resources by investing in new network ties; instead, they automatically incur substantial costs—in the sense that the relationships themselves are merely conduits for resources that entail maintenance. The benefits that an organization may derive from its ties are a function of the resources that its partners can furnish via those ties and its own capacity to absorb and leverage them. For this reason, research focused solely on network structure or on the quality of ties has offered incomplete interpretations at best and misleading recommendations at worst. In particular, heterogeneity in organizational performance can be attributed to variations in the distance to and diversity of partners (reach), in the value of network resources furnished by partners (richness), and in the transfer bandwidth of network resources (receptivity), rather than to only one of these sources of heterogeneity.

One implication of our framework is that organizations should pay as much attention to selecting partners, assessing resources offered by potential partners, and developing interorganizational routines for leveraging network resources as they do to expanding their networks or building long-term relationships. Prior research has tended to underplay such implications by implicitly assuming that network resources are made available automatically by virtue of tie formation and that they are homogeneously distributed across different partners. Empirical research refutes these assumptions while directing attention to the contributions of network resources (Baum et al., 2000; Lavie, 2007; Rothaermel, 2001; Stuart, 2000).

Another issue is the intermingling of interpersonal and interorganizational analyses in network research. A conceptual separation between the two is essential if such research is to make progress. Early research on the behavioral and performance consequences of networks was conducted at the interpersonal level; some of its ideas were then applied inappropriately to the study of interorganizational networks. Serious confusion arises when researchers use interpersonal concepts and findings to explain the performance implications of interorganizational networks. For instance, Granovetter's (1985) notion of embeddedness describes how interpersonal ties interfere with or facilitate economic transactions consummated within a hierarchical organization or a market. Although social ties are often intertwined with business relationships, they are not interchangeable. Furthermore, the content of interpersonal ties differs from that of interorganizational ties. For instance, whereas relational embeddedness is characterized in Granovetter's conceptualization by trust, emotional intensity, and intimacy, the latter two affect-based elements "are pertinent for the individual-level relationships central in Granovetter's (1973) work, but are not as applicable to the interfirm horizontal alliances" (Rowley et al., 2000, p. 371). Instead, field research in the interorganizational context reveals that relational embeddedness among organizations is characterized by knowledge exchange and joint problem solving, in addition to trust (Gulati & Sych, 2007; Larson, 1992; Uzzi, 1996).

The differences between interpersonal networks and interorganizational networks also become apparent when studying the nature of the underlying relationships. For instance, Arrow (2000) has observed that rewards for social interaction are often intrinsic: individuals may hear about jobs from acquaintances, but that is rarely their primary motivation for forming social ties. Thus interpersonal networks are not always instrumental and may be purely affect-based. In contrast, it is typical for organizations to engage in what Emirbayer and Goodwin (1994, p. 1428) have termed "structuralist instrumentalism," a utilitarian approach to social relations as a means of achieving material goals. A similar distinction between interpersonal and interorganizational networks appears in Adler and Kwon's (2002) treatment of social capital, which distinguishes between the social relations underlying social capital and the connections represented by market or hierarchical ties. Whereas market relations facilitate the transfer of network resources between organizations, social relations may channel only favors and gifts and thus cannot fully account for the economic benefits that organizations derive from their interorganizational networks. For example, a manager of an alliance may be personally better off not becoming involved in her organization's alliance with a second competing partner, so that she can maintain productive relations with her counterpart in the original alliance (social relations). On the other hand, such parallel involvement could enhance the organization's coordination of joint activities across competing partners (market relations), and thus create more value to the organization (Lavie, 2009). Besides differences in the types of assets that they channel, social relations are described as diffuse, tacit, and symmetrical (Adler & Kwon, 2002), in contrast to the formal relations characteristic of interorganizational networks.

Given the many inherent differences between interpersonal and interorganizational ties, researchers should exert greater caution about importing interpersonal mechanisms into the interorganizational context. We have developed our framework by suggesting mechanisms specifically applicable to interorganizational networks without borrowing

arguments whose application is confined to interpersonal networks. We recognize that scholars may continue to draw inspiration from the voluminous research on interpersonal networks, but we encourage consideration of alternative conceptual schemes more fully grounded in the study of interorganizational networks.⁴

Our goal has been to demonstrate that the performance effects of interorganizational networks depend on the interplay of reach, richness, and receptivity. This approach entails a multidimensional view of an organization's partners, of the inherent value of the partners' resources, and of the extent to which the organization can channel and leverage those resources. This point of view suggests that organizations operate within multiple contexts that should be considered holistically. This viewpoint is akin to well-established configuration perspectives in organization theory (e.g., Ketchen et al., 1997) and strategy (Porter, 1996) that explain how different elements tend to cluster into commonly observed configurations, and posit that the interactions among these elements are as important as each element per se. Thus we stress the need to investigate, theoretically and empirically, the interactions among the three mechanisms.

5. Future research

Our analysis naturally raises a number of questions for subsequent research: Are there inherent tradeoffs across the three mechanisms? Do organizations that extend the reach of their networks typically enjoy stronger or weaker receptivity? Are organizations that establish formal functions to manage interorganizational relationships (Kale et al., 2002) more capable of concurrently advancing reach, richness, and receptivity? Are there diminishing returns to enhancement of each of these three mechanisms beyond a certain threshold? These questions can serve as fertile ground for future research.

We believe that we have taken a meaningful step toward explaining how interorganizational networks affect organizational performance. We have established that organizations are likely to benefit from simultaneously enhancing the reach, richness, and receptivity associated with their network resources. An important caveat emerging from our framework is that an organization needs sufficient internal resources to create value from its network resources. For example, organizations often allocate managerial resources and establish dedicated organizational functions for managing alliances (Kale et al., 2002). Also, the formation of interorganizational ties entails mutual agreement between an organization and its partners. Therefore, successful development of reach, richness, and receptivity depends not only on what the network can offer to the organization but also on what the organization can offer to its partners. Future research may thus explore how partners' interdependent decisions influence the value that they can derive from their networks.

Another direction for future research is to elaborate on our framework by exploring the possible negative implications of networks for the organizations within them. For example, the same ties that facilitate access to resources also offer channels for the outbound flow of resources. As long as this outbound flow is voluntary and supports joint value creation and collaboration, it is likely to be beneficial (Dyer & Singh, 1998). But an involuntary spillover of proprietary assets could undermine an organization's competitive position (Lavie, 2006). Future research could examine losses arising from outbound spillover in evaluating whether, and under what conditions, organizations are better off reducing the reach and receptivity of their networks (Khanna et al., 1998). Another negative implication is the counterintuitive dark side of receptivity. For example, by facilitating excessive knowledge sharing among its partners, an organization can potentially diminish the organizational diversity in its network and thus deplete the richness of network resources available to it in the future (Gulati et al., *in press*). In this sense, receptivity can undermine as well as amplify the effect of richness.

Future research could also explore how the specific types of ties that connect a network affect reach, richness, and receptivity. Organizations may be linked through strategic alliances, board interlocks, or interpersonal ties. By design, our framework is indifferent to the nature of the network, but it would be valuable to study multimode networks that connect organizations via multiple types of relationships. It is possible that organizations invest in the receptivity of one type of tie and the reach of another, depending on the nature of the resources transferred by each. Finally, future investigation of the antecedents of reach, richness, and receptivity could offer new insights into the endogeneity of

⁴ We do not imply that the mechanisms of reach, richness, and receptivity lack relevance to, or analogues in, the interpersonal context. We hope that future research will address their relevance to that context.

network evolution. Some network configurations may reflect proactive attempts to leverage the reach, richness, and receptivity of network resources.

In conclusion, we believe that our study offers a comprehensive view of the mechanisms whereby networks affect organizational performance. By identifying reach, richness, and receptivity as the three core mechanisms that drive outcomes, and by specifying their interactions, we resolve some of the ambiguity in this important field of inquiry and lay new groundwork for future empirical research.

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References

- Adler, P. S., & Kwon, S.-W. (2002). Social capital: Prospects for a new concept. *Academy of Management Review*, 27(1), 17–40.
- Ahuja, G. (2000a). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly*, 45(3), 425–455.
- Ahuja, G. (2000b). The duality of collaboration: Inducements and opportunities in the formation of interfirm linkages. *Strategic Management Journal*, 21(Special Issue), 317–343.
- Arrow, K. J. (2000). Observations on social capital. In P. Dasgupta & I. Serageldin (Eds.), *Social capital: A multifaceted perspective* (pp. 3–5). Washington, DC: The World Bank.
- Baker, W. E. (1990). Market networks and corporate behavior. *American Journal of Sociology*, 96, 589–625.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Baum, J. A. C., Calabrese, T., & Silverman, B. S. (2000). Don't go it alone: Alliance network composition and startups' performance in Canadian biotechnology. *Strategic Management Journal*, 21, 267–294.
- Baum, J. A. C., Shipilov, A. V., & Rowley, T. J. (2003). Where do small worlds come from? *Industrial and Corporate Change*, 12(4), 697–725.
- Bonacich, P. (1987). Power and centrality: A family of measures. *American Journal of Sociology*, 92, 1170–1182.
- Bott, E. (1957). *Family and social structure*. London: Tavistock.
- Brass, D. J. (1984). Being in the right place: A structural analysis of individual influence in an organization. *Administrative Science Quarterly*, 29, 519–539.
- Burt, R. S. (1987). Social contagion and innovation: Cohesion versus structural equivalence. *American Journal of Sociology*, 92, 1287–1335.
- Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.
- Burt, R. S. (1997). The contingent value of social capital. *Administrative Science Quarterly*, 42, 339–365.
- Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior*, 22, 345–423.
- Burt, R. S., Jannotta, J. E., & Mahoney, J. T. (1998). Personality correlates of structural holes. *Social Networks*, 20, 63–87.
- Carter, R. B., & Manaster, S. (1990). Initial public offerings and underwriter reputation. *Journal of Finance*, 45, 1045–1067.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128–152.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, S95–S120.
- DiMaggio, P. (1992). Nadal's paradox revisited: Relational and cultural aspects of organizational structure. In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form and action* (pp. 118–142). Boston, MA: Harvard Business School Press.
- Doz, Y. L., & Hamel, G. (1998). *Alliance advantage*. Boston, MA: Harvard Business School Press.
- Durkheim, E. (1933). *The division of labor in society*. New York: Free Press.
- Durkheim, E. (1951). *Suicide*. New York: Free Press.
- Dyer, J. H., Kale, P., & Singh, H. (2001). How to make strategic alliances work. *Sloan Management Review*, 42(4), 37–43.
- Dyer, J. H., & Nobeoka, K. (2000). Creating and managing a high-performance knowledge-sharing network: The Toyota case. *Strategic Management Journal*, 21(3), 345–367.
- Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategies and sources of interorganizational competitive advantage. *Academy of Management Review*, 23(4), 660–679.
- Emirbayer, M., & Goodwin, J. (1994). Network analysis, culture, and the problem of agency. *American Journal of Sociology*, 99(6), 1411–1454.
- Freeman, L. C. (1979). Centrality in social networks: Conceptual clarification. *Social Networks*, 1, 215–239.
- Gnyawali, D. R., & Madhavan, R. (2001). Cooperative networks and competitive dynamics: A structural embeddedness perspective. *Academy of Management Review*, 26(3), 431–445.
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 78, 1360–1380.
- Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91, 481–510.
- Granovetter, M. (1992). Problems of explanation in economic sociology. In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form and action* (pp. 25–56). Boston, MA: Harvard Business School Press.

- Gulati, R. (1995a). Does familiarity breed trust? The implications of repeated ties for contractual choices. *Academy of Management Journal*, 35(4), 85–112.
- Gulati, R. (1995b). Social structure and alliance formation patterns: A longitudinal analysis. *Administrative Science Quarterly*, 40(4), 619–652.
- Gulati, R. (1998). Alliances and networks. *Strategic Management Journal*, 19, 293–317.
- Gulati, R. (1999). Network location and learning: The influence of network resources and firm capabilities on alliance formation. *Strategic Management Journal*, 20(5), 397–420.
- Gulati, R. (2007). *Managing network resources: Alliances, affiliations and other relational assets*. New York: Oxford University Press.
- Gulati, R., & Gargiulo, M. (1999). Where do interorganizational networks come from? *American Journal of Sociology*, 104(5), 1439–1493.
- Gulati, R., Khanna, T., & Nohria, N. (1994). Unilateral commitments and the importance of process in alliances. *Sloan Management Review*, 35, 61–69.
- Gulati, R., Lawrence, P. R., & Puranam, P. (2005). Adaptation in vertical relationships: Beyond incentive conflict. *Strategic Management Journal*, 26, 415–440.
- Gulati, R., & Nickerson, J. (2008). Interorganizational trust, governance choice, and exchange performance. *Organization Science*, 19(2), 1–21.
- Gulati, R., Nohria, N., & Zaheer, A. (2000). Strategic networks. *Strategic Management Journal*, 21(Special Issue), 203–215.
- Gulati, R., & Singh, H. (1998). The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances. *Administrative Science Quarterly*, 43(4), 781–814.
- Gulati, R., & Sych, M. (2007). Dependence asymmetry and joint dependence in interorganizational relationships: Effects of embeddedness on a manufacturer's performance in procurement relationships. *Administrative Science Quarterly*, 52(3), 32–69.
- Gulati, R., & Sych, M. (2008). Does familiarity breed trust? Revisiting the antecedents of trust. *Managerial and Decision Economics*, 29, 165–190.
- Gulati, R., Sych, M., & Tatarynowicz, A. (in press). The rise and fall of small worlds: Exploring the dynamics of social structure. *Organization Science*.
- Gupta, A. K., & Govindarajan, V. (2000). Knowledge flows within multinational corporations. *Strategic Management Journal*, 21, 473–496.
- Hamel, G. (1991). Competition for competence and interpartner learning within international strategic alliances. *Strategic Management Journal*, 12(Summer Special Issue), 83–103.
- Higgins, M. C., & Gulati, R. (2003). Stacking the deck: The effects of upper echelon affiliations on interorganizational endorsements. *Organization Science*, 14(3), 244–263.
- Hirsch, P. M., & Levin, D. Z. (1999). Umbrella advocates versus validity police: A life-cycle model. *Organization Science*, 10, 199–212.
- Inkpen, A. C., & Tsang, E. W. K. (2005). Social capital, networks, and knowledge transfer. *Academy of Management Review*, 30(1), 146–165.
- Jensen, M. (2003). The role of network resources in market entry: Commercial banks' entry into investment banking, 1991–1997. *Administrative Science Quarterly*, 48(3), 466–497.
- Kale, P., Dyer, J. H., & Singh, H. (2002). Alliance capability, stock market response, and long-term alliance success: The role of the alliance function. *Strategic Management Journal*, 23(8), 747–767.
- Kale, P., Singh, H., & Perlmutter, H. (2000). Learning and protection of proprietary assets in strategic alliances: Building relational capital. *Strategic Management Journal*, 21(3), 217–237.
- Ketchen, D. J., Combs, J. G., Russell, C. J., Shook, C., Dean, M. A., Runge, J., et al. (1997). Organizational configurations and performance: A meta-analysis. *Academy of Management Journal*, 40(1), 223–240.
- Khanna, T., Gulati, R., & Nohria, N. (1998). The dynamics of learning alliances: Competition, cooperation, and relative scope. *Strategic Management Journal*, 19(3), 193–210.
- Kilduff, M., & Brass, D. J. (2010). Organizational social network research: Core ideas and key debates. *Academy of Management Annals*, 4, 317–357.
- Kilduff, M., & Krackhardt, D. (1994). Bringing the individual back in: A structural analysis of the internal market for reputation in organizations. *Academy of Management Journal*, 37(1), 87–108.
- Kilduff, M., & Tsai, W. (2003). *Social networks and organizations*. London: Sage.
- Knott, A. M., Bryce, D. J., & Posen, H. E. (2003). On the strategic accumulation of intangible assets. *Organization Science*, 14(2), 192–207.
- Koka, B. R., & Prescott, J. E. (2002). Strategic alliances as social capital: A multidimensional view. *Strategic Management Journal*, 23, 795–816.
- Krackhardt, D. (1992). The strength of strong ties: The importance of philas in organizations. In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form, and action* (pp. 216–239). Boston, MA: Harvard Business School Press.
- Lane, P. J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, 19(5), 461–477.
- Lane, P. J., Salk, J. E., & Lyles, M. A. (2001). Absorptive capacity, learning, and performance in international joint ventures. *Strategic Management Journal*, 22, 1139–1161.
- Larson, A. (1992). Network dyads in entrepreneurial settings: A study of the governance of exchange processes. *Administrative Science Quarterly*, 37, 76–104.
- Lavie, D. (2006). The competitive advantage of interconnected firms: An extension of the resource-based view. *Academy of Management Review*, 31(3), 638–658.
- Lavie, D. (2007). Alliance portfolios and firm performance: A study of value creation and appropriation in the U.S. software industry. *Strategic Management Journal*, 28, 1187–1212.
- Lavie, D. (2009). Capturing value from alliance portfolios. *Organizational Dynamics*, 38(1), 26–36.
- Lavie, D., & Miller, S. (2008). Alliance portfolio internationalization and firm performance. *Organization Science*, 19(4), 623–646.
- Lavie, D., & Rosenkopf, L. (2006). Balancing exploration and exploitation in alliance formation. *Academy of Management Journal*, 49(6), 797–818.
- Lin, N. (2001). *Social capital: A theory of social structure and action*. Cambridge: Cambridge University Press.
- Lorenzoni, G., & Lipparini, A. (1999). The leveraging of interfirm relationships as a distinctive organizational capability: A longitudinal study. *Strategic Management Journal*, 20, 317–338.

- Madhok, A., & Tallman, S. B. (1998). Resources, transactions, and rents: Managing value through interfirm collaborative relationships. *Organization Science*, 9(3), 326–339.
- Mohr, J., & Spekman, R. (1994). Characteristics of partnership success: Partnership attributes, communication behavior, and conflict resolution techniques. *Strategic Management Journal*, 15(2), 135–152.
- Moreno, J. L. (1934). *Who shall survive?* Washington, DC: Nervous and Mental Disease Publishing Company.
- Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23, 242–266.
- Nohria, N., & Eccles, R. G. (1992). *Networks and organizations: Structure, form, and action*. Boston: Harvard Business School Press.
- Nohria, N., & Garcia-Pont, C. (1991). Global strategic linkages and industry structure. *Strategic Management Journal*, 12, 105–124.
- Parkhe, A. (1993). Strategic alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal*, 36(4), 794–829.
- Peteraf, M. A. (1993). The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal*, 14(3), 179–191.
- Podolny, J. M. (1993). A status-based model of market competition. *American Journal of Sociology*, 98, 829–872.
- Podolny, J. M. (2001). Networks as the pipes and prisms of the market. *American Journal of Sociology*, 107(1), 33–60.
- Porter, M. E. (1996). What is strategy? *Harvard Business Review*, 74(6), 61–78.
- Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*, 24, 1–24.
- Powell, W. (1990). Neither market nor hierarchy: Network forms of organization. *Research in Organizational Behavior*, 12, 295–336.
- Provan, K. G., & Milward, B. H. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative Science Quarterly*, 40(1), 1–33.
- Provan, K. G., & Sebastian, J. G. (1998). Networks within networks: Service link overlap, organizational cliques, and network effectiveness. *Academy of Management Journal*, 41(4), 453–463.
- Putnam, R. D. (1993). The prosperous community: Social capital and public life. *American Prospect*, 13, 35–42.
- Reagans, R. E., & Zuckerman, E. W. (2008). All in the family: Reply to Burt, Podolny, and van de Rijt, Ban, and Sarkar. *Industrial and Corporate Change*, 17(5), 979–999.
- Ring, P. S., & Van De Ven, A. H. (1994). Developmental processes of co-operative interorganizational relationships. *Academy of Management Review*, 19(1), 90–118.
- Rothaermel, F. T. (2001). Incumbent's advantage through exploiting complementary assets via interfirm cooperation. *Strategic Management Journal*, 22, 687–699.
- Rowley, T., Behrens, D., & Krackhardt, D. (2000). Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industries. *Strategic Management Journal*, 21, 369–386.
- Saxton, T. (1997). The effects of partner and relationship characteristics on alliance outcomes. *Academy of Management Journal*, 40(2), 443–461.
- Schilling, M. A., & Phelps, C. C. (2007). Interfirm collaboration networks: The impact of large-scale network structure on firm innovation. *Management Science*, 53(7), 1113–1126.
- Singh, J., & Fleming, L. (2010). Lone inventors as sources of breakthroughs: Myth or reality? *Management Science*, 56(1), 41–56.
- Stuart, T. E. (2000). Interorganizational alliances and the performance of firms: A study of growth and innovation rates in a high-technology industry. *Strategic Management Journal*, 21(8), 719–811.
- Stuart, T. E., Hoang, H., & Hybels, R. (1999). Interorganizational endorsements and the performance of entrepreneurial ventures. *Administrative Science Quarterly*, 44, 315–349.
- Zsulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, 17(Winter Special Issue), 27–43.
- Tsai, W. (2001). Knowledge transfer in interorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. *Academy of Management Journal*, 44(5), 996–1004.
- Tsai, W., & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. *Academy of Management Journal*, 41(4), 464–476.
- Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American Sociological Review*, 61, 674–698.
- Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42, 35–67.
- Verspagen, B., & Duysters, G. (2004). The small world of strategic technology alliances. *Technovation*, 24(7), 563–571.
- Watts, D. J. (1999). Networks, dynamics, and the small-world phenomenon. *American Journal of Sociology*, 105(2), 493–527.
- White, H. C. (1992). Agency as control in formal networks. In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form, and action* (pp. 92–117). Boston, MA: Harvard Business School Press.
- Zaheer, A., & Bell, G. G. (2005). Benefiting from network position: Firm capabilities, structural holes, and performance. *Strategic Management Journal*, 26(9), 809–826.
- Zaheer, A., McEvily, B., & Perrone, V. (1998). Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance. *Organization Science*, 9(2), 141–159.
- Zaheer, A., & Venkatraman, N. (1995). Relational governance as an interorganizational strategy: An empirical test of the role of trust in economic exchange. *Strategic Management Journal*, 17(5), 373–392.