

INTRODUCTION: EVOLVING WEBS IN NETWORK ECONOMIES

Knowledge and information have become increasingly important assets to contemporary firms, and as a result, network approaches have become central to their strategic organization as firms turn to cooperative arrangements to gain advantage. In industrial economies characterized by oligopolistic competition in which a few large firms dominated their industries, scale economies dominated strategic thinking. Interfirm collaboration was less common than competition. In knowledge and information economies, however, network economies have become vital for strategic action and success (Shapiro & Varian, 1999).

Networks are increasingly important in modern-day economies because technological and competitive advantage can be rapidly eroded by knowledge and information emerging from beyond as well as within a firm's industry. Success depends on the value and uniqueness of a firm's knowledge to its stakeholders. To develop information and knowledge-based advantages, firms have increasingly turned to cooperative ties to access other firms' complimentary expertise, valuable information flows, and novel technological developments that reduce uncertainty and facilitate initiation of additional ties. The proliferation of such cooperative ties has created interfirm networks – evolving webs of linkages spanning and linking entire industries.

Inside organizations, hierarchical structures have similarly given way to networks as the means of creating value for the organization and pursuing individual and group goals. Made possible by modern information technologies, more flexible and disaggregated forms of production have emerged, initiating a shift from hierarchical to network organizational structures characterized by horizontal linkages both within and across organizations (Nohria, 1992).

Entrepreneurial firms have challenged incumbents in many industries with strategies based on knowledge advantages derived from collaboration within and beyond their boundaries. Established firms have attempted to respond by restructuring themselves along network lines, outsourcing activities to suppliers and partnering with other firms to access technological

developments and complimentary expertise, allowing them to concentrate on refining core activities in which they possess a unique advantage (Kogut, 1988; Oliver, 1991; Powell, 1990; Powell, Koput, & Smith-Doerr, 1996).

In part, network models of strategic organization originated in the empirical observations of network forms operating effectively in new information-rich environments. However, the focus on networks in the study of organizations and strategy preceded the rise of network forms of strategic organization. Perhaps the sharpest motivation for adopting the network perspective has been to move away from the individualist, essentialist and atomist assumptions and explanations in economic theory that treat individual choices and exchanges as independent, toward more relational, contextual and systemic appreciations. From a network perspective, individual rationality is a variable rather than an assumption (Stinchcombe, 1985); markets are conceived not as a pricing mechanism among anonymous firms, but as meeting places and repositories of exchange histories and existing relations all of which affect future patterns of exchange (Smelser & Swedberg, 1994; Gulati & Gargiulo, 1999).

Network theory has also contributed to research in strategy and organizations by affording greater precision in the conceptualization of environments in terms of the relational system surrounding individuals, groups and firms, and helping to specify sources and mechanisms underlying environmental munificence, uncertainty and change (Wasserman, 1992).

NETWORK THEORY: KEY ASSUMPTIONS AND RESEARCH

Two core assumptions set network theory apart from other perspectives and direct research into specific strategic and organizational topics.

From a network perspective, social actors – individuals, groups and firms – and their actions are viewed as interdependent and the relational ties among them as pipes through which influence and resources flow, and prisms through which their qualities are reflected (Podolny, 2001). Firms' relationships may be symbiotic, the resources accessed and status obtained through one tie making ties with other firms possible and/or valuable (Powell et al., 1996; Uzzi & Gillespie, 2002). Partnering decisions are also influenced by strategic considerations such as the ability to play one partner off against another (Burt, 1992; Simmel, 1950; Willer, 1999), the desire to create an appropriate mix of new and old ties (Levitt & March, 1988;

Baum & Ingram, 2002), or the need to maintain a manageable alliance portfolio size (Li & Rowley, 1999) and composition (Gomes-Casseres, 2003; Rowley, Baum, Shipilov, Greve, & Rao, 2004).

Within networks, the evolving pattern of relationships – the network structure – shapes opportunities and constraints. Adopting Burt's (this volume) language, the pattern of network ties surrounding social actors is a “*causal spark*” that can promote or hinder action. Networks take shape as actors enter into collaborative relations based on information about the quality, trustworthiness, and status of potential partners obtained through experiences in their own and their partners' past relationships. The more the network internalizes information about potential partners, the more actors look to the network for cues about future relationships. And, in building new ties, actors contribute to the structuring of the network that shapes and constrains their future actions.

Together, these assumptions suggest that networks affect actors' behavior and performance by serving as conduits through which information, knowledge and other resources flow, and reputations are signaled. And, that the topologies of networks and positions of actors within them determine which actors will have access to and control over resources and information flowing through the network pipes and which will shine brightly in the network prism. In the network model, then, the social structure of organizational life is the mechanism inspiring strategic action and competitive advantage.

In practical terms, these assumptions have guided research toward the area of social capital, which relates the network structure surrounding actors to their behavior and performance. The central questions in social capital research on strategy and organizations pertain to the types of network structures and positions that confer advantages on social actors.

Research emphasizes to two types of advantageous network structures and positions. Burt (1992) equates social capital with the lack of ties among an actor's partners, a structural property he terms structural holes. He argues that the spanning of structural holes provides efficiency and brokering advantages based on the ability to arbitrage non-redundant information and resource exchanges. In contrast to Burt, Coleman's (1988) view of social capital, calls for a dense connections among an actor's partners to promote trust and cooperation among them.

These contrasting views of beneficial network structures triggered a productive stream of research. While some studies emphasize the superior performance of actors spanning structural holes (e.g., McEvily & Zaheer, 1999; Rowley & Baum, 2004; Soda, Usai, & Zaheer, 2004) or having dense

ties (Ahuja, 2000; Walker, Kogut, & Shan, 1997), others adopt contingency approaches in which exogenous factors (e.g., uncertainty, opportunism) or tie function (e.g., exploration or exploitation) to clarify the conditions under which each type of structure would be most beneficial (e.g., Podolny & Baron, 1997; Rowley, Behrens, & Krackhardt, 2000). These studies share a theoretical view in which actors enjoy advantages of either structural holes or dense ties among their partners – but not both.

Recently, researchers have begun to examine benefits of “hybrid” network structures that contain elements of both bridging and closure (Baldassarri & Diani, 2007; Baum, van Lie, & Rowley, 2007; Reagans & McEvily, 2003, this volume; Reagans, Zuckerman, & McEvily, 2004). Hybrid networks resemble locally clustered, sparsely connected small-world structures (e.g., Watts, 1999), in which closure and bridging are viewed as complements that support coordinated action and create advantages. Within such structures, bridging improves vision through the circulation of diverse information and new ideas, while closure strengthens exchange relations and enforcement of cooperative norms (Schilling & Phelps, 2007). Although the small-world concept is now more than forty years old, empirical research is just now gaining traction into these network structures thanks to recent developments in physics and mathematics.

While many questions remain unanswered, a vast body of research now affirms the significance of social capital to actors at individual, group and organizational levels. This affirmation has spawned a closely related stream of research examining how actors choose partners and networks emerge. Partner selection research examines mechanisms of relationship formation and thus provides knowledge of how network structures emerge and change. The underlying theory, particularly at the firm level, treats partner selection as a risk-uncertainty problem. Specifically, firms’ decision makers are conceived to follow a logic of reducing uncertainty and risk in their exchanges by engaging past partners in repeated ties and forming new ties with partners’ partners based on referrals (Podolny, 1994; Gulati, Daldin, & Wang, 2002), rather than seeking riskier and more uncertain nonlocal ties beyond these bounds (Baum, Rowley, Shipilov, & Chuang, 2005; Li & Rowley, 2002). As a result of this preference for ties with past partners and their partners, firms’ ties tend to congeal into dense, stable, and constraining local clusters (Walker et al., 1997; Gulati & Gargiulo, 1999). Thus, partner selection research tends to emphasize inertia in partner choice and network stabilizing mechanisms (Chung, Singh, & Lee, 2000; Li & Rowley, 2002).

THE CHALLENGE OF NETWORK STRATEGY RESEARCH

Social capital research convincingly illustrates the influence of network structures and positions on competitive advantage: Advantages are unevenly distributed across networks that confer to those in privileged positions better access to information, knowledge, resources and partners (Krackhardt, 1992; Burt, 2000). What is unclear from this work is the degree to which network structures and positions are the outcome of social actors actively seeking network advantages or by-product of other, more myopic concerns. While some theorists suggest that social actors are aware of their networks and perhaps entrepreneurial in their approach (e.g., Rowley & Baum, 2004; Burt, 1992; Obstfeld, 2005; Shipilov, Labianca, Kalnysh, & Kalnysh, 2007; Sik & Wellman, 2000; Vissa, 2008), most are silent on topics of network cognition and agency. Neither does network theory typically consider the strategic goals and self-interests of actors in shaping network positions and structures. Instead, research typically asserts a passive role of existing network structures in shaping future relationships, while discounting the proactive role individuals may play in shaping local network structures through strategic formation, maintenance and dissolution of ties. This orientation contrasts starkly with research in other areas of strategy (e.g., Porter, 1980; Teece, 1986) and organization theory (e.g., Pfeffer & Salancik, 1978) where actors' active and strategic efforts to manipulate their positioning vis-à-vis markets, rivals or resource holders is taken-for-granted.

Relatedly, partner selection research emphasizes myopic partnering and network inertia (Podolny, 1994; Gulati, 1995). However, decision makers do not inevitably reproduce their past relationships (Baker, Faulkner, & Fisher, 1998; Palmer, 1983). As a result of its focus on the risk and uncertainty reduction partnering logic, partner selection research supplies few insights into the forces driving partner and network change. Baum et al. (2005) recently attempted to generalize the risk-avoidance model of partner selection by adopting the performance feedback model from organizational learning to specify conditions under which risk-taking is more or less likely to occur, and thus the conditions under which firms' decision makers would select new partners and change their network. Consistent with learning theory predictions a firm was more likely to adopt the risk and uncertainty avoidance pattern of partnering with past partners and their partners when the firm met its performance aspirations, but more likely to select partners with which it had no prior direct or indirect contact when its performance fell below aspirations, or greatly exceeded them.

In contrast to tie formation, tie dissolution has seen far less attention. While it seems straightforward (and nearly tautological) to suggest that important ties are less likely to be severed, such claims beg the question of which relationships are considered important (Greve, Baum, Mistuhashi, & Rowley, 2008). Network change depends importantly on relationship termination because severing one or a few ties alters network positions of both firms that withdraw and their former partners. These indirect effects can be amplified as initial dissolutions trigger additional ones. Study of tie dissolution is needed to augment models of network dynamics, as the implications of partnering patterns will remain clear until termination patterns are better understood.

Despite research advances identifying performance-enhancing network advantages and partner selection logics, Salancik's (1995) lament – that network research indicates how network positions can be used to advantage, but says little about how these positions evolve or are destroyed – remains an accurate critique. The mechanisms underlying network dynamics are critical to understanding network-based advantages. Different from other types of advantage, social capital is not a property of the actors enjoying the benefits because they do not control the relationships comprising their network positions. As such, social capital can ebb and flow as a result of *other* actors' actions.

The challenge for network strategy research – taken up in this volume – is to move beyond static conceptions of networks and their effects and to promote a dynamic view that aids our understanding of how networks create (dis)advantages by exploring the origins, evolution and decay of network structures, positions and their associated advantages.

To orient the volume's contributors we identified three important network strategy themes:

Network Dynamics

Although the sources of network stability are well understood, how networks emerge and change over time is not. Research suggests that interfirm networks commonly exhibit 'small world' properties, but is virtually silent regarding why they are patterned in this way (Baum, Shipilov, & Rowley, 2003). From a resource-based perspective, network theories should not only allow us to identify sources of competitive advantage, but also evaluate their emergence and sustainability over time (Barney, 1991; Dyer & Singh, 1998). Understanding both exogenous and

endogenous drivers of network change is vital to improving our understanding of how networks and positions within them emerge, take shape and dissolve, and to further our knowledge of competitive advantage in general and network advantage in particular.

Network change cannot be studied without measuring network structures over time. A one-shot measure of the network and ongoing measures of behaviors influenced by the network is a common study design when networks are stable (or thought to be) and the behaviors caused by the network rather than the network itself are emphasized. Such designs are nearly universal in network diffusion studies. For studying the network itself, however, such a design is inadequate. In a long-overdue response to numerous calls to arms (e.g., [Laumann, Galaskiewicz, & Marsden, 1978](#); [Nohria, 1992](#)), longitudinal analyses are now being undertaken to understand networks in terms of the processes that construct, maintain, and alter them. Many of the chapters in this volume tackle questions of network change head on.

Network Entrepreneurship

We echo [DiMaggio's \(1988\)](#) call for the reintroduction of “agency” – the capacity to “make a difference” in one’s situation – into institutional theorizing in the domain of social network theory. Awareness of the structural advantages available to occupants of certain network positions should inspire organizations and their managers to seek these advantages. Several perspectives, including structural hole and resource dependence theories, suggest that firms and managers take actions to influence the structure of relationships around them, constructing networks that facilitate innovation or serve as barriers to entry that new entrants must overcome. [Obstfeld \(2005\)](#), for example, has shown how individuals initiate ties between existing network contacts in the pursuit of innovation. However, there is limited understanding of the extent to which social actors understand their networks sufficiently well to manipulate the network structure and/or their position within it strategically.

With an emphasis on network entrepreneurship, we seek to broaden the research focus in the strategic networks literature from a firm’s (or other actor’s) ‘partnering strategy’ to its ‘networking strategy’ by linking the firm’s partnering choices to changes in its network position over time. An understanding of actors’ potential for (re)constructing their positions within social and exchange networks is essential to network strategy research.

Endogeneity

Although the idea that structural advantages are available to occupants of certain network positions is widely accepted, this idea is largely corroborated by cross-sectional studies, and more recently by panel studies that do not typically account for the potential endogeneity of network positions. Is it possible that some advantages precede, rather than follow, network positions? Assumptions of causal order require further theoretical and empirical consideration. For example, network research applied to the area of innovation suggests well-positioned actors gain information advantages used to drive higher levels of innovation often measured through patenting rates. Reversing the causal order of this logic represents a viable alternative explanation: The most innovative actors attract many and the best partnering opportunities and as a result end up in preferred network positions. A closer examination of causality through dynamic modeling and more sophisticated empirical approaches is needed to address these issues.

ORGANIZATION AND CONTRIBUTIONS OF VOLUME 25

We distinguish the contributions to this volume on two dimensions. First, each chapter touches on one or more of the three challenges of network strategy research identified above. Second, each chapter addresses these challenges within one of five topical areas: (1) Small Worlds and Complex Systems, (2) Network Change, (3) Network Position and Performance, (4) Endogeneity and Embeddedness and (5) Network Navigation. [Table 1](#) locates the chapters according to topic area and research challenge(s) addressed. After discussing the contributions of each chapter along these two dimensions, we conclude with a discussion of the volume's collective contribution, highlighting several additional themes that emerge in the chapters and that we think merit attention in future network strategy research.

Small Worlds and Complex Systems

In "The rise of ecommerce as an epidemic in the small world of venture capital," Gordon Walker examines how investment in ecommerce firms diffuses across the network of deals among venture capitalists (VCs) in the

Table 1. Chapter Topics and Themes.

	Author	Network Dynamics	Network Agency	Endogeneity
Small worlds and complex systems	Walker	X		X
	Canyon and Muldoon	X		
Network change	Dagnino et al.	X	X	X
	Hite	X	X	X
	Amburgey et al.	X		X
	Neuman et al.	X		
	Doreian	X	X	
Network position and performance	Reagans and McEvily		X	
	Burt		X	
	Løvås and Sorenson	X	X	X
Endogeneity and embeddedness	Venkatraman et al.		X	X
	Cowan and Jonard	X	X	X
	Madhavan et al.	X	X	X
	Hagedoorn and Frankort	X	X	X
	Soda et al.	X		X
Network navigation	Fund et al.	X	X	
	Van Lieere et al.	X	X	
	Rowley and Baum	X	X	

1990s. Likening the diffusion of VC investment in ecommerce to the spread of a disease in an epidemic, Walker shows that ecommerce investment is stimulated when syndicated investments in the industry are located on key network paths – “shortcuts” in the deal network. These shortcuts integrate the network by bringing VC firms located in different regions of the syndicate network closer together. As they are brought together, they are exposed to the new information about the new industry, increasing the likelihood that they will fund industry startups. Thus, in much the same way as a disease spreads, ecommerce investments diffused through prior investments located on shortcuts in the network.

Martin Canyon and Mark Muldoon’s chapter, “Ownership and control: A small-world analysis,” applies computational graph theory in the context of corporate interlocks to highlight some important limitations of traditional agency models of corporate ownership and control, which ignore influential links among corporations that promote knowledge diffusion. By comparing empirical data on corporate interlocks in the

U.K. with the results of a simulation study, they show that, relative to a set of comparable random graphs, the U.K. ownership and control network is characterized by short path-lengths and high clustering, or cliquishness. Mechanisms of tie formation and termination in the U.K. network also appear to differ from those in U.S. and German interlock networks suggesting cultural influences on the evolution of these networks. Given their findings, Conyon and Muldoon suggest that a recently developed class of small world models may offer promise in accounting for the social structure of interlock and related interfirm networks.

“Evolutionary dynamics of interfirm networks: A complex system perspective,” by Giovanni Dagnino, Gabriella Levanti, and Arabella Li Destri, draws on in-depth case studies of STMicroelectronics and Toyota’s supplier network to explore network emergence and evolution. They develop a complex systems framework that travels across multiple levels of relational structure: the overarching network, clusters of firms and single firms. The results suggest a strong interplay of factors across levels and provide evidence that network change is triggered by changes in managers’ interpretations of the competitive domain surrounding network ties. In this study, network evolution is not the result of exogenous shocks but a recursive pattern on influence between managerial cognition and network structure.

Network Change

In “The role of dyadic multidimensionality in the evolution of strategic network ties,” Julie Hite argues that dyadic ties are multidimensional systems that evolve according to changes within multiple contexts and levels. For example, dyadic ties are terminated or gain/lose strength as factors at the actor, dyad and network levels evolve. The implication for network research is a model of perpetual dynamics: The social structure can change a tie’s worth or purpose, which spurs tie change and in turn changes the structure. In addition, individual differences among social actors color how they perceive their networks and thus the types of ties they form and terminate.

Terry Amburgey, Andreas Al-Laham, Daniel Tzabbar and Barak Aharonson develop and test an ecological model of network dynamics in their chapter “The structural evolution of multiplex organizational networks: Research and commerce in biotechnology.” Amburgey et al. contend that such a model should include modification and replacement processes

and multiple levels of analysis – organizations, clusters of organizations and overarching networks. In an analysis of research and development and marketing and distribution alliances among biotechnology firms and their partners over a 30-year period, they examine the relationship between firms' actions and the network structure. These networks show distinctive patterns of change based on preferential attachment processes that 'jump' between the two networks. The result is that while initially fragmented, over time the network is bound into fewer and larger components as high-status firms establish bridging ties – short cuts – across the fragments.

Eric Neuman, Jerry Davis and Mark Mizruchi's chapter, "Industry consolidation and network evolution in U.S. global banking, 1986–2004," examines the interplay of network factors with other evolutionary forces. They explore how industry evolution in the form of banks' changing role in the economic system and merger and acquisition proliferation affect networks. The study shows that networks change as a result of changes in organizations' strategies. Notably for the study of network dynamics, Neuman et al. highlight the role of exogenous forces. They argue that banks diminished centrality in board interlock networks over time was the consequence of the changing role of the board, institutional pressure to reduce the size of boards, and geographic proximity constraints on board member commitment.

In "Actor utilities, strategic action and network evolution," Pat Doreian pushes beyond the network axiom that network structure is the dominant factor promoting network change. He offers a model of network dynamics based on the contention that social actors make strategic choices regarding the costs and benefits of structural hole opportunities and the structure of the network in which those choices are made. Doreian's findings suggest that structural holes may not provide the best partnering options and that direct structural competitors have conflicting interests. This study illustrates that strategic maneuvering to find optimal network position may be overly complex and thus suggests that, beyond some point, actors cannot fully understand the structural and positional consequences of their partner selection decisions.

Network Position and Performance

In "Contradictory or compatible? Reconsidering the tradeoff between brokerage and closure on knowledge sharing," Ray Reagans and Bill McEvily challenge the widely held assumption that brokerage and closure

are opposing forces in networks. They advance an integrative model of knowledge sharing that distinguishes the effects of brokerage and closure from each other, and between two distinct phases of knowledge sharing: seeking and transfer. The results of their analysis of a small contract R&D firm supports the view that brokerage and closure are mutually reinforcing, each promoting knowledge seeking and knowledge transfer, although in distinct ways and to differing extents. Patterns of collaboration are driven by both the risks and potential gains of cooperation. Reagans and McEvily's analysis suggests that networks provide information key to knowing not only who merits cooperation, but also its value.

In his chapter, "Returns to secondhand brokerage in industry networks: Spillover effects on price-cost margins in American manufacturing," Ron Burt examines the boundaries of agency in networks by testing whether there are spillovers effects from partners' network positions. Building on results from his work on second-hand brokerage effects at the individual level, Burt explores in this chapter similar mechanisms at the industry level using interindustry flows in the US economy (1987–1992). Contrary to findings in earlier work at the individual level (Burt, 2007), Burt finds that industries in close proximity to other industries with low constraint (access to structural holes) benefit from better price-cost margins. His chapter motivates further research to explain the differences between managers and industries and suggests that spillover benefits are likely exist in manager networks but they lack the cognitive and emotional skills necessary to internalize those indirect benefits.

Bjørn Løvås and Olav Sorenson argue that successful resource mobilization depends on the nature of relationships among actors as well as the demand for the resource in question. In their chapter, "The mobilization of scarce resources," they argue that because the cost of reciprocating rises as the resources in question become scarcer, actors increasingly rely on mobilization through relations embedded in a set of mutual, third-party acquaintances to reduce the risk of renegeing. Survey data on senior partners at a consulting firm corroborates their idea. Resource scarcity is thus an important determinant of the value of triadic relations to exchange – one that alters the value of a given triad over time as resource scarcity varies. Notably, their findings suggest that those best positioned to assemble resources may find it difficult to identify opportunities to exploit those resources because the dense ties that facilitate the former do not aid in the latter. Løvås and Sorenson encourage a shift away from a focus on relationship strength to the effects of common alters on the value of ties.

In “Interconnect to win: The joint effects of business strategy and network positions on the performance of software firms,” N. Venkat Venkatraman, Chi-Hyon Lee and Bala Iyer examine the interaction of business strategies and network position on performance. They model software firms’ alliances as links to complementary resources arguing that product scope strategy is the mechanism through which value is produced, but that the firm’s network position determines the degree to which that value can be appropriated. Moreover, and consistent with their view that network positions support execution of business strategy, the effects product scope on performance precede those of network position in time, suggesting a temporal distinction of firm and network effects on competitive advantage.

Endogeneity and Embeddedness

Joint innovation networks are the focus of “If the alliance fits: Innovation and network dynamics,” by Robin Cowan and Nicolas Jonard. Using the degree of knowledge overlap, which affects the likelihood of innovation, as the main driver of partner selection, they simulate a dynamic model of network formation, the results of which replicate the central features (e.g., clustering, short average path length, skewed degree distribution) and behavior (e.g., repeated ties) of real-world interfirm networks. Thus, the process of seeking partners with a high potential for joint innovation is, by itself, sufficient to produce networks that share many properties of empirically observed networks. When choosing partners, firms clearly consider many factors; empirical research has, however, focused primarily on social capital as a primary antecedent. Cowan and Jonard’s findings provocatively suggest that social capital may instead be a corollary of other antecedents.

In “Bringing the firm back in: Networking as an antecedent to network structure,” Ravi Madhavan, Turanay Caner, John Prescott and Balaji Koka explore how network factors combine with firm characteristics to influence network change and competitive advantage. They question the assumption that network advantage requires only that firms occupy preferential positions, arguing instead that network-based advantage depends on both a firm’s position and its ability and motivation to network. Building from an absorptive capacity logic, Madhavan et al. portray alliance networks as the outcome of firms’ differing network strategies and abilities to internalize innovation from their network positions. They supplement a standard structural analysis of biotechnology firms’ alliances with qualitative analysis

to gain insight into firm-specific differences in networking ability and motivation to enrich their account of antecedents to and consequences of network structure.

In “The gloomy side of embeddedness: The effects of over-embeddedness on partnership formation,” John Hagedoorn and Hans Frankort draw on detailed histories of IBM’s collaborations to develop a set of propositions suggesting a dynamic process operating at multiple, nested network levels. In particular, their case histories suggest that the partner selection processes underlying tie formation result, over time, in network overembeddedness, which diminishes the value of network ties to its members, motivating firms to forego the comfort of established embedded ties to seek out new non-embedded partners, lowering network density and opening structural holes. Hagedoorn and Frankort’s theoretical model portrays networks as dynamic entities, alternating between periods of increasing and decreasing density.

In “Initiative behavior: Network antecedents and performance consequences,” Giuseppe Soda, Akbar Zaheer and Alessandra Carlone examine network positions and performance in the Italian TV production industry, a network context in which competitors must collaborate to access specialized resources necessary for achieving highly creative output. Contrary to findings in other settings, Soda et al. find that imitation declines with closure while increasing with centrality, and in addition, that imitation lowers performance. Their results suggest that exploratory efforts to uncover novel information to drive innovation need not come from far reaching brokerage ties. Under conditions of competitive interdependence among highly specialized partners, actors in this study were able to access and absorb more knowledge in a dense structure resulting in more creativity (less imitation).

Network Navigation

In their chapter, “Who’s the new kid? The process of developing network centrality and embeddedness in venture capital deal networks,” Bret Fund, Tim Pollock, Ted Baker and Adam Wowak explore conditions under which new venture capital firms are able to move from the periphery to the core of their networks. They consider firm and network influences and, akin to several other chapters in this volume (e.g., Venkatraman et al.), argue that it is the interplay between firm and network factors that drive this dynamic process. By detailing two in-depth case studies of venture capital firms founded in 1995, they build a model of factors facilitating firms’ move

toward the network core: founders' status, resource endowment, attractiveness as a partner, visibility of portfolio firms, and the venture capital firm's urgency and effort. Perhaps most notable, however, is that 'cognitive centrality' – the perception that one is or at least belongs at the core of the network – precedes and predicts structural centrality.

In "Strengthening of bridging positions: Network horizon and network horizon heterogeneity," Diederik van Lier, Otto Koppius and Peter Vervest consider the question of why firms differ in their abilities to create network advantages. They contend that the answer resides in variation in actors' "network horizons" – the extent of information they possess about network structure and positions. Using network experiments involving both students and managers, they examine the role of network information by varying their subjects' ability to see their networks. Subjects with broader network horizons more often occupied networks positions rich in structural holes, particularly when experimental subjects varied in their network horizons. Their findings thus suggest that actors possessing structural information about their network can identify network-based advantages and are capable of strategically maneuvering to capture them vis-à-vis less-informed actors in the network.

In our chapter, "The dynamics of network strategies and positions," we (Tim Rowley and Joel Baum) wonder how firms come to occupy bridging ties spanning structural holes given the strong motives to form closure ties specified in partner selection research. We examine nearly 40 years of underwriting syndicates in Canada. Our findings indicate that lead investment banks, which have greater discretion in choosing syndicate partners than colead banks, are more likely to create bridging positions for themselves by selecting coleads that are not connected to one another. We also find that bridging positions deteriorate when lead banks form syndicate ties with each other, suggesting that lead investment banks compete for bridging positions. Taken together the evidence we provide supports the idea that, like the subjects in van Lier et al.'s experiments, investment banks' managers are aware of network structures and advantages, and act to realize them.

Emergent Themes

Beyond the three challenges we emphasized in orienting the volume's contributors, three notable additional themes emerged across multiple chapters in this volume.

Network Cognition

Inspired partly by a focus on questions of network agency, network cognition emerged as a theme. Actors' ability to conceive their networks is argued to influence partner selection decisions (Cowan and Jonard; Hagedoorn and Frankort; Rowley and Baum), pursuit of network advantage (van Lieke et al.), absorption of network-based advantages (Burt; Fund et al.; Madhavan et al.) and shape network evolution more generally (Doreian; Dagnino et al.; Hite). Although no single chapter provides definitive evidence of actors' network awareness and strategic pursuit of network positions, collectively these chapters suggest, at the very least, that network cognition varies across actors and point to the need for future research designed to examine more directly actors' mental models and cognitive abilities with respect to their networks.

Situated Networks

A second theme pervading the volume is that network effects and dynamics are frequently situated within or contingent on a range of non-network factors. Several chapters emphasize that firm strategies and attributes (Madhavan et al., Venkatraman et al.) as well as industry and institutional characteristics (Neuman et al., Soda et al.) influence network dynamics and the degree to which network effects are enjoyed (see also Shipilov, 2005, 2006, 2008). Cultural or country-specific factors, for example, concerning the operation of capital markets operating in different jurisdictions as observed by Conyon and Muldoon, may also result in the emergence of distinctive network structures. Indeed, the value of relationships may vary dynamically with the scarcity of resources flowing through them (Løvås and Sorenson). Perhaps a lingering artifact of an earlier erroneously polarized view of social structure dominating rather than supplanting other social processes, network researchers have tended to overlook the situatedness of networks in their theorizing. The chapters in this volume begin a correction of this oversight that we hope continues.

Multilevel Analysis

Finally, several chapters highlight the need multilevel theorizing and analysis of network strategy. Network models span not only individual, group and firm actor levels of analysis, but also 'network' levels of analysis: dyad, ego network, clique and network. Appealing to the study of strategy and organizations is the clustering of these levels, which permit application of theory at different levels of analysis and development of multilevel models (Wellman, 1988). Amburgey et al. and Dagnino et al. explicitly model multiple

levels of analysis, Hite, Hagedoorn and Frankort, and Walker argue that dyadic ties are influenced by network structure, and Burt and Rowley and Baum contend that network positions have differing effects across levels of analysis. In addition, many of these studies suggest these multiple level relationships are recursive: Network structure influences how social actors see their networks, which in turn leads to changing patterns of partner selection and thus dynamics in the network structure (e.g., Cowan and Jonard; Dagnino et al., Fund et al., van Liere et al.). These observations suggest the need to complement models of network persistence emphasized in most research on social capital and partner selection with an account of network dynamics. The work in this volume points to further development of multilevel models as holding promise for understanding the dynamics of network strategy.

CONCLUSION

Of course, by necessity, our introduction offers a partial view of the scope of network strategy research. Many important questions remain open, awaiting future study. And so, it is time to turn you over to the volume's contributors. They provide a sampling of important studies, each of which develop and extend aspects of network strategy – in areas we have touched upon as well as those we have not. By presenting their work, we hope to promote a shift from discussions of network *effects* to network *processes* and from *linear* to *recursive* models of network evolution that recognizing both top-down and bottom-up modes of influence. We hope their work inspires additional researchers to join in advancing our understanding of network strategy and aids practicing networkers to achieve network advantage.

Timothy J. Rowley
Joel A. C. Baum
Editors

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