

A GENERAL THEORY OF NETWORK GOVERNANCE: EXCHANGE CONDITIONS AND SOCIAL MECHANISMS

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A phenomenon of the last 20 years has been the rapid rise of the network form of governance. This governance form has received significant scholarly attention, but, to date, no comprehensive theory for it has been advanced, and no sufficiently detailed and theoretically consistent definition has appeared. Our objective in this article is to provide a theory that explains under what conditions network governance, rigorously defined, has comparative advantage and is therefore likely to emerge and thrive. Our theory integrates transaction cost economics and social network theories, and, in broad strokes, asserts that the network form of governance is a response to exchange conditions of asset specificity, demand uncertainty, task complexity, and frequency. These exchange conditions drive firms toward structurally embedding their transactions, which enables firms to use social mechanisms for coordinating and safeguarding exchanges. When all of these conditions are in place, the network governance form has advantages over both hierarchy and market solutions in simultaneously adapting, coordinating, and safeguarding exchanges.

Many industries increasingly are using network governance—coordination characterized by informal social systems rather than by bureaucratic structures within firms and formal contractual relationships between them—to coordinate complex products or services in uncertain and competitive environments (Piore & Sabel, 1984; Powell, 1990; Ring & Van de Ven, 1992; Snow, Miles, & Coleman, 1992). This type of governance has been observed in such industries as semiconductors (Saxenian, 1990), biotechnology (Barley, Freeman, & Hybels, 1992), film (Faulkner & Anderson,

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1987), music (Peterson & Berger, 1971), financial services (Eccles & Crane, 1988; Podolny, 1993, 1994), fashion (Uzzi, 1996, 1997), and Italian textiles (Lazerson, 1995; Mariotti & Cainarca, 1986). Although network governance is widely acknowledged and is seen as producing important economic benefits, "the mechanisms that produce these benefits are vaguely specified and empirically still incipient" (Uzzi, 1996: 677). This vague specification lacks clarity on what network governance is, when it is likely to occur, and how it helps firms (and nonprofit agencies) resolve problems of adapting, coordinating, and safeguarding exchanges.

A synthesis of transaction cost economics (TCE) and social network theory can resolve this vague specification of network governance in multiple ways. TCE provides a comparative framework for assessing alternative governance forms (Williamson, 1994), and it allows us to go beyond descriptive observations of where network governance has occurred and identify the conditions that predict where network governance is likely to emerge. Prior work within the TCE framework has shown that relational contracting is the basis for an alternative governance form between markets and hierarchies (Eccles, 1981; Jarillo, 1988; Mariotti & Cainarca, 1986). These studies, although important, rarely define network governance and do little to show how network governance resolves fundamental problems of adapting, coordinating, and safeguarding exchanges. In addition, these studies most often focus on exchange dyads rather than on the network's overall structure or architecture. By examining exchanges between dyads, "without reference to the nature of other ties in the network or how they fit together" (Wellman, 1991: 35-36), these studies cannot show adequately how the network structure influences exchanges.

Synthesizing TCE and social network theory also advances our understanding of transaction costs and governance.¹ Although the social context, referred to as "structural embeddedness," surrounding economic exchange has been recognized as critical since Granovetter's (1985) widely cited critique was published, it has not been integrated into the TCE framework. "Embeddedness refers to the fact that economic action and outcomes . . . are affected by actors' dyadic (pairwise) relations and by the structure of the overall network of relations" (Granovetter, 1992: 33). As Williamson (1994: 85) acknowledges, "[N]etwork relations are given short shrift," partly because of TCE's preoccupation with dyadic relations.

¹ Our approach reflects "the increasing points of contact between the two disciplines" (Winship & Rosen, 1988: S1) of economics and sociology. Some scholars question whether the gulf between economics and sociology can or even should be bridged (Swedberg, 1990). We believe that much is to be gained by drawing from both disciplines. Swedberg's observation about the possibilities for combining the perspectives is true for understanding network governance: "What is happening today is very significant: the border line between two of the major social sciences is being redrawn, thereby providing new perspectives on a whole range of very important problems both in the economy and in society at large" (Swedberg, 1990: 5, emphasis in original).

We integrate social context into the TCE perspective by explaining how social mechanisms influence the costs of transacting exchanges. Specifically, we show that exchange conditions characterized by needs for high adaptation, high coordination, and high safeguarding influence the emergence of structural embeddedness. We also show how structural embeddedness provides the foundation for social mechanisms, such as restricted access, macrocultures, collective sanctions, and reputations, to coordinate and safeguard exchanges in network governance. We move beyond recent work on embeddedness by explaining how structural embeddedness arises and provides a foundation for social mechanisms to coordinate and safeguard exchanges. Finally, we show how social mechanisms interact to create an exchange system where coordination and cooperation among autonomous parties for customized exchanges is not only possible but probable.

By integrating TCE and social network theory, we provide a simple, yet coherent, framework for identifying the conditions under which network governance is likely to emerge and the social mechanisms that allow network governance to coordinate and safeguard customized exchanges simultaneously in rapidly changing markets.

The article is organized as follows. First, we review the literature defining network governance and provide our own definition. Second, we identify conditions for network governance and explore why networks, rather than markets or hierarchies, are employed. Third, we explain how structural embeddedness arises out of exchange conditions and provides the foundation for social mechanisms used in network governance. In addition, we specify how key social mechanisms enhance coordination and reduce behavioral uncertainty among exchange parties. These social mechanisms in network governance reduce transaction costs, gaining comparative advantage over markets and hierarchies, which enables network governance to emerge and thrive. Finally, we suggest future directions for research on network governance.

WHAT IS NETWORK GOVERNANCE?

Definitions in the Literature

The terms "network organization" (Miles & Snow, 1986), "networks forms of organization" (Powell, 1990), "interfirm networks," "organization networks" (Uzzi, 1996, 1997), "flexible specialization" (Piore & Sabel, 1984), and "quasi-firms" (Eccles, 1981) have been used frequently, and somewhat metaphorically, to refer to interfirm coordination that is characterized by organic or informal social systems, in contrast to bureaucratic structures within firms and formal contractual relationships between them (Gerlach, 1992: 64; Nohria, 1992). We call this form of interfirm coordination "network

governance."² Network governance constitutes a "distinct form of coordinating economic activity" (Powell, 1990: 301), which contrasts (and competes) with markets and hierarchies.

A number of scholars have offered definitions (see Table 1), typically using different terms and providing partial definitions. These definitions cluster around two key concepts: (1) patterns of interaction in exchange and relationships and (2) flows of resources between independent units. Those scholars who emphasize the first concept focus on lateral or horizontal patterns of exchange (Powell, 1990), long-term recurrent exchanges that create interdependencies (Larson, 1992), informal interfirm collaborations (Kreiner & Schultz, 1993), and reciprocal lines of communication (Powell, 1990). Some highlight patterned relations among individuals, groups, and organizations (Dubini & Aldrich, 1991); strategic long-term relationships across markets (Gerlach & Lincoln, 1992); and collections of firms using an intermediate level of binding (Granovetter, 1994). Those who emphasize the second concept focus on flows of resources (Powell, 1990) between nonhierarchical clusters of organizations made up of legally separate units (Alter & Hage, 1993; Miles & Snow, 1986, 1992; Perrow, 1992), and they underscore the independence of interacting units.

Our own definition includes elements from all of these definitions and is intended to be more complete and specific than its predecessors.

Proposed Definition of Network Governance

Network governance involves a select, persistent, and structured set of autonomous firms (as well as nonprofit agencies) engaged in creating products or services based on implicit and open-ended contracts to adapt to environmental contingencies and to coordinate and safeguard exchanges. These contracts are socially—not legally—binding.³

We use the term "select" to indicate that network members do not normally constitute an entire industry. Rather, they form a subset in which they exchange frequently with each other but relatively rarely with other members. For example, in human service agencies, Van de Ven, Walker, and Liston (1979) found three clusters of agencies having more connections within cluster than between, and they found that each cluster employed different patterns of coordination to achieve distinct goals.

By "persistent" we mean that network members work repeatedly with each other over time. For analytical purposes, we think of working together over time as a sequence of exchanges that are facilitated by the network structure and that, in turn, create and re-create the network struc-

² The term "network governance" is used, rather than "network organization," because many scholars in management define "organization," either implicitly or explicitly, as a single entity. "Governance" more accurately captures the process and approach to organizing among firms that we discuss here.

³ We thank an anonymous reviewer for insights and suggestions on our definition.

TABLE 1
Differing Terms and Definitions for Network Governance

Reference	Term	Definition of Network Governance
Alter & Hage, 1993	Interorganizational networks	Unbounded or bounded clusters of organizations that, by definition, are nonhierarchical collectives of legally separate units
Dubini & Aldrich, 1991	Networks	Patterned relationships among individuals, groups, and organizations
Gerlach & Lincoln, 1992	Alliance capitalism	Strategic, long-term relationships across a broad spectrum of markets
Granovetter, 1994, 1995	Business groups ^a	Collections of firms bound together in some formal and/or informal ways by an intermediate level of binding
Kreiner & Schultz, 1993	Networks	Informal interorganizational collaborations
Larson, 1992	Network organizational forms	Long-term recurrent exchanges that create interdependencies resting on the entangling of obligations, expectations, reputations, and mutual interests
Liebeskind, Oliver, Zucker, & Brewer, 1996	Social networks	Collectivity of individuals among whom exchanges take place that are supported only by shared norms of trustworthy behavior
Miles & Snow, 1986, 1992	Network organizations	Clusters of firms or specialized units coordinated by market mechanisms
Powell, 1990	Network forms of organization	Lateral or horizontal patterns of exchange, independent flows of resources, reciprocal lines of communication

^a Not all business groups are characterized by networks of cooperation (1995: 102).

ture. In this sense network governance is a dynamic process of organizing, rather than a static entity.

We use "structured" to indicate that exchanges within the network are neither random nor uniform but rather are patterned, reflecting a division of labor, and we use the phrase "autonomous firm" in order to highlight the potential for each element of the network to be legally

independent. However, we do not exclude business units that may share common ownership or that may directly invest in each other.

Finally, we use the phrase "implicit and open-ended contracts" to refer to means of adapting, coordinating, and safeguarding exchanges that are not derived from authority structures or from legal contracts. To be sure, formal contracts may exist between some pairs of members, but these do not define the relations among all of the parties. For example, in a film project both the cinematographer and the editor may have contracts with the studio, but these contracts do not specify the relationship between the two subcontractors. Yet the task before them requires these and many other pairs to work together closely in a complicated dance of mutual adjustment and communication. Thus, network governance is composed of autonomous firms that operate like a single entity in these tasks requiring joint activity; in other domains these firms often are fierce competitors. To enhance cooperation on shared tasks, the network form of governance relies more heavily on social coordination and control, such as occupational socialization, collective sanctions, and reputations, than on authority or legal recourse.

Many scholars commonly cite the film industry as an example of network governance (Hirsch, 1972; Meyerson, Weick, & Kramer, 1996; Miles & Snow, 1986; Powell, 1990; Reich, 1991). Here, film studios, producers, directors, cinematographers, and a host of other contractors join, disband, and rejoin in varying combinations to make films. Network governance comprises a select subset of film studios and subcontractors. The seven major film studios repeatedly use and share among their films an elite set of subcontractors who constitute 3 percent (459 of the 12,400) of those registered in guilds (Jones & Hesterly, 1993). Persistence is indicated by the fact that this network governance has been in use and thriving since the mid 1970s (Ellis, 1990: 437-439). Structured relations among subcontractors and film studios are based on a division of labor: film studios finance, market, and distribute films, whereas numerous subcontractors with clearly defined roles and professions (e.g., producer, director, cinematographer, and editor) create the film.

EXCHANGE CONDITIONS FOR NETWORK GOVERNANCE

Our goal is to provide a framework explaining why network governance emerges and thrives. To do so we integrate TCE and social network theories. We see governance forms, similar to TCE, as "mechanism[s] for exchange" (Hesterly, Liebeskind, & Zenger, 1990: 404). In the TCE perspective three exchange conditions—uncertainty, asset specificity, and frequency—determine which governance form is more efficient. Environmental uncertainty triggers adaptation, which is the "central problem of economic organization," because environments rarely are stable and predictable (Williamson, 1991: 278). Asset-specific (or customized) exchanges

involve unique equipment, processes, or knowledge developed by participants to complete exchanges. This intensifies coordination between parties. Customization combined with uncertainty requires safeguarding exchanges to reduce behavioral uncertainty, which can range from honest disagreements to opportunism⁴ (Hesterly & Zenger, 1993). Frequency is important for three reasons. First, frequency facilitates transferring tacit knowledge in customized exchanges, especially for specialized processes or knowledge. Second, frequent interactions establish the conditions for relational and structural embeddedness, which provide the foundation for social mechanisms to adapt, coordinate, and safeguard exchanges effectively. Third, frequent interactions provide cost efficiency in using specialized governance structures (Williamson, 1985: 60).

Many of our arguments are based on TCE logic. For a governance form to emerge and thrive, it must address problems of adapting, coordinating, and safeguarding exchanges more efficiently than other governance forms (Williamson, 1991). Less efficient modes of organizing are at a comparative disadvantage and will not be selected in the long run. However, we move beyond TCE in three ways. First, we identify the specific forms of uncertainty and asset specificity that give rise to network governance. Second, we extend TCE by incorporating task complexity (Powell, 1990; Powell, Koput, & Smith-Doerr, 1996) into the explanation of governance form; this is important because it moves the theory beyond a dyadic focus. Third, we show how Williamson's notion of frequency, which is underspecified and underdeveloped in TCE, provides a link with social network constructs of relational and structural embeddedness (Granovetter, 1985, 1992; Uzzi, 1996, 1997). Based on TCE and Powell's work

⁴ Ghoshal and Moran (1996) argue that assuming opportunism is dangerous because it leads to mechanisms that may create more opportunism (the self-fulfilling prophecy). Although we agree with much of Ghoshal and Moran's argument (e.g., we clearly agree that the scope of governance issues should be broader than opportunism), it is not clear to us that their critique applies to our article. First, we do not employ the assumption of opportunism in the strictly narrow way (i.e., self-interest seeking with guile) often either used by or ascribed to Williamson. Instead, we use the term "behavioral uncertainty," which includes unexpected variance in performance and understandings and is more consistent with the broader characterization of opportunism espoused by Alchian & Woodward: "It [opportunism] includes honest disagreements . . . [between] honest, ethical people who disagree about what event transpired and what adjustment would have been agreed to initially had the event been anticipated" (1988: 66). This is clearly a different concept from the one Ghoshal and Moran critique or the strong-form assumption that has occasionally been ascribed to TCE: "the serious presumption that all action is . . . opportunistic" (Hirsch, Friedman, & Koza, 1990: 89). A second reason why we question whether Ghoshal and Moran's essay applies to our article is that their focus is on the unintended consequences of formal mechanisms that are used to counter opportunism. Our article is clearly about informal mechanisms. For further exploration of the debate on the role of opportunism in organizations, see Barney, 1990, versus Donaldson, 1990, and Hill, 1990; Conner & Prahalad, 1996, versus Foss, 1996; Ghoshal & Moran, 1996, versus Williamson, 1996; Hirsch, Friedman, & Koza, 1990, versus Hesterly & Zenger, 1993; and Kogut & Zander, 1996, versus Foss, 1996.

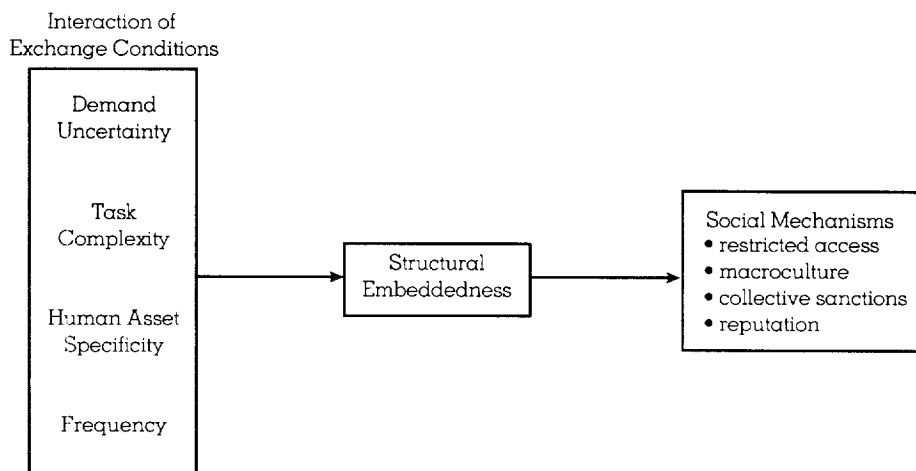
(1990), we identify four conditions necessary for network governance to emerge and thrive (see Figure 1): (1) demand uncertainty with stable supply, (2) customized exchanges high in human asset specificity, (3) complex tasks under time pressure, and (4) frequent exchanges among parties comprising the network. We discuss these in greater detail next.

Product Demand Uncertainty with Stable Supply

"Environmental uncertainty" (also called "state uncertainty") refers to the inability of an individual or organization to predict future events (Miliken, 1987). The source of this uncertainty can come from suppliers, customers, competitors, regulatory agencies, unions, or financial markets (Miles & Snow, 1978). Understanding the sources of uncertainty is important, since these influence what governance form is used to coordinate and safeguard exchanges. Research on environmental uncertainty and governance form shows that even modest levels of supply uncertainty, combined with predictable product demand, entice firms to integrate vertically (Helfat & Teece, 1987), whereas customer demand uncertainty makes vertical integration for firms risky owing to obsolescence (Balakrishnan & Wernerfelt, 1986; Mariotti & Cainarca, 1986) or seasonality (Acheson, 1985).

Under conditions of demand uncertainty, firms disaggregate into autonomous units, primarily through outsourcing or subcontracting (Mariotti & Cainarca, 1986; Robins, 1993; Snow, Miles, & Coleman, 1992; Zenger & Hesterly, 1997). This *decoupling* (Aldrich, 1979: 325-326) increases flexibility—the ability to respond to a wide range of contingencies—because

FIGURE 1
How Interaction of Exchange Conditions Leads to Structural Embeddedness and Social Mechanisms in Network Governance



resource bundles, now exchanged or rented rather than owned, can be reallocated cheaply and quickly to meet changing environmental demands. For example, the network structure of the textile industry in Prato, Italy, enhanced the textile firms' ability to respond quickly to changes in fashion (Piore & Sabel, 1984: 215). In Japanese automobile *keiretsu*, decoupling enhanced organizational flexibility as parties learned from one another what reduced lead time and improved quality for new models (Nishiguchi, 1994).

We find network governance in industries with high levels of demand uncertainty but a relatively stable supply of labor; these include the film, fashion, music, high-technology, and construction industries. Demand uncertainty is generated by unknown and rapid shifts in consumer preferences, which is exemplified in the film industry, where it is unclear what makes a film a hit with an audience. "Who knows what the public wants to see? . . . I defy anyone to tell me up front how much a picture is going to make—or how much it is going to lose," says David Picker, who, as President of United Artists, was in charge of the studio's movie selection (Baker & Firestone, 1972: 29–30).

Demand uncertainty also is generated by rapid changes in knowledge or technology, which results in short product life cycles and makes the rapid dissemination of information critical (Barley, Freeman, & Hybels, 1992; Garud & Kumaraswamy, 1993; Powell & Brantley, 1992; Robertson & Langlois, 1995). In high-technology industries, such as biotechnology and semiconductors, new products and technologies leap frog prior products and technologies, leaving participants scrambling to catch up.

Finally, demand uncertainty is generated by seasonality, which makes vertical integration inefficient, as in the construction (Stinchcombe, 1959) and Maine lobster industries (Acheson, 1985). In Maine lobster trapping, seasonal fluctuations and wide swings in market prices make predicting both catches and revenues difficult. The region relies on a network structure of small firms and individual fishermen rather than vertically integrated firms (Acheson, 1985). In essence, demand uncertainty with stable supply provides conditions amenable to networks and markets but inimical to hierarchies.

Customized Exchanges High in Human Asset Specificity

Customized (or asset-specific) exchanges create dependency between parties. For example, if a buyer decides not to purchase the customized product or service, the seller cannot sell or transfer the product or service easily to another (Williamson, 1985). The customization of products or services increases demands for coordination between parties. It also raises concerns about how to safeguard these exchanges, since customizing products or services makes both seller and buyer more vulnerable to shifts in markets. Customization in conjunction with demand uncertainty increases behavioral uncertainty in two ways: (1) parties may disagree

about what the initial customized exchange involved, or (2) they may disagree about whether the parties will fulfill their initial, agreed-upon obligations now that circumstances have changed. With customized goods or services, exchange parties may try to reduce their dependency on one another. For example, in the mechanical engineering region of Lyons, both clients and subcontractors devised methods to reduce dependency stemming from customized investments; these methods included restricting sales and having clients purchase specialized tools or dies (Lorenz, 1988).

Customization of products or services is common among firms in a network (Miles & Snow, 1992: 55). This form of customization involves human asset specificity (e.g., culture, skills, routines, and teamwork acquired through "learning-by-doing"; see Williamson, 1985) because it is derived from participants' knowledge and skills, as in semiconductors (Saxenian, 1990), movies (Faulkner, 1987), construction (Stinchcombe, 1959), and process and product improvements in the auto industry (Dyer, 1994; Nishiguchi, 1994).

Customized exchanges with high levels of human asset specificity require an organizational form that enhances cooperation, proximity, and repeated exchanges to transfer effectively tacit knowledge among parties. Cooperation among exchange parties is necessary, for parties must work together to gain tacit knowledge. Since "assets" may quit the exchange or reduce their efforts, they are more dependent upon one another's cooperation to complete the exchange (Coff, 1993). Proximity facilitates transferring tacit knowledge through such an "information-rich" medium as face-to-face communication (Lengel & Daft, 1988; Nohria & Eccles, 1992). In the auto industry resident engineers who are employed by one firm but work at another firm enhance the transfer of knowledge and routines that improve product and process quality (Dyer, 1994; Nishiguchi, 1994). Repeated exchanges allow tacit knowledge, which cannot be assimilated in short-term interactions, to be assimilated over time. Pisano, in his study of the biotechnology industry, found that "knowledge about a particular partner and how to collaborate with that partner represents important relationship-specific capital . . . [which] . . . becomes deeper for collaborative arrangements encompassing multiple projects than for those involving a single project" (1989: 116). Customized exchanges with high levels of human asset specificity are not effectively coordinated by market mechanisms and require either hierarchies or networks.

Demand uncertainty pushes firms toward disaggregation, whereas customized, human asset-specific exchanges intensify the need for coordination and integration among parties. Network governance balances these competing demands by enhancing the rapid dissemination of tacit knowledge across firm boundaries. In Silicon Valley, networks facilitated the rapid deployment of tacit knowledge across semiconductor firms, spurring new innovations and markets, creating new ventures, and gen-

erating revenues 10 times that of nonnetworked Route 128 firms (Saxenian, 1994).

Complex Tasks Under Intense Time Pressure

"Task complexity" refers to the number of different specialized inputs needed to complete a product or service. Task complexity creates behavioral interdependence (Pfeffer & Salancik, 1978: 41) and heightens the need for coordinating activities. Differing specialists and inputs may result from an increased scope of activities, number of business functions needed, number of products created, or number of different markets served (Killing, 1988). Task complexity coupled with time pressures makes coordinating through a series of sequential exchanges unfeasible. These time pressures are due to the need to reduce lead time in rapidly changing markets, such as semiconductors, computers, film, and fashion, or to the need to reduce costs in highly competitive markets, such as automobiles and architecture. Task complexity in conjunction with time pressures has led to team coordination, where diversely skilled members work simultaneously to produce a good or service (Faulkner & Anderson, 1987; Goodman & Goodman, 1976; Van de Ven, Delbecq, & Koenig, 1976). Teams coordinate activities through mutual adjustment (horizontal information flows and group meetings), which speeds information sharing among parties and reduces the time to complete complex tasks (Clark & Fujimoto, 1989; Imai, Nonaka, & Takeuchi, 1985).

Network governance facilitates integrating multiple autonomous, diversely skilled parties under intense time pressures to create complex products or services. The need for speeding products and services to markets is a critical condition for networks (Powell, 1990). For example, in the film industry the approximate time for film production went from 2 years in the 1950s to 6 weeks in the 1970s (Jones & DeFillippi, 1996). Using networks and team coordination in the auto industry to enhance organizational capabilities (e.g., informal and frequent communication between upstream-downstream production units and between work levels) gave the Japanese a competitive advantage over Europeans and Americans, who used sequential coordination (Clark & Fujimoto, 1989: 43). The reduced lead times and reduced costs in the Japanese auto industry were substantial: 17 hours to assemble a car for the Japanese, versus 25 and 37 hours for Americans and Europeans, respectively (Clark & Fujimoto, 1989). Coriat (1995) argues that automotive firms across the globe are moving toward network governance in an effort to achieve product variety under intense time pressures.

Frequent Exchanges Among Parties

"Frequency" concerns how often specific parties exchange with one another. Although frequent exchange is identified by Williamson (1985) as an important determinant of governance, it is typically "set aside" (1985:

293) in TCE. Because specialized governance structures are costly, they are used only with recurring exchanges (Williamson, 1985: 60). We suggest, however, that frequent exchanges not only justify but enable using interfirm networks as an alternative governance form. Frequency allows human asset specificity to develop from learning-by-doing (Williamson, 1991: 281) and to "deepen" through continued interaction; this creates exchanges where the "identity" of the other matters (Williamson, 1991: 282) and enhances the transfer of tacit knowledge among parties.

Frequency also transforms the orientation that parties have toward an exchange and the amount of informal control that can be exerted over exchanges. Even Williamson notes, "Repeated personal contacts across organizational boundaries support some minimum level of courtesy and consideration between the parties [and] discourage[s] efforts to seek a narrow advantage in any particular transaction" (1975: 107). Reciprocity "transforms a unilateral supply relationship into a bilateral one" (Williamson, 1985: 191) and creates the perception of a similar "destiny" with greater "mutual interest" (Williamson, 1985: 155). In addition, the frequency of dyadic exchanges allows informal control through embeddedness. Embeddedness explains how dyadic exchanges and the overall structure of relations influence economic action and outcomes (Granovetter, 1992). Williamson agrees and argues, "Individual aggressiveness is curbed by the prospect of ostracism among peers, in both trade and social circumstances" (1975: 107-108). Thus, TCE logic is not antithetical to social network notions of embeddedness.

Granovetter (1992) identifies two aspects of embeddedness: relational and structural. Relational embeddedness captures the quality of dyadic exchanges—the degree to which exchange parties consider one another's needs and goals (Granovetter, 1992) and the behaviors exchange parties exhibit, such as trust, confiding, and information sharing (Uzzi, 1997). Uzzi's (1996, 1997) recent work provides a rich description as well as measures for illuminating the behavioral and attitudinal orientations of exchange parties in primarily dyadic exchanges or members' relational embeddedness. Structural embeddedness—the network's overall structure or architecture—and how it influences behavior is not described by Uzzi, however. Structural embeddedness provides "more efficient information spread about what members of the pair are doing, and thus better ability to shape that behavior" (Granovetter, 1992: 35). Thus, structural embeddedness, which we discuss more fully in the next section, focuses on social control. This notion of structural embeddedness is akin to Williamson's notion of "atmosphere," which also emphasizes social control by facilitating "informal group influences" (1975: 99), group disciplinary actions, and stronger informal infrastructure (1975: 104).

The importance of frequency and reciprocity and how they allow informal control over exchanges provides important common ground between TCE and social network theorists, although this common ground rarely is recognized by either. However, a point of difference is that al-

though a social network perspective often takes social structures as a given, TCE is interested in identifying the conditions giving rise to alternative governance forms and the social mechanisms that are employed within them. "A successful social analysis," suggests Aldrich, "cannot take social structures as given, but rather must be able to account for their origins and their persistence" (1982: 282). Even Granovetter notes, "Finally, I should add that the level of causal analysis adopted in the embeddedness argument is a rather proximate one. I have had little to say about what broad historical or macrostructural circumstances have led systems to display the social-structural characteristics they have" (1985: 506). We suggest that by integrating TCE with social network theory, we can enhance our understanding of the origins and persistence of structural embeddedness and social mechanisms that allow network governance to emerge and thrive.

Interaction Effects of Exchange Conditions

No single exchange condition propels the emergence of network governance; rather, a combination of specific conditions is required for network governance to emerge and to thrive as an organizational form offering comparative advantages over markets and hierarchies. These conditions involve *high adaptation* needs, owing to changing product demand; *high coordination* needs, owing to integrating diverse specialists in complex tasks; and *high safeguarding* needs, owing to overseeing and integrating parties' interests in customized exchanges. The need for safeguarding and coordinating exchange inhibits parties from using market mechanisms for customized, complex tasks, and the need for adapting exchanges inhibits parties from using hierarchies, even though hierarchies facilitate complex, customized exchanges. Our point here is that network governance balances the competing demands of these exchange conditions.

Exchange conditions of complex, customized tasks with recurrent interaction generate structural embeddedness. Complex tasks require that many parties interact to complete a product or service, which enhances the likelihood that mutual contacts will evolve, rather than strictly bilateral, exclusive exchanges. Customized processes and knowledge intensify the need for coordinating and safeguarding exchanges among parties and enhance the frequency of interaction so that tacit knowledge can be shared. These exchange conditions provide the impetus for the emergence of structural embeddedness, which, in turn, creates the foundation for social mechanisms to adapt, coordinate, and safeguard customized, complex exchanges effectively. In industries with these exchange conditions, we should see network governance emerging and thriving more frequently. From this we derive the following proposition:

Proposition 1: The interaction of exchange conditions—demand uncertainty with stable inputs, customized

goods/services requiring high levels of human asset specificity, complex tasks requiring diverse specialists, and frequent exchanges—promotes structural embeddedness among exchange parties.

STRUCTURAL EMBEDDEDNESS AS A FOUNDATION FOR SOCIAL MECHANISMS

Under conditions of demand uncertainty coupled with stable supply, human asset specificity, task complexity, and frequency of exchange, organizational fields develop *structural embeddedness*. In contrast to relational embeddedness, which essentially refers to the quality and depth of a single dyadic tie, structural embeddedness can be defined as the extent to which a "dyad's mutual contacts are connected to one another" (Granovetter, 1992: 35). This means that organizations do not have relationships only with each other, but with the same third parties as well; thus, many parties are linked indirectly by third parties. Structural embeddedness is a function of how many participants interact with one another, how likely future interactions are among participants, and how likely participants are to talk about these interactions (Granovetter, 1985, 1992). Because of decoupling, subcontractors and professionals move frequently among firms and fellow professionals in networks; this links different groups together and spreads information about third parties among those within the network, which allows information, norms, and common understandings to move across group boundaries (Friedkin, 1982; Granovetter, 1973, 1982). In addition, since parties' mutual contacts know or know of one another, they have a greater interest in the information and are more likely to share it with one another. The more structural embeddedness there is in a network, the more information each player knows about all of the other players and the more constraints there are on each player's behavior (Burt, 1992; Mayhew, 1968).

Structural embeddedness is critical to our understanding of how social mechanisms coordinate and safeguard exchanges in networks, for it diffuses values and norms that enhance coordination among autonomous units, and it diffuses information about parties' behaviors and strategies that enhances safeguarding customized exchanges. Thus, structural embeddedness allows parties to use implicit and open-ended contracts for customized, complex exchanges under conditions of demand uncertainty, and it enables social mechanisms, such as restricted access, macroculture, collective sanctions, and reputation, to coordinate and safeguard exchanges. Structural embeddedness makes restricted access possible, for it provides information so that parties know with whom to exchange and whom to avoid. Negative gossip by third parties about a party's uncooperative behavior significantly reduces the likelihood of direct relations, whereas positive gossip strengthens the likelihood of direct relations (Burt & Knez, 1995). Gulati's (1995) work on alliances shows that

parties also gather information regarding potential opportunities, synergies, and exchange partners via indirect links provided by structural embeddedness. Since structural embeddedness diffuses information throughout a system, it also facilitates the development of macroculture—the common values, norms, and beliefs shared across firms—because parties share perceptions and understandings (Pfeffer & Leblebici, 1973) and facilitates reputation—information about parties' behavior—to flow throughout the system. Structural embeddedness allows the use of collective sanctions, since parties must know about misfeasance in order to act jointly to condemn or ostracize perpetrators. Thus, we propose the following:

Proposition 2: Structural embeddedness provides the basis for social mechanisms to adapt, coordinate, and safeguard exchanges; thus, its presence enhances the likelihood of network governance emerging and thriving in rapidly changing markets for complex, customized tasks.

Too much embeddedness may create its own set of problems. Uzzi (1997) suggests that overembeddedness in relational embeddedness (i.e., many strong ties and few weak ties) can lead to feuding, choking off novel information from other parts of the industry, and welfarelike support of weak network members. Essentially, overreliance on strong ties tends to develop tight, relatively isolated cliques that are not well integrated with the rest of the industry (Granovetter, 1973). The optimal level of structural embeddedness in terms of overall fitness of the network may be an intermediate range, where parties are neither too tightly connected to fragment social connections nor too loosely connected to be unaware of who needs information and has information to provide, and the optimal level may be determined by network size. It is an important empirical question.

NETWORK GOVERNANCE: SOCIAL MECHANISMS AS SOLUTIONS TO EXCHANGE PROBLEMS

The network form of governance carries with it special problems of adapting, coordinating, and safeguarding exchanges, relying as it does on autonomous units operating in a setting of demand uncertainty with high interdependence, owing to customized, complex tasks. Network governance overcomes these problems by using social mechanisms rather than authority, bureaucratic rules, standardization, or legal recourse.

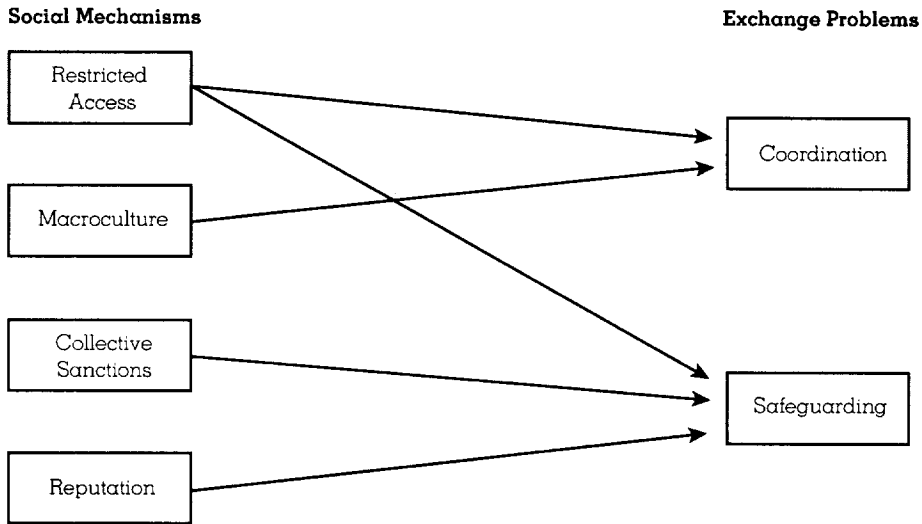
Since social mechanisms in network governance are poorly understood, we focus on identifying them and explaining how they facilitate adapting, coordinating, and safeguarding exchanges, as well as their boundary conditions (see Table 2). These social mechanisms consist of restricting access to exchanges, imposing collective sanctions, and mak-

TABLE 2
How Social Mechanisms Influence Exchange Behavior

Social Mechanism	Effect on Adapting, Coordinating, and Safeguarding Exchanges	Boundary Conditions
Restrict access to exchanges	<p>Reduces <i>coordination</i> costs by</p> <ul style="list-style-type: none"> • minimizing variance in parties' expectations, skills, and goals • developing communication protocols and establishing routines from continued interactions <p><i>Safeguards</i> exchanges by</p> <ul style="list-style-type: none"> • decreasing the amount of monitoring required and enhancing the monitoring of others that is done • increasing parties' interaction to enhance commitment and identification 	<p>Need some permeability of boundaries for innovation and new knowledge; otherwise, participants "wallow in their collective ignorance"</p>
Macroculture	<p>Reduces <i>coordination</i> costs by</p> <ul style="list-style-type: none"> • creating convergence of expectations through socialization • establishing common language to convey complex information • specifying broadly shared, tacit rules for behavior 	<ul style="list-style-type: none"> • Takes decades to establish shared understandings and routines • Requires third parties (e.g., guilds and professional schools) to institutionalize across firms • Content should value cooperation and commercial exchange
Collective sanctions	<p><i>Safeguards</i> exchanges by</p> <ul style="list-style-type: none"> • increasing costs of misfeasance • decreasing costs of monitoring to any one party • providing incentives to sort and monitor partners 	<ul style="list-style-type: none"> • Difficult to distinguish misunderstandings from opportunism • Need to discern best from minimal effort
Reputation	<p><i>Safeguards</i> exchanges by spreading information about behavior among parties</p>	<ul style="list-style-type: none"> • Information may be inaccurate or misused • May induce greater homophily in system and exclude women and minorities from network

ing use of social memory and cultural processes. In this section we explore each of these social mechanisms in turn. Figure 2 summarizes how these social mechanisms influence adapting, coordinating, or safeguarding exchanges. We suggest that the social mechanisms of network governance provide comparative advantage over other governance forms for

FIGURE 2
How Social Mechanisms Resolve Exchange Problems



these exchange conditions. *Ceteris paribus*, network governance is more likely to emerge under these exchange conditions and is more likely to thrive as a viable alternative governance form when these social mechanisms are present.

Restricted Access to Exchanges in the Network

Restricted access is a strategic reduction in the number of exchange partners within a network. In network governance restricted access occurs through status maximization and relational contracting. The status maximization strategy restricts access because partners seek to avoid partners of lower status; however, since other parties also are avoiding parties of significantly lower status, the result of status maximization is exchange among units of similar status. Status is based on "past demonstrations of quality" or association with high-status partners (Podolny, 1994: 460, 479). Status strategy is well established in the film industry, where having an "element"—a star or well-known director or producer—on a film ensures funding from and distribution with a major studio (Jones & DeFillippi, 1996). Alternatively, relational contracting restricts access, for a party works with fewer partners more often (Bolton, Malmrose, & Ouchi, 1994; Helper, 1991; Macauley, 1963). This strategy is well established in Japan, where firms work with far fewer suppliers than do American firms (McMillan, 1990: 39). For example, Dyer and Ouchi report that U.S. auto manufacturers used 20 different suppliers for electrical wiring, whereas Japanese auto manufacturers used only 2 (1993: 54).

Restricted access reduces coordination costs, and fewer partners increase interaction frequency, which can augment both the actors' motivation and ability to coordinate smoothly. First of all, having fewer partners who interact more often reduces variance in expectations, skills, and goals that parties bring to exchanges, facilitating mutual adjustment. In addition, continued interactions may substitute for internal socialization processes (Bryman, Bresnen, Beardsworth, Ford, & Keil, 1987: 267) and may permit exchange partners to learn each other's systems (Eccles, 1981; Faulkner & Anderson, 1987: 892), to develop communication protocols, and to establish routines for working together (Bryman et al., 1987: 280), all of which enhance coordination. Thus, we propose:

Proposition 3a: Restricted access reduces coordination costs of customized, complex exchanges. Ceteris paribus, restricted access enhances the likelihood of network governance emerging and thriving in rapidly changing markets for complex, customized tasks.

Restricted access also facilitates safeguarding exchanges. Having fewer partners decreases the total amount of monitoring a firm must do, which allows the firm to do a better job of monitoring the relationships it does engage in, thus both reducing transaction costs and the danger of becoming the victim of opportunistic behavior. In addition, having fewer partners who interact more often increases identification among parties and provides the conditions for developing strong ties among those involved (Granovetter, 1973). When this occurs, the actors involved tend to see their interests and needs as aligned rather than in opposition (Granovetter, 1992; Provan & Gassenheimer, 1994), which reduces the incentives for opportunism. Finally, having fewer partners who interact more often creates the conditions for an iterated prisoner's dilemma game (Axelrod, 1984). When the parties expect to interact repeatedly for the foreseeable future, they believe it rational to cooperate unless the other party defects. This decreases the potential for opportunism in exchanges. Thus:

Proposition 3b: Restricted access enhances safeguarding of customized exchanges in rapidly changing markets. Ceteris paribus, restricted access enhances the likelihood of network governance emerging and thriving in rapidly changing markets for complex, customized tasks.

We speculate that the relationship between the degree of access restriction and the contribution to adaptive fit of a network follows an inverted U shape, where too little restriction reduces performance because it impedes coordination of complex tasks, whereas too much restriction reduces performance because it provides inadequate incentives for quality and innovation. Closed systems can develop a "not-invented-here" syndrome that leads to participants "wallowing in their collective igno-

rance"⁵ and impedes innovation within the system. This notion has been used to describe the failure of U.S. auto manufacturers, who collectively ignored Japanese innovations and improvements (Abrahamson & Fombrun, 1994). In addition, the choice of exchange partners is important, since restricting exchange to only poor performers is unlikely to prove very successful.

Scholars' mathematical simulations of system performance in the context of information exchange (Huberman & Hogg, 1995) support both of these conclusions: very low restriction of exchange partners was optimal only when the number of actors in the system was very small and of similar quality; very high exchange restriction was optimal only when the size of the system was large and the variance in quality of actors was high (in other words, if some potential partners are very poor performers, it is better to stick with a closed set of the better performers). In all other cases, an intermediate level of restriction was optimal.

Macroculture

Macroculture is a system of widely shared assumptions and values, comprising industry-specific, occupational, or professional knowledge, that guide actions and create typical behavior patterns among independent entities (adapted from Abrahamson & Fombrun, 1992, 1994; Gordon, 1991; and Phillips, 1994: 384). This knowledge base is derived from fundamental assumptions about customers, competitors, suppliers, and society (Gordon, 1991). Macroculture is something that is shared by all participants of an interfirm setting (profession, industry, or occupation)—not only top managers (Abrahamson & Fombrun, 1994). Macroculture specifies roles, role relationships, and conventions—accepted approaches and solutions to problems—to be employed by participants (Becker, 1982); thus, macroculture coordinates interdependent activities among independent entities so that complex tasks may be completed.

Macroculture evolves out of the "webs of direct and indirect relationships" (Abrahamson & Fombrun, 1992: 181), as well as institutional sources and the larger national culture within which it exists. The more structurally embedded (e.g., the more connected and frequently interacting) the industry participants, the more widely they share their values, assumptions, and role understandings (Abrahamson & Fombrun, 1992; Reddy & Rao, 1990). Interfirm movement of participants diffuses norms, values, and expectations among those within the industry (DiMaggio & Powell, 1983; Pfeffer & Leblebici, 1973). In Silicon Valley, for instance, industry norms and understandings have emerged from and are reinforced by frequent strategic alliances, subcontracting, and job hopping of individuals among firms, all of which "blur the boundaries between independent firms" (Saxenian, 1990: 100).

⁵ We thank a reviewer for this insight.

In addition, macrocultures are diffused and sustained through three institutional means. First, socialization of those in professions and crafts shapes decisional premises among geographically disperse participants, which creates strongly shared macrocultures (Kaufman, 1960; Light, 1979; Van Maanen & Barley, 1984). Socialization often is provided by third parties, through formal schooling, such as in law and medicine, or through apprenticeship programs, such as in guild and trade associations. For example, the Directors Guild provides a limited number of highly coveted apprenticeship slots with the major studios for training directors. Second, trade journals or industry newsletters disseminate information throughout the industry (Abrahamson & Fombrun, 1994). Film industry participants refer to their primary trade journal, *Daily Variety*, as the "Bible" of the industry (Kent, 1991); in Silicon Valley the *San Jose Mercury News* serves this function (Saxenian, 1994). Third, industry events, such as trade shows, film festivals, and conferences, diffuse norms and values by providing role models, setting standards, and exchanging information among participants (Jones, 1996). This suggests that macrocultures evolve out of long-term repeated interactions but that they are sustained by an institutional infrastructure.

Macroculture is critical to understanding network governance, for its complex products and services require shared social processes and structures for effective exchange among autonomous partners. Macroculture enhances coordination among autonomous parties in three ways: (1) by creating "convergence of expectations" through socialization so that members do not work at "cross-purposes" (Williamson, 1991: 278), (2) by allowing for idiosyncratic language to summarize complex routines and information (Williamson, 1975: 99-104, 1985: 155), and (3) by specifying "broad tacitly understood rules . . . for appropriate actions under unspecified contingencies" (Camerer & Vepsäläinen, 1988: 115). Macroculture facilitates efficient exchange among parties because the ground rules do not have to be re-created for each interaction (Faulkner, 1987: 92-93). The high failure rate of recently formed alliances reveals how important established social processes and structures are to sustaining interfirm interactions (Gulati, Khanna, & Nohria, 1994). Research in international joint ventures also shows high failure rates owing to the difficulty of managing cultural differences among parties (Contractor & Lorange, 1988). All of this suggests that macroculture reduces coordination costs by increasing the ease of exchanging customized goods or services among autonomous parties. Thus, we propose:

Proposition 4: The presence of macroculture reduces coordination costs for customized, complex exchanges. Ceteris paribus, macroculture enhances the likelihood of network governance emerging and thriving in rapidly changing markets for complex, customized tasks.

Although macrocultures enhance network governance in emerging

and thriving, they are difficult to establish. Because networks involve disseminating cultural beliefs and values among many autonomous exchange parties, it may take decades to establish the shared understandings, routines, and conventions for complex tasks. For example, the network governance in the film industry emerged from interfirm exchanges among the major studios during the 1930s and 1940s and excluded the minor studios (Faulkner & Anderson, 1987). In Silicon Valley the network developed from second-sourcing agreements among initial semiconductor manufacturers (Saxenian, 1990). But it also takes third-party institutions, such as guilds, professional schools, or associations to institutionalize common approaches and understandings by socializing new members. In general, macrocultures are enhanced by close geographic proximity, because of the increased likelihood and ease of interaction, and they tend to rise in such geographically concentrated areas as California's wineries (Philips, 1994); Silicon Valley's semiconductors (Saxenian, 1990, 1994); Hollywood's films (Faulkner, 1987); Prato, Italy's fashion textiles (Lazerson, 1995; Piore & Sabel, 1984); and Tokyo's surrounding auto and electronic firms (Nishiguchi, 1994). Hence, we expect to find network governance in geographically concentrated areas.

The above discussion does not take into account the content of macroculture. Macrocultures that emphasize the dangers of commercial exchanges—seeing them as opportunities for deception and theft—or that view cooperation among firms, especially competitors, as unethical collusion may hinder the development of network governance. However, at this point, little is known empirically about the relationships between macrocultural content and the development of network governance.

Collective Sanctions

Collective sanctions involve group members punishing other members who violate group norms, values, or goals and range from gossip and rumors to ostracism (exclusion from the network for short periods or indefinitely) and sabotage; these sanctions are employed in network governance. In Maine lobster trapping, for instance, "interlopers" who violate fishing territories and accepted norms are sanctioned "through surreptitious destruction of their traps" (Acheson, 1985: 386), and in the film industry ostracism is used when parties violate accepted behaviors. The experience of those involved in making the film *Heaven's Gate* is especially instructive (Bach, 1985: 309, 319–322). Contrary to previous agreements, Michael Cimino attempted to make the film artistic rather than commercial. In the process the film went extensively over budget. After the excessive costs and box office failure became known throughout the industry, sanctions ensued. The perceived misbehavior eventually "led to at least temporary unemployment for almost everyone associated with the picture" (Balio, 1987: 339).

Collective sanctions safeguard exchanges, for they define and reinforce the parameters of acceptable behavior by demonstrating the

consequences of violating norms and values. However, individuals often choose not to enforce social norms because of the costs involved (Olson, 1971). Collective sanctions, supported by *metanorms*, enforce those social norms. A metanorm is a norm for punishing those who do not punish deviants (Axelrod, 1985). In network governance one's reputation is hurt when one recommends someone whose performance does not meet expected standards. For example, Howard Becker describes his experience in the music network based on a colleague's recommendation—a colleague who "interrogated" him about his abilities. The colleague told Becker, "[I]f you can't hit my ass. In fact, it's not just my ass, it's three or four different asses" (1982: 87). In effect, a collective sanction punishes those who do not adequately screen or punish poor performers. Consequently, collective sanctions reduce behavioral uncertainty by increasing the costs of opportunism, decreasing the costs of monitoring to any one party, and providing incentives to sort and monitor compatriots.

Proposition 5: The use of collective sanctions facilitates safeguarding customized exchanges for parties. Ceteris paribus, collective sanctions enhance the likelihood of network governance emerging and thriving in rapidly changing markets for complex, customized tasks.

Collective sanctions are limited in how accurately they may be applied. For example, one is often unable to discern intentional opportunism from a genuine misunderstanding, especially with complex tasks under conditions of high uncertainty. As uncertainty increases, it becomes increasingly difficult to tell when parties have met or left unmet their obligations to one another. As Bhidé and Stevenson note, "[T]he aggrieved party must not only prove that a contract was breached but also the fact that there was even an agreement (a meeting of minds). There is, in fact, a great potential for genuine misunderstandings" (1992: 196). In addition, human asset specificity makes it difficult to discern minimal versus best effort.

Reputation

Reputation involves an estimation of one's character, skills, reliability, and other attributes important to exchanges and is important under exchange conditions of uncertainty and customization. As environmental uncertainty increases, exchange parties become more concerned with information about their own and others' reputations (Kollock, 1994). In the film industry this concern for reputation is seen in the director's search for information on crew members. Director Sidney Pollack, for example, explains that his strategy for picking a crew is to "research the background of a tentative crew member religiously" (Jones & DeFillippi, 1996). Customized exchanges demand that parties work through problems and develop common understandings. Reputation reduces behavioral uncer-

tainty by providing information about the reliability and goodwill of others.

Reputation safeguards exchanges because it relays the detection of and serves to deter deceptive behavior, which enhances cooperation (Parkhe, 1993). As an experienced production manager in film explained, "Everyone knows everyone. If you don't know them, you normally know about them. If you don't know, you can find out" (Jones & DeFillippi, 1996). A film commissioner confirmed this: "We're a big industry but a small industry because we talk to one another" (Jones, 1996: 65). Reputations have economic consequences for participants in network governance. In the film industry, for example, those "with successful performances and track records move ahead in their careers, those with moderate reputations do not, [and] those with poor reputations experience employment difficulties" (Faulkner & Anderson, 1987: 881). "A director does not want to have a reputation for being wasteful because that is harmful to a career," explains Sidney Pollack (Jones & DeFillippi, 1996). In fact, reputations for mutual adjustment are critical for deciding who gets to repeat exchanges. As Paul Maslansky, a line producer, explains, "After all, other productions will follow this one" (Jones & DeFillippi, 1996). Consequently, reputation, supported by structural embeddedness, allows specialized exchanges to occur under a wider range of governance mechanisms (Williamson, 1991: 290-291). Therefore, we offer the following:

Proposition 6: Reputations enhance the safeguarding of customized exchanges. Ceteris paribus, the more important reputations are, the greater the likelihood of network governance emerging and thriving in rapidly changing markets for complex, customized tasks.

Reputations have limitations in their use. For instance, information about reputation may be inaccurate or misinterpreted. When diffused across long chains of links, information may become distorted as it is filtered by participants. In addition, overreliance on reputation may reduce new and innovative information as actors limit their range of partners to a small, increasingly in-bred group. Over time, this may increase homophily, effectively shutting out players that are very different (Blau, 1977). For example, Joan Micklin Silver has described how she was denied an opportunity to do a 46-minute television film by a male producer because she had done only 30-minute films up to that point. She remembered thinking that "the opportunities are going to be extremely rare for me as a woman who wanted to direct" (quoted in Squire, 1983: 39). Others in the film industry complain that the system is an "old boys network" that excludes minorities and women.

Interaction Effects of Social Mechanisms

The interaction of these social mechanisms in network governance may promote cooperative behavior while at the same time thwarting

problems characterized as social dilemmas (Schroeder, 1995). "[Social] dilemmas are defined by two simple properties: (a) each individual receives a higher payoff for a socially defecting choice . . . than for a socially cooperative choice, no matter what the other individuals in society do, but (b) all individuals are better off if all cooperate than if all defect" (Dawes, 1980: 169). Restricted access, reputation, and collective sanctions align well with Putnam's review of the conditions that favor cooperation in the face of collective or social dilemmas: "the number of players be limited, . . . information about each player's past behavior be abundant, and . . . players not discount the future too heavily," as well as "graduated sanctions against violators" (1993: 166). Social mechanisms of network governance enhance cooperative behavior needed for customized, complex tasks under conditions of uncertainty. Restricted access limits the number of players, reputation provides information about participants' actions, and collective sanctions discourage participants from yielding to incentives for short-term opportunistic behavior.

Proposition 7a: Multiple social mechanisms of restricted access, macroculture, collective sanctions, and reputation interact to decrease the coordination costs of and to enhance the safeguarding of customized exchanges. As more of these social mechanisms are used, the likelihood of network governance emerging and thriving is enhanced for overseeing complex, customized tasks in rapidly changing markets.

A key issue in assessing the effectiveness of these social mechanisms for adapting, coordinating, and safeguarding exchanges is their congruence. Congruent mechanisms reinforce one another to promote cooperation. For example, reputation and collective sanctions safeguard semi-specialized or specialized exchanges in network governance by dispersing information about behavior and increasing the costs of malfeasance. However, the content of some social mechanisms may undermine others and create incoherence in the system. For example, macroculture content may inhibit and collective sanctions may penalize information sharing and undermine coordination, even when there is an appropriate social structure for dispersing information about reputations. We suggest that the interplay of social mechanisms and their influence on coordinating and safeguarding exchanges is an area ripe for empirical study.

Proposition 7b: The congruent content of social mechanisms influences the coordination costs and the safeguarding of complex, customized exchanges. The more congruent the content of multiple social mechanisms for collaboration and sharing of information, the greater the likelihood of network governance emerging and thriving in rapidly changing markets for complex, customized tasks.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Contributions and Challenges

In this article we provide several contributions to the general understanding of network governance. We furnish a simple, integrated framework for understanding not only why firms disaggregate but the conditions under which they form durable networks. We extend TCE by integrating task complexity and structural embeddedness into the TCE framework and by moving TCE from a dyadic to a systems perspective. We extend the work on structural embeddedness by identifying exchange conditions that promote its development, and we also elaborate its role in social mechanisms. Finally, we delineate some key social mechanisms needed for networks to function effectively. Since these social mechanisms have been "only vaguely articulated" and are "still incipient" (Uzzi, 1997), we enhance knowledge of network governance available in the extant literature. Although we identify a few key social mechanisms, we acknowledge that these are not an exhaustive set, and we expect future research to identify other social mechanisms in network governance.

A challenge in researching network governance is to define network membership. Because network governance exists to complete a project, product, or service, this goal is an organizing principle around which the network is "draped" (Kadushin, 1976). Network membership may be defined in terms of the firm's relationship to the attainment of this goal, rather than by firm characteristics, such as size, SIC codes, or geographical location. From a research point of view, then, network membership is operationally defined by the relations an organization has with other firms in the network, rather than by an attribute of the organization itself. In social network analysis this corresponds to taking a realist approach to boundary specification, rather than a nominalist approach (Laumann, Marsden, & Prensky, 1983: 20-25). Since network governance is a select, persistent, and structured set of autonomous firms, it is not enough to call an industry or region a "network" without examining relations among the firms and how these relations complete a product or service.

Directions for Future Research

We identify several areas ripe for future research in network governance. A first area of investigation involves macrocultures and their content and development. The content of macrocultures in network governance is poorly understood, and an important contribution would involve identifying key values, norms, and assumptions that guide network participants. Uzzi's (1997) and Faulkner's (1987) research are important first steps in this direction. However, more comparative work across network domains needs to be done to ascertain similarities and differences in values, goals, and assumptions of those within networks. A related issue involves identifying the processes of socialization and institutionalization and whether these vary across networks in differing domains. For

example, are third parties and institutions, such as professional schools and industry events, critical for all networks?

A second research stream, examining the interaction of social mechanisms, could provide important insights. Since the network form of governance involves implicit and open-ended contracts, social mechanisms are critical to networks functioning effectively. Thus, we must have a better understanding of how social mechanisms reinforce, substitute, or undermine one another and how their combination influences performance. For example, are some combinations of social mechanisms more effective—if so, under what conditions? In addition, we do not understand whether some social mechanisms are more important for predicting when networks emerge and others for when networks thrive.

A third research agenda concerns whether there is an optimal size for network governance. Just as prior TCE work on governance explored the tradeoffs involved in determining an optimal firm size, our studies need to consider how similar tradeoffs influence optimal network size. Presumably, as networks get larger, they can draw from more numerous and diverse resources, which would give them greater adaptability. However, greater size brings greater coordination and safeguarding problems. Having too many partners places overwhelming demands on resources (e.g., time, energy, and finances), as well as on the ability to define a common goal while minimizing competing claims (Gomes-Casseres, 1994). Thus, there may be a negative correlation between network size and structural embeddedness, so that to maintain a certain level of embeddedness, networks must not get too large. We see network size as an empirical question to be answered by comparing many contexts in which network governance is found. To date, few comparative studies exist. In addition, the influence of size on governance and on performance of individual firms and the network needs to be assessed.

A fourth important topic is power and its exercise within the network form of governance. Any discussion of social structure raises questions of how such structures facilitate or constrain the exploitation of power (Perrow, 1986). Power may be constrained in networks owing to complex tasks high in human asset specificity. These tasks demand a high degree of creative problem solving, knowledge, and effort, which are enhanced by a cooperative, rather than adversarial, orientation. Those who are typically seen as powerful—the prime contractors, distributors, or financiers—become dependent on subcontractors to execute their tasks with their best effort and with financial integrity. In addition, a network structure of decoupled units performing complex tasks enhances the ability of parties to use two-step leverage and complex cooptation, where a dependent actor gains leverage over a more powerful actor by developing a relationship with a third actor, to alter power relations (Gargiulo, 1993). This leverage may constrain those in more powerful positions from exploiting their power fully. Finally, power is influenced by output demand uncertainty, which means that power may be transitory, since it is unclear

that today's success will also be tomorrow's successes. Thus, abuses of power could generate retaliation when power shifts because of rapidly changing markets. This prospect may constrain power abuse within network governance. Power, however, may be abused where a few parties control key resources. For example, film studios control movie distribution channels, and control over this resource gives the studios greater bargaining power when negotiating profit-sharing contracts with directors, producers, and stars.

A fifth research agenda is determining whether networks result from searches for efficiency or from managerial fads and institutional processes. Although our arguments are based on efficiency considerations, we do not rule out the possibility of adoption for other reasons. The somewhat simultaneous, but isolated, emergence of some networks (e.g., film, Italian textile, Silicon Valley, and deal making in investment banking) argues against fashion as the reason for their emergence. It seems unlikely (and we know of no accounts which suggest) that those forming these networks were looking to other industries as models, although, more recently, fashion and institutionalization appear to play an increasing role. Recent popular press books advocate that firms form networks without careful discrimination about what conditions are necessary for networks to thrive. We suggest that such processes may result in many experiments in network governance in a variety of industries but that, according to our theory, these experiments will fail unless the necessary exchange conditions and social mechanisms are in place to solve problems of adaptation, coordination, and safeguarding.

We suggest testing institutional and efficiency explanations in three ways. First, by comparing networks in divergent industries (e.g., the U.S. film industry, the Maine lobster market, and the construction industry), we can support efficiency explanations more solidly when we find firms across a variety of domains instituting networks to resolve similar exchange conditions. A second study is along the lines of Tolbert and Zucker's (1983) seminal work on the diffusion of civil service reform. By assessing the conditions of earlier versus later network governance, we may tease out the relationship between efficiency and institutional explanations. A third study could compare failure or productivity rates of networks. If our efficiency explanation is correct, networks with more of the exchange conditions and social mechanisms we have identified should have better adaptive fit to the environment, which should be indicated by lower failure rates and greater productivity. If failure rate or productivity is independent of exchange conditions and social mechanisms for networks, isomorphism may be a more viable explanation.

Network governance is increasingly important but poorly understood. Although the exchange conditions and social mechanisms we have identified might make networks seem a rare or difficult governance form to employ, we suggest that network governance will likely become more prevalent because these exchange conditions—demand uncertainty,

human asset specificity, and complex tasks—are increasing. Several scholars have noted increased uncertainty in firms' environments (Daft & Lewin, 1993; Volberda, 1996), which has been labeled the "hypercompetitive shift" (Thomas, 1996). Hypercompetition necessitates more rapid and flexible responses on the part of firms, suggesting that the conditions needed for network emergence and viability will be increasingly common. In addition, work has shifted increasingly to knowledge-based modes, where human asset specificity and the transfer of tacit knowledge across firm boundaries are important.

Research on network governance is not only of theoretical importance, but of practical importance as well. The practical implications of our theoretical framework highlight the dangers for those who might seek to use network governance without the appropriate supporting social mechanisms. Without these mechanisms both coordination and safeguarding are likely to suffer. Nonetheless, as the research agenda we outline here suggests, we still have much to learn about network governance. Our conceptual framework provides an enhanced understanding of and guides needed empirical research on network governance.

REFERENCES

- Abrahamson, E., & Fombrun, C. J. 1992. Forging the iron cage: Interorganizational networks and the production of macro-culture. *Journal of Management Studies*, 29: 175-194.
- Abrahamson, E., & Fombrun, C. J. 1994. Macrocultures: Determinants and consequences. *Academy of Management Review*, 19: 728-755.
- Acheson, J. M. 1985. The Maine lobster market: Between market and hierarchy. *Journal of Law, Economics and Organization*, 1: 385-398.
- Alchian, A. A., & Woodward, S. 1988. The firm is dead; long live the firm: A review of Oliver E. Williamson's *The Economic Institutions of Capitalism*. *Journal of Economic Literature*, 26: 65-79.
- Aldrich, H. E. 1979. *Organizations and environments*. Englewood Cliffs, NJ: Prentice-Hall.
- Aldrich, H. E. 1982. The origins and persistence of networks: A comment. In P. Marsden & N. Lin (Eds.), *Social structure and network analysis*: 281-295. Beverly Hills, CA: Sage.
- Alter, C., & Hage, J. 1993. *Organizations working together*. Newbury Park, CA: Sage.
- Axelrod, R. 1984. *The evolution of cooperation*. New York: Basic Books.
- Axelrod, R. 1985. An evolutionary approach to norms. *American Political Science Review*, 80: 1055-1111.
- Bach, S. 1985. *Final cut*. New York: Onyx.
- Baker, F., & Firestone, R. (Eds.). 1972. *Movie people*. New York: Douglas Book Corp.
- Balakrishnan, S., & Wernerfelt, B. 1986. Technical change, competition, and vertical integration. *Strategic Management Journal*, 9: 347-359.
- Balio, T. 1987. *United Artists: The company that changed the film industry*. Madison, WI: University of Wisconsin Press.
- Barley, S. R., Freeman, J., & Hybels, R. C. 1992. Strategic alliances in commercial biotechnology. In N. Nohria & R. Eccles (Eds.), *Networks and organizations*: 311-347. Boston: Harvard Business School Press.

- Barney, J. B. 1990. The debate between traditional management theory and organizational economists: Substantive differences or intergroup conflict? *Academy of Management Review*, 15: 382-393.
- Becker, H. S. 1982. *Art worlds*. Berkeley, CA: University of California Press.
- Bhide, A., & Stevenson, H. 1992. Trust, uncertainty and profit. *The Journal of Socio-Economics*, 21: 191-208.
- Blau, P. M. 1977. *Inequality and heterogeneity*. New York: Free Press.
- Bolton, M. K., Malmrose, R., & Ouchi, W. G. 1994. The organization of innovation in the United States and Japan: Neoclassical and relational contracting. *Journal of Management Studies*, 31: 653-679.
- Bryman, A., Bresnen, M., Beardsworth, A. D., Ford, J., & Keil, E. T. 1987. The concept of the temporary system: The case of the construction project. In N. Di Tomaso & S. B. Bacharach (Eds.), *Research in the sociology of organizations*: 253-283. Greenwich, CT: JAI Press.
- Burt, R. S. 1992. *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.
- Burt, R. S., & Knez, M. 1995. Trust and third-party gossip. In R. Kramer & T. Tyler (Eds.), *Trust in organizations: Frontiers of theory and research*: 68-69. Thousand Oaks, CA: Sage.
- Camerer, C., & Vepsäläinen, A. 1988. The economic efficiency of corporate culture. *Strategic Management Journal*, 9: 115-126.
- Clark, K. B., & Fujimoto, T. 1989. Lead time in automobile product development: Explaining the Japanese advantage. *Journal of Engineering and Technology Management*, 6: 53.
- Coff, R. W. 1993. *Corporate acquisitions of human-asset-intensive firms: How buyers mitigate uncertainty*. Paper presented at the annual meeting of the Academy of Management, Atlanta, GA.
- Conner, K. R., & Prahalad, C. K. 1996. A resource-based theory of the firm: Knowledge versus opportunism. *Organization Science*, 7: 477-501.
- Contractor, F., & Lorange, P. (Eds.). 1988. *Cooperative strategies in international business*. Lexington, MA: Lexington Books.
- Coriat, B. 1995. Variety, routines and networks: The metamorphosis of Fordist firms. *Industrial and Corporate Change*, 4: 205-228.
- Daft, R. L., & Lewin, A. Y. 1993. Where are the theories for the "new" organizational forms? An editorial essay. *Organization Science*, 4: i-v.
- Dawes, R. M. 1980. Social dilemmas. *Annual Review of Psychology*, 31: 169-193.
- DiMaggio, P. J., & Powell, W. W. 1983. The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48: 147-160.
- Donaldson, L. 1990. The ethereal hand: Organizational economics and management theory. *Academy of Management Review*, 15: 369-381.
- Dubini, P., & Aldrich, H. 1991. Personal and extended networks are central to the entrepreneurial process. *Journal of Business Venturing*, 6: 305-313.
- Dyer, J. H. 1994. Dedicated assets: Japan's manufacturing edge. *Harvard Business Review*, 72(6): 174-178.
- Dyer, J. H., & Ouchi, W. G. 1993. Japanese-style partnerships: Giving companies a competitive edge. *Sloan Management Review*, 35(1): 51-63.
- Eccles, R. G. 1981. The quasifirm in the construction industry. *Journal of Economic Behavior and Organization*, 2: 335-357.

- Eccles, R. G., & Crane, D. B. 1988. *Doing deals: Investment banks at work*. Boston, MA: Harvard Business School Press.
- Ellis, J. C. 1990. *A history of film* (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Faulkner, R. R. 1987. *Music on demand: Composers and careers in the Hollywood film industry*. New Brunswick, NJ: Transaction Books.
- Faulkner, R. R., & Anderson, A. B. 1987. Short-term projects and emergent careers: Evidence from Hollywood. *American Journal of Sociology*, 92: 879-909.
- Foss, N. J. 1996. Knowledge-based approaches to the theory of the firm: Some critical comments. *Organization Science*, 7: 470-476.
- Friedkin, N. E. 1982. Information flow through strong and weak ties in interorganizational social networks. *Social Networks*, 3: 273-285.
- Gargiulo, M. 1993. Two-step leverage: Managing constraint in organizational politics. *Administrative Science Quarterly*, 38: 1-19.
- Garud, R., & Kumaraswamy, A. 1993. Changing competitive dynamics in network industries: An exploration of Sun Microsystems' open systems strategy. *Strategic Management Journal*, 14: 351-369.
- Gerlach, M. L. 1992. The Japanese corporate network: A blockmodel analysis. *Administrative Science Quarterly*, 37: 105-139.
- Gerlach, M. L., & Lincoln, J. R. 1992. The organization of business networks in the United States and Japan. In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form, and action*: 491-520. Boston: Harvard Business School Press.
- Ghoshal, S., & Moran, P. 1996. Bad for practice: A critique of transaction cost theory. *Academy of Management Review*, 21: 13-47.
- Gomes-Casseres, B. 1994. Group versus group: How alliance networks compete. *Harvard Business Review*, 4: 62-74.
- Goodman, R. A., & Goodman, P. L. 1976. Some management issues in temporary systems: A study of the professional development and manpower—the theater case. *Administrative Science Quarterly*, 21: 494-500.
- Gordon, G. C. 1991. Industry determinants of organizational culture. *Academy of Management Review*, 16: 396-415.
- Granovetter, M. S. 1973. The strength of weak ties. *American Journal of Sociology*, 78: 1360-1380.
- Granovetter, M. 1982. The strength of weak ties: A network theory revisited. In P. Marsden & N. Lin (Eds.), *Social structure and network analysis*: 105-130. Beverly Hills, CA: Sage.
- 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*: 25-56. Boston: Harvard Business School Press.
- Granovetter, M. 1994. Business groups. In N. J. Smelser & R. Swedberg (Eds.), *The handbook of economic sociology*: 453-475. Princeton, NJ: Princeton University Press.
- Granovetter, M. 1995. Coase revisited: Business groups in the modern economy. *Industrial and Corporate Change*, 1: 93-130.
- Gulati, R. 1995. Social structure and alliance formation patterns: A longitudinal analysis. *Administrative Science Quarterly*, 40: 619-652.
- Gulati, R., Khanna, T., & Nohria, N. 1994. Unilateral commitments and the importance of process in alliances. *Sloan Management Review*, 35(3): 61-69.

- Helfat, C. E., & Teece, D. E. 1987. Vertical integration and risk reduction. *Journal of Law, Economics and Organization*, 3: 47-67.
- Helper, S. 1991. How much has really changed between U.S. automakers and their suppliers? *Sloan Management Review*, 32(4): 15-28.
- Hesterly, W. S., Liebeskind, J., & Zenger, T. R. 1990. Organizational economics: An impending revolution in organization theory. *Academy of Management Review*, 15: 402-420.
- Hesterly, W. S., & Zenger, T. R. 1993. The myth of a monolithic economics: Fundamental assumptions and the use of economic models in policy and strategy research. *Organization Science*, 4: 496-510.
- Hill, C. W. L. 1990. Cooperation, opportunism, and the invisible hand: Implications for transaction cost theory. *Academy of Management Review*, 15: 500-513.
- Hirsch, P. M. 1972. Processing fads and fashions: An organization-set analysis of cultural industry systems. *American Journal of Sociology*, 77: 639-659.
- Hirsch, P. M., Friedman, R., & Koza, M. P. 1990. Collaboration or paradigm shift?: Caveat emptor and the risk of romance with economic models for strategy and policy research. *Organization Science*, 1: 87-98.
- Huberman, B. A., & Hogg, T. 1995. Communities of practice: Performance and evolution. *Computational & Mathematical Organization Theory*, 1(1): 73-92.
- Imai, K., Nonaka, I., & Takeuchi, H. 1985. Managing the new product development process: How Japanese companies learn and unlearn. In K. B. Clark, R. H. Hayes, & C. Lorenz (Eds.), *The uneasy alliance*: 337-375. Boston: Harvard Business School Press.
- Jarillo, J. C. 1988. On strategic networks. *Strategic Management Journal*, 9: 31-41.
- Jones, C. 1996. Careers in project networks: The case of the film industry. In M. Arthur & D. Rousseau (Eds.), *The boundaryless career*: 58-75. New York: Oxford University Press.
- Jones, C., & DeFillippi, R. J. 1996. Back to the future in film: Combining industry- and self-knowledge to meet career challenges of the 21st century. *Academy of Management Executive*, 10(4): 89-104.
- Jones, C., & Hesterly, W. S. 1993. *Network organization: An alternative governance form or a glorified market?* Paper presented at the annual meeting of the Academy of Management, Atlanta, GA.
- Kadushin, C. 1976. Networks and circles in the production of culture. *American Behavioral Scientist*, 19: 769-784.
- Kaufman, H. 1960. *The forest ranger*. Baltimore: John Hopkins University Press.
- Kent, N. 1991. *Naked Hollywood*. New York: St. Martin's Press.
- Killing, J. P. 1988. Understanding alliances: The role of task and organizational complexity. In F. Contractor & P. Lorange (Eds.), *Cooperative strategies in international business*: 55-68. Lexington, MA: Lexington Books.
- Kogut, B., & Zander, U. 1996. What firms do? Coordination, identity, and learning. *Organization Science*, 7: 502-518.
- Kollock, P. 1994. The emergence of exchange structures: An experimental study of uncertainty, commitment and trust. *American Journal of Sociology*, 100: 313-345.
- Kreiner, K., & Schultz, M. 1993. Informal collaboration in R & D: The formation of networks across organizations. *Organization Studies*, 14: 189-209.
- Larson, A. 1992. Network dyads in entrepreneurial settings: A study of the governance of exchange relationships. *Administrative Science Quarterly*, 37: 76-104.
- Laumann, E. O., Marsden, P. V., & Prensky, D. 1983. The boundary specification problem in

- network analysis. In R. S. Burt & M. J. Minor (Eds.), *Applied network analysis*: 18-34. Newbury Park, CA: Sage.
- Lazerson, M. 1995. A new phoenix?: Modern putting-out in the Modena knitwear industry. *Administrative Science Quarterly*, 40: 34-59.
- Lengel, R. H., & Daft, R. L. 1988. The selection of communication media as an executive skill. *Academy of Management Executive*, 2: 225-232.
- Liebeskind, J. P., Oliver, A. L., Zucker, L., & Brewer, M. 1996. Social networks, learning, and flexibility: Sourcing scientific knowledge in new biotechnology firms. *Organization Science*, 7: 428-443.
- Light, D., Jr. 1979. Surface data and deep structure: Observing the organization of professional training. *Administrative Science Quarterly*, 24: 551-559.
- Lorenz, E. H. 1988. Neither friends nor strangers: Informal networks of subcontracting in French industry. In D. Gambetta (Ed.), *Trust: Making or breaking cooperative relations*: 194-210. New York: Basil Blackwell.
- Macauley, S. 1963. Non-contractual relations in business: A preliminary study. *American Sociological Review*, 28: 55-67.
- Mariotti, S., & Cainarca, G. C. 1986. The evolution of transaction governance in the textile-clothing industry. *Journal of Economic Behavior and Organization*, 7: 354-374.
- Mayhew, B. 1968. Behavioral observability and compliance with religious proscriptions on birth control. *Social Forces*, 47: 60-70.
- McMillan, J. 1990. Managing supplier incentives systems in Japanese and U.S. industry. *California Management Review*, 32(4): 38-55.
- Meyerson, D., Weick, K. E., & Kramer, R. M. 1996. Swift trust and temporary groups. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations: Frontiers of theory and research*: 166-195. Thousand Oaks, CA: Sage.
- Miles, R. E., & Snow, C. C. 1978. *Organizational strategy, structure, and process*. New York: McGraw-Hill.
- Miles, R. E., & Snow, C. C. 1986. Organizations: New concepts for new forms. *California Management Review*, 28(3): 62-73.
- Miles, R. E., & Snow, C. C. 1992. Causes of failures in network organizations. *California Management Review*, 34(4): 53-72.
- Milliken, F. J. 1987. Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management Review*, 12: 133-143.
- Nishiguchi, T. 1994. *Strategic industrial sourcing: The Japanese advantage*. New York: Oxford University Press.
- Nohria, N. 1992. Is network perspective a useful way of studying organizations? In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form, and action*: 1-22. Boston: Harvard Business School Press.
- Nohria, N., & Eccles, R. G. 1992. Face-to-face: Making network organizations work. In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form, and action*: 288-308. Boston: Harvard Business School Press.
- Olson, M. 1971. *The logic of collective action: Public goods and a theory of groups* (2nd ed.). Cambridge, MA: Harvard University Press.
- Parkhe, A. 1993. Strategic alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal*, 36: 794-829.
- Perrow, C. 1986. *Complex organizations: A critical essay* (2nd ed.). New York: Random House.

- Perrow, C. 1992. Small firm networks. In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form, and action*: 445-470. Boston: Harvard Business School Press.
- Peterson, R. A., & Berger, D. G. 1971. Entrepreneurship in organizations: Evidence from the popular music industry. *Administrative Science Quarterly*, 10: 97-106.
- Pfeffer, J., & Leblebici, H. 1973. Executive recruitment and the development of interfirm organizations. *Administrative Science Quarterly*, 18: 449-461.
- Pfeffer, J., & Salancik, G. R. 1978. *The external control of organizations*. New York: Harper & Row.
- Phillips, M. E. 1994. Industry mindsets: Exploring the cultures of two macro-organizational settings. *Organization Science*, 5: 384-402.
- Piore, M. J., & Sabel, C. F. 1984. *The second industrial divide*. New York: Basic Books.
- Pisano, G. P. 1989. Using equity participation to support exchange: Evidence from the biotechnology industry. *Journal of Law, Economics, and Organization*, 51: 109-126.
- Podolny, J. 1993. A status-based model of market competition. *American Journal of Sociology*, 98: 829-872.
- Podolny, J. 1994. Market uncertainty and the social character of economic exchange. *Administrative Science Quarterly*, 39: 458-483.
- Powell, W. W., 1990. Neither market nor hierarchy: Network forms of organization. In B. Staw & L. L. Cummings (Eds.), *Research in organizational behavior*: 295-336. Greenwich, CT: JAI Press.
- Powell, W. W., & Brantley, P. 1992. Competitive cooperation in biotechnology: Learning through networks? In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form, and action*: 366-394. Boston: Harvard Business School Press.
- Powell, W. W., Koput, K., & Smith-Doerr, L. 1996. Interorganizational collaborations and the locus of innovation: Networks of learning in biotechnology. *Administrative Science Quarterly*, 41: 116-145.
- Provan, K. G., & Gassenheimer, J. G. 1994. Supplier commitment in relational contract exchanges with buyers: A study of interorganizational dependence and exercised power. *Journal of Management Studies*, 31: 55-68.
- Putnam, R. D. 1993. *Making democracy work: Civic traditions in modern Italy*. Princeton, NJ: Princeton University Press.
- Reddy, N. M., & Rao, M. V. H. 1990. The industrial market as an interfirm organization. *Journal of Management Studies*, 27: 43-59.
- Reich, R. R. 1991. *The work of nations*. New York: Alfred Knopf.
- Ring, P. S., & Van de Ven, A. H. 1992. Structuring cooperative relationships between organizations. *Strategic Management Journal*, 13: 483-498.
- Robertson, P. L., & Langlois, R. N. 1995. Innovation, networks, and vertical integration. *Research Policy*, 24: 543-562.
- Robins, J. A. 1993. Organization as strategy: Restructuring production in the film industry. *Strategic Management Journal*, 14: 103-118.
- Saxenian, A. 1990. Regional networks and the resurgence of Silicon Valley. *California Management Review*, 33(1): 89-112.
- Saxenian, A. 1994. *Regional advantage: Culture and competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press.
- Schroeder, D. A. 1995. An introduction to social dilemmas. In D. A. Schroeder (Ed.), *Social dilemmas: Perspectives on individuals and groups*: 1-15. Westport, CT: Praeger.

- Snow, C. C., Miles, R. E., & Coleman, H. J., Jr. 1992. Managing 21st century network organizations. *Organizational Dynamics*, 20(3): 5-20.
- Squire, J. E. (Ed.). 1983. *The movie business book*. Englewood Cliffs, NJ: Prentice-Hall.
- Stinchcombe, A. L. 1959. Bureaucratic and craft administration of production: A comparative study. *Administrative Science Quarterly*, 4: 168-187.
- Swedberg, R. 1990. *Economics and sociology*. Princeton, NJ: Princeton University Press.
- Thomas, L. G. 1996. The two faces of competition: Dynamic resourcefulness and hypercompetitive shift. *Organization Science*, 7: 221-242.
- Tolbert, P. S., & Zucker, L. G. 1983. Institutional sources of change in the formal structure of organizations: The diffusion of civil service reforms. *Administrative Science Quarterly*, 23: 22-39.
- 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.
- Van de Ven, A. H., Delbecq, A., & Koenig, R. H. 1976. Determinants of coordination modes within organizations. *American Sociological Review*, 41: 322-338.
- Van de Ven, A. H., Walker, G., & Liston, J. 1979. Coordination patterns within an interorganizational network. *Human Relations*, 32: 19-36.
- Van Maanen, J., & Barley, S. R. 1984. Occupational communities: Culture and control in organizations. In B. Staw & L. L. Cummings (Eds.), *Research in organizational behavior*: 287-365. Greenwich, CT: JAI Press.
- Volberda, H. W. 1996. Toward the flexible form: How to remain vital in hypercompetitive environments. *Organization Science*, 7: 359-374.
- Wellman, B. 1991. Structural analysis: From method and metaphor to theory and substance. In B. Wellman & S. D. Berkowitz (Eds.), *Social structures: A network approach*: 19-61. Cambridge, England: Cambridge University Press.
- Williamson, O. E. 1975. *Markets and hierarchies: Analysis and antitrust implications*. New York: Free Press.
- Williamson, O. E. 1985. *The economic institutions of capitalism: Firms, markets and relational contracting*. New York: Free Press.
- Williamson, O. E. 1991. Comparative economic organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly*, 36: 269-296.
- Williamson, O. E. 1994. Transaction cost economics and organization theory. In N. J. Smelser & R. Swedberg (Eds.), *The handbook of economic sociology*: 77-107. Princeton, NJ: Princeton University Press.
- Williamson, O. E. 1996. Economic organization: The case for candor. *Academy of Management Review*, 21: 48-57.
- Winship, C., & Rosen, S. 1988. Introduction: Sociological and economic approaches to the analysis of social structure. *American Journal of Sociology*, 94(Supplement): S1-S17.
- Zenger, T. R., & Hesterly, W. S. 1997. The disaggregation of U.S. corporations: Selective intervention, high-powered incentives, and molecular units. *Organization Science*, 8: 209-222.

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