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**NETWORK CAPABILITIES:
BROKERAGE AS A BRIDGE BETWEEN NETWORK THEORY
AND THE RESOURCE-BASED VIEW OF THE FIRM**

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Abstract

We accomplish three tasks here. (1) We highlight the lack of cross-fertilization between research on network theory and the resource-based view of the firm (RBV). (2) We sketch by analogy what we believe should be a productive bridge between network brokerage as a core concept in network theory and integrating resources as a core concept in RBV. (3) Network brokerage quickly introduced, we distinguish and illustrate three levels to the proposed network-RBV analogy: tight integration of resources (closed networks for learning-curve efficiency), loose integration of resources (brokered clusters for resilience to market vicissitudes), and recombinatory integration of resources (broker leadership for innovation and robust response to market shock).

Keywords: Resource-based view, social network, structural hole

Our goal here is to encourage more interest in network theory and analysis as a perspective from which to view the resource-based view of the firm (RBV), and more interest in RBV as a conception of competitive advantage that can inform network theory and analysis. We focus on network capabilities, by which we mean the extent to which interpersonal connections in a firm are appropriate for an intended strategy, as in: "Does this organization have the network capabilities to successfully pursue that strategy?" We elaborate at the end of the paper, after we have sketched an analogy between network theory and RBV. We believe the result of the analogy can be more accurate predictions, a promising angle on aggregating between individual and organizational advantage, and deeper explanations of how resources provide unique, inimitable advantage. Fair warning: to develop the analogy, we soften the boundaries around purist images of RBV and dynamic capabilities, and of course, we speak from the vantage of our network expertise interested in linking with RBV. Boundaries can be made rigid again where empirical research indicates such would be productive. Also, we make no pretense to providing a literature review within this brief discussion. We cite key pieces to illustrate our points, but interested readers are directed elsewhere for fulsome discussion. We begin by highlighting the current lack of cross-fertilization between research on network theory and RBV.

TWO INDEPENDENT LITERATURES

The premise for social network theory and analysis is strikingly simple: The way events play out depends on the context in which they occur. Within a framework as rich as RBV, the network premise has wide applicability. However, allowing for some exceptions, little use has been made in RBV research of network theory or analysis.

Figure 1 illustrates the point. The yellow area is proportional to the 4.38 million Google hits reported by a search for the following two terms: organization and RBV. The letters RBV can refer to more than a theory of organization so searching for RBV alone yields 19.8 million hits, searching for “resource-based view” yields only 2.05 million hits, and searching for organization and “resource-based view” yields still fewer 1.94 million hits. The blue area in Figure 1 is proportional to the 88.8 million Google hits reported by a search for the following two terms: organization and “social network”. Here again, searching for “social network” without the modifier “organization” yields a much larger 275 million hits, and searching for “network” alone yields 4.39 billion hits. The point of mentioning the alternative searches is to highlight that we only offer the counts as a heuristic useful for their relative, not absolute, magnitude.

The main point illustrated in Figure 1 is the large, and largely unexplored, domain of network research from which RBV could draw and to which it could contribute. The two circles in Figure 1 overlap in proportion to the 304,000 Google hits from a search for all three terms: organization and “social network” and RBV. The organization literature that combines RBV with any kind of a network metaphor is on the periphery of the RBV literature (304,000 is 6.9% of the RBV hits), and quite remote within the social networks literature (304,000 is 0.3% of the “social networks” hits). Of course, exact numbers mean little here since small differences in search can yield big differences in hits. Searching for RBV, "organizational network" shrinks the Figure 1 overlap from 302,000 hits to an even smaller 13,900.

Focusing on relative numbers, the illustrative low overlap in Figure 1 is corroborated by looking through key works in the RBV and social network literatures.

We do not cite works here as a criticism, only as corroboration of the literature separation illustrated in Figure 1. Widely-cited network reviews explicitly aimed at business school audiences give little or no attention to RBV (e.g., no mention of RBV in Borgatti & Foster, 2003; Brass et al., 2004; Borgatti & Halgin, 2011). More important for this discussion, key foundational work in the RBV literature spend little or no time on networks. Wernerfelt's (1984) initial formulation does not mention networks. Barney's (1991) wildly popular discussion of RBV does not mention networks. In the late 1990s there is mention of consumer networks affecting demand from RBV firms (Teece, Pisano, & Shuen, 1997: 523; Eisenhardt & Martin, 2000:1117; Barney, Wright, & Ketchen, 2001:629-630), but it is only mentioned in passing, and is gone again in the subsequent decennial review by Barney, Ketchen, and Wright (2011). Even when early RBV works are explicitly about management, attention is on the attributes of managers, not the networks through which they are coordinated (e.g., no mention of management networks in Castanias & Helfat, 1991, in the initial RBV issue of this *Journal*).

———— Figure 1 About Here ————

When networks are mentioned in prominent RBV works, they tend to refer to networks of connections between organizations (e.g., Eisenhardt & Schoonhoven, 1996; Gulati, Nohria & Zaheer, 2000; Lavie, 2006; Gulati, 2007), rather than the internal networks through which managers coordinate (an instance of the more general lament by Felin, Foss & Ployhart, 2015). Figure 1 shows that the 304 thousand Google hits combining RBV and social networks are 73% about interorganizational networks.¹ However, one of the attractions of network theory is its indifference to levels of analysis in that network principles hold across levels of analysis: To cite core examples, the network size/centrality that indicates a person's status/power (Bonacich, 1987), indicates an organization's status/power (Podolny, 1993; Chu & Davis, 2016; Mahmood, Zhu & Zaheer, 2017). The access to structural holes that indicates a person's information advantage for detecting and developing good ideas (Burt, 2004), indicates an organization's information advantage for

detecting and developing good ideas (McEvily & Zaheer, 1999; Zaheer & Bell, 2005). The closed networks associated with trust between people (Greif, 1989; Ellickson, 1991) are associated with trust and collaboration between organizations (Dyer & Nobeoka, 2000; Bernstein, 2015; Davis, 2016). We focus in this discussion on manager networks because intra-organization networks have received less RBV attention, and network principles are more obvious in relations between individual people relative to the multi-person relations between organizations (Lavie, 2006:650-651; Zaheer & Soda, 2009:11-14). But throughout, the network principles we discuss apply to managers within an organization or managers connected within and across organizations.

NETWORK BROKERAGE

The general premise for network theory and analysis is that the context in which perception and behavior occur shapes the way people understand and how they behave. Typical network data form a square matrix of relations among people or groups that define a context. There are a great many ways to crunch those data (Wasserman & Faust, 1994), and organization research has made extensive use of the possibilities (Borgatti & Foster, 2003) — but particular progress has been made in research on managers and groups as middlemen, the ligaments that hold together organizations and markets (Borgatti & Foster, 2003). The middlemen are discussed as network brokers and their context is the structural holes across which they broker. These developments are at the core of network theory not only for their fruitfulness, but for their overlap with other network variables popular in organization research such as clustering, density, size, status, and centrality.² In the spirit of opening a path for RBV to enter the core of network theory, and using the path to bring network theory into RBV, we sketch a network-RBV analogy anchored on brokerage across structural holes. For readers anticipated to be more familiar with RBV than network theory, we offer a quick introduction to brokerage.³

Cumulating through the final decades of the twentieth century, the concept of network brokerage emerged from the work of several people, all building on a foundation of two facts established during the 1950s “golden age” of social psychology such that the structure of social networks can proxy the distribution of information: (1) people cluster into groups as a result of interaction opportunities defined by the places where people meet; and (2) communication is more frequent and influential within than between groups such that people in the same group develop similar behaviors and beliefs. Within their group, people tire of repeating arguments and stories explaining why they believe and behave the way they do. They invent phrasing, opinions, symbols and behaviors that define what it means to be a member of the group. Beneath familiar arguments and experiences are new, emerging arguments and experiences awaiting a label, the emerging items more understood than said. What was once explicit knowledge interpretable by anyone becomes tacit knowledge meaningful primarily to insiders. With continued time together, information in the group becomes “sticky”—nuanced, interconnected, implicit meanings difficult to understand in other groups (Von Hippel, 1994). For reasons of a division of labor in which groups specialize on separate bits of work, or variation due to the independent evolution of separate social groups — holes tear open in the flow of information between groups. These holes in the social structure of communication, or more simply structural holes, are missing relations indicating where information is likely to differ between groups on opposite sites of the hole, and therefore not flow easily across groups. In short, clustering in networks is a proxy for the distribution of information in a population, indicating where information is relatively homogeneous (within group) and likely heterogeneous (between groups).

Information Breadth, Timing, and Arbitrage

Connections between groups are bridge relations, and people attached to those bridges, living at the edge of their social cluster, linked to other clusters, are network brokers. A bridge in graph theory is a link that connects two people who cannot

otherwise be connected, but it is customary to discuss as bridges any connection between groups unlikely to otherwise coordinate with each other. The more bridge relations a person has, the more opportunities he or she has to broker information. Characterized by their location in social structure, network brokers correspond to Merton's (1949; Gouldner 1957) "cosmopolitans," Katz and Lazarsfeld's (1955) "opinion leaders" (see Burt 2005:84-86, on network brokers versus opinion leaders), and, more distantly, Schumpeter's (1911) and Hayek's (1937, 1945) touchstone images of what it means for a person to be an entrepreneur (Burt 2005: Chap. 5, for network discussion; and compare Stigler's 1961:216, image of "specialized traders" in the economics of information).

Network brokers have three information advantages over people who do not have bridge connections: breadth, timing, and arbitrage. With respect to breadth, bridge relations across groups give brokers access to more diverse information. With respect to timing, brokers are positioned at crossroads in the flow of information between groups, so they are early to learn about activities in other groups and are often the person introducing to one group information from another. Brokers are more likely to know when it would be rewarding to bring together separate groups, which gives them disproportionate say in whose interests are served when the contacts come together, which brings in arbitrage: Network brokers have an advantage in translating opinion and behavior familiar from one group into the dialect of a target group.

In sum, structural holes are potentially valuable contexts for action, brokerage is the act of coordinating across a hole via bridges between people on opposite sides of the hole, and network brokers are the people who build the bridges and become more able brokers as they gain experience with diversity in their immediate social environment. Brokers operate somewhere between the force of corporate authority and the dexterity of markets, building bridges between disconnected parts of markets and organizations where it is valuable to do so, translating what is known here into

what can be understood to be valuable over there. Network brokers are the social mechanism that clears a sticky-information market.

Empirical Evidence

How the brokerage mechanism works is a fascinating topic, but for the purposes here we limit ourselves to illustrative empirical evidence.⁴ Brokers are predicted to look creative when they import to a target group good ideas adapted from broker familiarity with other groups. As expected, network brokers score high on creativity when creativity is measured by supervisor summary opinion of a subordinate's work, by executive opinion of a middle manager's best idea for improving the organization, or by external critical opinion of final product.

———— Figure 2 About Here ————

Broker performance has been the primary interest for research. Diverse studies show success systematically increasing with the brokerage opportunities provided by access to structural holes. The robust success-brokerage association is illustrated in Figure 2 with data on a few thousand managers and executives. Relative success is measured on the vertical axis as a residual z-score after controlling for non-network success factors in each population such as job rank, experience, and so on. Success factors held constant within each population to measure relative success are described in published articles listed with the source figure in Burt (2019b:38). A score of zero on the vertical axis in Figure 2 indicates a manager whose success is what would be expected in his or her study population for someone with his or her characteristics. Positive numbers indicate managers ahead of expected. Negative numbers indicate managers below expected. To the left on the horizontal axis are the network brokers, people whose networks reach across the structural holes separating groups (illustrated by the sociogram of a person's network below the left side of the horizontal axis). To the right are people embedded in a closed network of strongly interconnected colleagues (illustrated by the sociogram at the bottom right of the horizontal axis). The network metric across the horizontal axis, network

constraint, measures the extent to which a person has no access to structural holes. Constraint increases from zero with the extent to which a person has few contacts (network size), those contacts are strongly connected directly to one another (network density), or strongly connected indirectly through their connections to the same other person in the network (network centralization/hierarchy). The data plotted in Figure 2 are average values of the axes within five-point intervals on the horizontal axis in each study population. The triangles describe thirteen hundred managers in Asia, primarily China. The hollow squares describe a thousand managers in Europe. The solid circles describe two thousand managers in American companies. As predicted by network theory, and reported in published studies of the study populations, a manager's relative success decreases as his or her network becomes more closed. More, the pattern is strikingly similar in the three regions: -.75 partial correlation in the U.S., -.73 in the E.U., and -.79 in Asia (Burt, Reagans, & Volvovsky, 2021, for similar pattern with people assigned at random to networks).

A NETWORK-RBV ANALOGY

Table 1 contains a sketch of a network-RBV analogy likely to be successful in empirical research. The first row of the table sketches network brokers in the structural hole argument. The second row sketches an analogy by which the network brokers who are the key action element in the structural hole argument are the key action element in the recombination of resources described by RBV's concept of dynamic capabilities (Teece et al., 1997). We selected the Table 1 analogy for three reasons: (1) widespread application and empirical support for predictions about network brokers, (2) potential new empirical ground for RBV theory in that the intraorganizational networks that have provided so much empirical support for structural hole theory are less often studied in RBV research than interorganizational networks (Figure 1), and (3) if the Table 1 analogy turns out to be empirically fruitful, network brokers from network theory could be a useful addition to RBV in providing a microfoundation for the theory (Felin et al., 2015; Kleinbaum & Stuart, 2014).

———— Table 1 About Here ————

The gist of the analogy in Table 1 is that the network brokers defined by structural hole theory are the human micro social mechanism by which organization resources are refined, recombined, and redeployed. Company processes can facilitate or inhibit the work of network brokers, but it is network brokers who get the job done. A lack of experience with network brokerage can make even an earnest effort come up short, illustrated below by our final example. The analogy seems clear to us from Table 1, but review discussions of the bridge from both sides are readily available — given above for network brokerage, and for network analysts interested in RBV dynamic capabilities, we find the original article by Teece, Pisano, and Shuen (1997) compelling, especially as tempered by Eisenhardt and Martin (2000) and Barney and Clark (2007:309).

THREE LEVELS OF NETWORK-RBV ANALOGY

To illustrate the network-RBV analogy in Table 1, we separate three levels to the analogy distinguished by how a broker resolves a structural hole. The three levels are intervals on a continuum familiar in theory between closure at one end and brokerage at the other. Ultimately, the continuum is a circle in which brokers lead by closing or opening the network around them (Levin & Walter, 2018). With an eye to RBV, we distinguish the levels here differences in the difficult-to-imitate value that brokers create (once a business practice is embedded in a network of specific people, it can be difficult to imitate, Gibbons & Henderson, 2012). Tight integration involves removing structural holes, what was two is now one. Loose integration involves preserving structural holes. What was separate is now interdependent. Recombinatorial integration involves transforming structural holes. New holes open to future brokerage are created between new combinations of resources.

Tight Integration of Resources

In the spirit of Lawrence and Lorsch's (1967) contingency theory, the value of network brokers is contingent on market context. Hansen's (1999) widely cited

research shows that projects based on complex knowledge conclude more quickly when they occur in a division strongly connected to other divisions, thereby facilitating knowledge transfers between divisions (extensive brokerage, termed low “tie weakness” in the article), while projects based on familiar local knowledge conclude more quickly when they occur in a division relatively disconnected from other divisions (little brokerage, termed high “tie weakness” in the article). Thus, at the commodity extreme of efficient execution on a familiar value stream, brokers can be suspected of eroding performance. The emphasis is on closed networks and little brokerage. When a leader establishes strong connections within a group, emphasizing responsibilities within the group over connections beyond the group, reputational governance emerges intrusive and omnipresent, which facilitates the detection and punishment of people not aligned with group norms, which facilitates trust and cooperation within the group. The group becomes self-aligning and moves down a learning curve of faster, more reliable work requiring less external supervision. Argote (1999) reviews the general phenomenon (with Burt, 2005:Chps 3-4, a review of the network mechanism; Barker, 1993, illustrative ethnographic discussion, Dyer & Nobeoka, 2000, illustrative organization discussion, and Bernstein, 2015, illustrative legal discussion). Often cited examples are soccer teams, basketball teams, surgical teams, race-car pit crews, emergency teams, swat teams, elite assault teams — any group that performs better from tight integration within the group. Such groups in contemporary business are the foundation for TQM, SixSigma, and Lean Manufacturing programs.

One might think that network brokers have no role in these efficiency plays. However, learning curves do not exist in isolation. They cascade. A group comes down one learning curve as the group becomes more and more skilled with current practice. Then a new, better practice is adopted, and the group breaks out of its “competency trap” to move down the learning curve associated with the new practice. Moving down a learning curve is where closed networks are valuable. Transition from the old to the new learning curve is where network brokers are

valuable. An example is Intel's "Copy Exactly!" program which successfully transfers learning-curve performance across business units by creating broker connections between units (Natarajan et al., 2002; cf., Dyer and Nobeoka, 2000, on Toyota's supply chain governance). An example more widely familiar is the network broker Henry Kaiser, whose tight coordination between supply chain and production stages affected the course of WWII by moving his shipyards down a production learning curve, decreasing the time required to build a merchant "Liberty Ship" from one every eight months down to almost one a month (Thompson, 2001, for details; Burt, 2005:148-156, for network discussion; Six Sigma Award winners for contemporary examples).⁵

Loose Integration of Resources

Henry Kaiser is a heroic story, but like most such stories, it describes an unusual situation. Empirical studies of organizations more often reveal a continuous presence of network brokers coordinating between organization silos within which resources are tightly integrated — hence the bridge-and-cluster social structure so often observed in management network research. In this, we move along March's (1991) contrast from exploit to explore, not with respect to deciding whether to explore new possibilities versus exploit old certainties (the primary focus in March's discussion), but rather focused on how to organize for either. From the resource based view, exploitation refers to leveraging existing resources and capabilities (internal and external) to enhance internal processes. At the same time, competitive advantage is more sustainable over time to the extent firms are able to reconfigure, recombine and transform resources into dynamic capabilities. While exploitation involves enhancing a firm's current knowledge base, exploration involves recombination and synthesis to enlarge the base (e.g., Levinthal & March, 1993) — which is where network brokers enter the picture. Of course, deciding between explore versus exploit, and our concern with strategizing about how to do either, are kindred issues intimately linked in operational decisions. Regardless, our focus here is the latter.

Tight integration in a closed network enables exploitation of a known value stream. Advantage comes from structural rigidity; strong interconnected relations reinforcing one another. Loose integration of multiple clusters enables exploration of refined, recombined, and redeployed resources within and across clusters.

Advantage comes from adaptive flexibility; brokered connections between silos tightened or loosened as needed. Closed and brokered networks gyroscopically stay on course guided by their respective forms of reputational criteria: reputation as a good citizen within a closed network, reputation for distinguished achievement as a network broker.

As Henry Kaiser is a heroic figure for tight integration, heroes abound in the more numerous examples of loose integration. Particularly well-known is General Electric CEO Jack Welch's emphasis on "integrated diversity" as an aspiration goal in the 1980s, believed to work "when the elements of that diversity, the thirteen business, were strong in their own right." (Slater, 1999:97). Rhone-Poulenc CEO Jean-René Fourtou emphasized the importance of preserving "*le vide*" (literally, vacuum or empty space, or in network terms, structural holes): "*Le vide* has a huge function in organizations." "Shock comes when different things meet. It's the interface that's interesting." Stewart (1996:165).

The image of loose integration is not far from the original RBV framework proposed by Wernerfelt (1984) in which the optimal growth of a firm involves a balance between exploitation of existing resources and development of new ones (cf., Penrose, 1959; Rubin, 1973). Once technological and marketing knowledge has been produced and absorbed, internal integrative capabilities are needed to redeploy and organize its use (Pisano, 1994; Henderson & Cockburn, 1994; Verona, 1999). Such capabilities are strictly linked to the dimensions of processes, and structures, both formal and informal. For example, RBV foundational literature talks about flows of communication among teams as trigger for speed and productivity of new product development (Brown & Eisenhardt, 1995: 368). Managers who connect across clusters (network brokers in Table 1) can be recognized for refining knowledge,

facilitating the redeployment of resources, and altering the level of interaction between organizational silos (Sirmon et al., 2011, on “resource orchestration;” Kleinbaum & Stuart, 2014, on “network responsiveness”). The loose integration among organizational clusters facilitated by brokers implies that brokers exercise some degree of control over the process by which resources are redeployed and eventually recombined to ensure that the different contributions are synthesized “into a coherent whole” (Lingo & O’Mahony, 2010: 49; Furnari & Rolbina, 2018).

———— Figure 3 About Here ————

More concretely, the sociogram of a supply-chain organization in Figure 3 illustrates loose integration. Our brief illustration here is abstracted from detailed description elsewhere (Pedersen, Soda & Stea, 2019). With annual net sales of more than \$9 billion and employing almost 80 thousand people worldwide, the company within which the study supply-chain organization operates is a global leader in its market. The supply-chain organization ensures product flow among 18 distribution centers and 12 manufacturing facilities worldwide. In this context, global coordination and integration emerge from best practices developed at local levels (regions or countries) then spread quickly, as relevant, across the organization.

In Figure 3, each dot of the sociogram is a person in the organization. Lines capture work-related information and knowledge discussion between connected people. Dense clusters coincide with geographies in which the organization operates through distribution hubs and factories. The role of connecting the clusters is played by network brokers (some example are visualized in the figure and labeled as B1, B2, B3, B4, B4 and B6). They occupy structural positions that allow them to mobilize and redeploy knowledge and practices readily across network clusters (Kogut & Zander, 1993). Keeping with the RBV analogy in this example, brokers are positioned to take charge of the integrative capability in the organization, playing a fundamental role in lubricating and complementing formal organizational processes and structures (McEvily et al., 2014). This is particularly valuable because formal coordination and practice-diffusion mechanisms need to be applied on a global

scale, and are thus maximally complex and costly (Soda & Zaheer, 2012). Network brokers complement formal mechanisms in the integration capability (Birkinshaw et al., 2017; Minbaeva & Santangelo, 2016).

To further corroborate brokers playing the imputed role, employees were asked to name colleagues that the employee perceived to play a “key role in getting things done.” Three fourths (74.5%) of the named colleagues are network brokers (as distinguished by lowest 5% of network constraint scores, horizontal axis in Figure 1). The people identified in Figure 3 as broker B1 through B6 are all among the top 10 employees in nominations as “those who get things done.” More, 63% of the people nominated are outside the immediate network of discussion colleagues around respondents, further indicating a broad reputation for these achievers. In short, network brokers tend to be the individuals seen in this organization as crucial to achieve the goals of the function.

Recombinatory Integration of Resources

Loose integration sets the stage for recombinatorial integration — a term we use to refer to managers recombining company resources to create competitive advantage. The capabilities created are innovation and resilience to market shock. Network brokers have information breadth, timing, and arbitrage advantages so they are more likely to detect and develop productive new combinations of company resources (e.g., Burt, 2004; Burt & Soda, 2019; Fleming, Mingo, & Chen, 2007; Carnabuci & Quintane, 2018; Soda, Stea, & Pedersen, 2019). This makes network brokers, and their characteristic loose-integration structures, more resilient than rigid structures to exogenous shock (Rogan & Mors, 2014; van der Vegt et al., 2015; Grandori, 2020). Henry Kaiser’s Liberty Ship reorganization was an act of recombinatory integration, as was Lou Gerstner’s transformation of IBM away from mainframe computing toward e-business integrated solutions (Gerstner, 2002; cf., Teece, 2007, on “sensing, seizing, and reconfiguring capabilities”). In other words, Table 1 sketches

an analogy in which network brokers are the micro mechanism that enable company dynamic capabilities in RBV.

For the same reasons that efforts to recombine resources are more likely to be successful when they involve network brokers, the absence of network brokers makes success unlikely. As illustration, consider the situation confronting top management of a West Coast technology and manufacturing organization at the turn of the century (hereafter, the firm). Our brief discussion of the firm is abstracted from longer description elsewhere (Burt, 2009; and see Kleinbaum & Stuart, 2014:359-360, for a less concrete, but more positive, case illustration based on the creation of a digital division within USA Today).

The firm was composed of four businesses, each of which was doing well in its established product markets. The four businesses all involved state-of-the art technology, and overlapped in their target markets, but sold distinct products. The firm's markets were evolving in response to rapid developments in technology. The internet was intruding everywhere. Small companies were chipping away at the firm's markets with new products rapidly developed in response to opportunities that quickly emerged with each advance in technology. Top management was advised by an expensive external consultancy that the firm was missing lucrative opportunities that lay between the markets on which the four businesses were focused. More specifically, prompt action was advised in light of the ambiguous but potentially lucrative new "homeland security" market that had emerged as a result of the 9/11 terrorist attack in New York City. Some leaders in the firm believed the consultant advice was unrealistic. The four businesses were doing well with their established products using familiar processes successful in familiar markets. Earnings would be obviously less certain with less familiar products. Shifting a business to go after new opportunities would be risky.

It was decided to keep the existing business as they were but create a new, virtual organization across the businesses. The goal of the virtual organization was to identify and develop opportunities between the existing businesses — that is to

say, emerging markets for which the firm could develop a lucrative product quickly from what was already going on in the firm, or an emerging market where the firm would have an advantage in creating new products from combinations of its existing technologies. An initial team of four experienced senior managers, one from each of the firm's businesses, was assigned to recruit people to the virtual organization.

The situation is generic to established firms in dynamic markets: how to harvest efficiencies and growth from coordination across the enterprise without giving up productivity within existing businesses. Viewed through an RBV lens, the four businesses were bundles of organization routines as resources that were productively deployed to coordinate suppliers, production, and customers. How now to recombine certain of those resources into new resource bundles to take advantage of technological advances, and the exogenous shock of a homeland security market?

Figure 4 is a sociogram of the virtual organization after it had been in operation for a year. Each dot is a person. Lines connect people citing one or the other as a key collaborator in the virtual organization. Two people are located close to one another in the figure to the extent that they cite one another as key collaborators, or cite the same other people as collaborators (Borgatti, 2002). Four dots with plus signs (+) indicate the four people who were assigned as initial leaders to recruit the right other people into the virtual organization. There was no brick-and-mortar building that distinguished people in the organization, so key people were identified by snowball sampling. Each initial leader ("+" in figure) was asked to name the people on whom he or she most depended for collaboration in the virtual organization. The people named were then asked who they most depended on, and so on. Shape and color indicate business division. For example, blue squares indicate people drawn from business D.

———— Figure 4 About Here ————

The first year was unsatisfactory. The most obvious issue was that the virtual organization looked too much like the formal organization. There was little evidence

of people making new contacts in the virtual organization. Connected people in Figure 4 had known one another on average for eight years — well before the launch of the virtual organization in the previous year. Perhaps the problem was created by the way people were recruited; leaders mobilized people in their own division, and those people turned to colleagues they already knew well. Notice in Figure 4 that the shape and shade of each initial leader (marked with “+”) always matches the shape and shade of his or her key collaborators. Note also the two structural holes in the virtual organization that correspond to boundaries between businesses in the formal organization. Most obvious, there are no direct connections between people drawn from business A (white circles in lower right of the figure) and people drawn from business D (blue squares in upper left). Less obvious, but clearly visible, are the three clusters in the virtual organization corresponding to businesses A, B-C, and D. There is one connection between the persons labeled 1 and 2 that links the cluster of blue squares to the upper-left in Figure 4 with the cluster in the center of the figure. Remove either person 1 or person 2, and the two clusters are entirely disconnected. Two connections through the persons labeled 3 and 4 link the cluster of white circles to the lower-right in Figure 4 with the cluster in the center. The connection through person 3 is fragile; he is connected to one person in either cluster. The connection through person 4 is strong; he is connected to three people in the center cluster and many colleagues in the white-circle cluster. Remove persons 3 and 4 from the network, and here again, there is no connection between the center cluster and the cluster to the lower right.

The evidence of myopia within organization silos — people focused on familiar colleagues within their own business — was troubling. Opportunities across business units were being missed. Stories had come to top management from the field about people in the virtual organization stepping on one another’s toes, and on the toes of the established businesses, in presenting customers with multiple, contradictory images of the company. It was disconcerting to see people respond to the new initiative by turning to the same people they had turned to in the past. They did not

seem to “get” the virtual-organization strategy. They brought their experience in organization silos to work that required collaborative dexterity — a fortress mentality applied to mobile combat (Gargiulo & Benassi, 2000; Battilana & Casciaro, 2013; Oppen & Burt, Forthcoming).

To facilitate better performance, the network analysis in Figure 4 was used to identify people to send to a workshop on strategic leadership in management networks, and discuss ways forward from the virtual organization in Figure 4. The elephant in the room throughout the workshop was the fact well-known among the participants that top management was unhappy with the state of things after a year of work.

One year later, at the end of the virtual organization’s second year, the people labeled as 5 and 6 in Figure 4 emerged as central in a revitalized virtual organization (sociogram given in Burt, 2009). Note how well these two people are positioned in Figure 4 to broker coordination between businesses. Person 5 is anchored in Business B (blue dots) with four connections into the other businesses (white dots and squares). Person 6 is anchored in Business C (white squares), with four connections into Business B and two into Business A (white dots). Note also, the wisdom of the initial recruiters. The initial recruiter for Business B brought in three collaborators, one of whom was the broker, person 5. The initial recruiter for Business C brought in two collaborators, one of whom was the broker, person 6. The initial recruiter for Business A was similarly wise in recruiting person 4, who is a broker in Figure 4 between Businesses A and B. In the glaring light of top management attention during the second year, and given strong leadership provided by persons 5 and 6, person 4 relaxed to a less critical role in the virtual organization.

The example illustrates that dynamic capability in the form of refining, recombining, and redeploying resources is facilitated by key managers being familiar with network brokerage. The more a proposed change is at variance with past practice, the more valuable the familiarity with network brokerage. Facilitation can help in creating a shared frame of reference for broker and brokered, but more in

legitimizing brokerage skill rather than creating it. The workshop at the beginning of the second year did not teach experienced managers to be network brokers. That skill is visible in Figure 4 for several people, most notably persons 4, 5, and 6. But brokers in Figure 4 were working as knowledgeable individuals. The workshop served to highlight for everyone the importance and necessity of network brokerage, creating a shared frame of reference for participating in the practice.

CLOSE

To stimulate cross-fertilization between network theory and RBV, we engaged three tasks. First, we highlighted in Figure 1 the lack of cross-fertilization between research on network theory and the resource-based view of the firm (RBV). Second, we sketched by analogy in Table 1 what we believe should be a productive bridge between network brokerage as a core concept in network theory and integrating resources as a core concept in RBV. Third, we distinguished and illustrated three levels to the proposed network-RBV analogy. Superior ability to transfer knowledge across management networks, and integrated operations, are often cited as examples of "organizational advantages" that are sustainable, difficult to imitate, and so corporate resources. Network brokerage is the micro-mechanism responsible for those advantages in the form of tight integration (closed networks created by a network broker to obtain learning-curve efficiency), loose integration (brokered clusters for innovation and resilience to market vicissitudes) and recombinatory integration (broker leadership for innovation and robust response to market shock).

Both network theory and RBV potentially benefit from the analogy in Table 1. We highlight three benefits: accuracy, aggregation, and depth. Network theory currently predicts performance from the extent to which a manager has access to structural holes — less access to structural holes means fewer opportunities to leverage information breadth, timing and arbitrage, and fewer opportunities manifest as weaker performance. RBV highlights certain company activities as core to sustained advantage. Returns to brokerage should be higher for people positioned to

broker core resources across structural holes in the organization and market (see Arend, 2006, on advisory criteria for measuring resources). More specifically, consider stages in the value stream of a firm's activities (e.g., sourcing, fabrication, base assembly, finished assembly, distribution), each with its contribution to the firm's competitive advantage, some higher than others. Who are the people with solid contacts and experience in multiple of the stages? (Easy to identify in a network analysis.) Those people will enjoy higher returns to their brokerage. Who are the people with solid contacts and experience in the more valuable, less imitable of those stages? (Easy to identify in a network analysis informed by RBV.) Those people will enjoy higher returns to their brokerage. The same logic applies to resources defined by product lines, service channels, legacy organizations, or geographies. By distinguishing structural holes between key resources as more valuable and less imitable, RBV has the potential to improve the accuracy of network predictions.

Aggregating individual advantage to corporate advantage is a second potential benefit. The returns to brokerage illustrated in Figure 1 are supported by abundant research on both interpersonal networks within organizations and interfirm networks between organizations/industries (e.g., chapters 4 and 3 respectively in Burt, 1992). There is little research, however, on how returns to advantage in individual networks aggregate into company advantage. This is a concern we almost always hear from students in our management classes: "I see how individuals benefit, but how is their benefit a benefit to the firm?" Clement et al. (2018) offer an exceptional response, describing broker positive and negative externalities in producing French television game shows. The usual response is to claim that executives presumably allocate benefits to individuals who are acting in the interest of the firm (who should receive more positive evaluations, larger raises, promotions, etc.). The usual response is valid, but sidesteps the question.

Measurement is a convenient culprit here. We have good research strategies for measuring relations between individuals (Marsden, 2011), we can use legal

documents to define business and alliance relations between firms (Gulati, 2007; Chu & Davis, 2016), and we can use census data to measure networks of buying and selling between industries (Pfeffer and Salancik, 1978; Burt, 1992:Chp. 3). However, from Lawrence and Lorsch's (1967) measurement of interdivision connections using the summarized opinions of managers, to Hansen's (1999) measurement of interdivision ties with Likert scale informant perceptions of interdivision connection frequency/closeness, the relative clarity of measuring relations between individuals dissolves into numerous personal judgements to measure relations between business units within an organization (e.g., see Hansen's, 1999:90-98, heroic effort).

Aggregation is more than a measurement issue. There is a lack of theory. How many people on a project need to be well connected into other divisions for the project as a whole to be well connected? It surely isn't everyone on the project. One leader? Perhaps two or three people? Projects led by an individual at the center of the project network might only need the leader to be well connected, but multiple brokers in the project lower the odds of a central leader becoming overwhelmed.

We see advantage in using RBV concepts to guide aggregation. In their discussion of intraorganizational networks as a source of dynamic capabilities, Kleinbaum and Stuart (2014:354-355) use a firm's formal reporting structure as a baseline for measuring "network responsiveness:" The more slowly interpersonal relations change in response to formal reorganization (low responsiveness), the more that continuing personal relations can be an advantage for coordination across silos in the new organization (illustrated in the positive by a Cisco reorganization, Kleinbaum & Stuart, 2014:358-359, and illustrated in the negative by the virtual organization in Figure 4). The more quickly personal relations change in response to formal reorganization (high responsiveness), the more that personal relations within old silos will not impede the rise of tight coordination within new silos (illustrated in the positive by the digital news unit in USA Today, Kleinbaum & Stuart, 2014:359-360, and illustrated by its absence in the Figure 4 virtual organization). We see

wisdom in Kleinbaum and Stuart's search for a baseline against which one can draw inferences about how personal relations facilitate or inhibit a company's ability to enact strategy. We see RBV as a promising source for such a baseline. By focusing aggregation on network advantage defined in terms of brokerage between key resources (versus all possible brokerage), RBV provides a direction in which we might be able to connect key individuals, key resources, and sustained corporate advantage.

A third consideration is RBV providing deeper explanation by incorporating elements of network theory. Applications of RBV focus on stylized company processes to refine, recombine, and redeploy core resources. Network theory has the potential to enhance those applications by measuring the extent to which specific individuals control key resources by being central within the network of a resource, or positioned to guide recombinations of key resources by being best connected across the resources (Bonacich, 1987, on a widely-used concept of network centrality; Burt, 2005:156-162, on brokers holding a virtual monopoly). Network theory and analysis detects network brokers in the organization and highlights the importance of having brokers available, and in the right locations, to do that resource refinement, recombination, and redeployment. This contextualizes resources, helps explain recombinations of resources (and so innovation), and it brings the managerial role to center stage in a way that has been difficult in the traditional RBV. The critical empirical questions needing answer are whether the managers responsible for refining, recombining, and redeploying resources in RBV research are network brokers, and whether the more successful resource actions, or successful more-difficult resource actions, involve people who are more clearly network brokers.

For provocative, stimulating discussion of background for the above three lines of work on accuracy, aggregation, and depth, see Haack, Sieweke and Wessel (2020), especially with respect to grounding organization theory in social relations (Hallett & Hawbaker, 2020; Powell, 2020; Zucker & Schilke, 2020), inserting

“resources” for “institutionalized belief/behavior” where the latter creates sustained competitive advantage, and making a distinction between microfoundations derived from the social implications of network theory versus microfoundations as a broad metaphor (Felin & Foss, 2020; cf., Barney & Felin, 2013).

We close on network capabilities, an umbrella term referencing the extent to which the social organization of a firm is appropriate for an intended strategy, as in: "Does this organization have the network capabilities to successfully pursue that strategy?" We have described network capabilities as a function of the information breadth, timing, and arbitrage advantages of network brokers in refining, recombining, and redeploying company resources. The desired balance of network brokers to have in management depends on the extent to which management is focused on exploiting a known value stream or exploring new streams; more brokers for more exploration. Network theory does not offer a practical answer to the optimum balance of brokers, however, at the opposite extreme, a firm can have good capabilities not appropriate to an intended strategy — and we can say what will happen when network capabilities are inappropriate. An organization pursuing the efficiency benefits of tight coordination in the absence of employees operational in closed networks, will fail to come down the expected learning curve. An organization pursuing the innovation and flexibility benefits of loose coordination in the absence of operational network brokers among their siloed employees, will be rigid and pedestrian. An organization pursuing innovation and re-organization in response to significant exogenous shock — in the absence of high-status network brokers to lead recombinatory integration — will decompose into confusion.

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FOOTNOTES

¹Google returned 221,000 hits from a search for “RBV and interorganizational network” versus 81,000 hits from a search for “RBV and intraorganizational network”. The 73% in the

text is $221/(221+81)$. The two searches sum to 302,000 hits, which is two thousand short of the 304,000 hits from a search for RBV and organization and “social network”. We tried the searches with British spelling (organisation), but that search included hits with the American spelling, so for the purposes here, we use the ratio of hits for interorganizational versus intraorganizational. The more restrictive search for — RBV, “organizational network” — that shrinks the Figure 1 overlap from 302,000 hits to 13,900, shows 3,210 for RBV, “interorganizational network”, 714 for RBV, “interorganizational network”, and 216 for both (RBV, “interorganizational network”, “intraorganizational network”), which leaves the remaining majority of 10,192 hits for organizational networks with no distinction between intra and inter. In short, the bulk of integrative work to date has been on interorganizational networks. The reported searches were done twice on November 2, 2020 in the early afternoon using Safari as the browser.

²A variety of metaphors are used to describe network correlates of getting things done, but the metaphors tend to be operationalized in terms of two structural dimensions: one vertical, the other horizontal. The vertical dimension distinguishes people/groups as network “nodes” by their relative visibility, power, prestige, status, etc. Nodes higher in social structure have more connections (size or degree), more strong connections (sum connections weighted by strength), or more strong connections from prominent others (network eigenvector). The horizontal dimension distinguishes people/groups in terms of the extent to which they are connected with diverse nodes, which increases on average with number of connections (size again), decreases with strong connections among one’s contacts (density), and decreases with having a dominant contact that holds the others together (centralization, hierarchy). With respect to network brokerage, the horizontal axis refers to a broker’s direct access to structural holes (“ego network”) and the vertical axis refers to the broker’s prominence in the surrounding social structure (“whole network”). There are conceptual reasons to distinguish how a person or firm is viewed from the person/firm’s immediate network (Podolny, 2001; Burt and Merluzzi, 2014; Burt, 2021), but network indices on the two dimensions tend to be strongly correlated. A study distinguishing people/groups by network centrality would likely yield similar results if distinctions were measured in terms of network brokerage. Burt and Merluzzi (2014) present graphs showing correlations over .8 between measures of network status and access to structural holes. Everett and Borgatti (2005) report correlations of .88 to 1.00 between ego-network and whole-network measures of access to structural holes, and correlations of .86 to .99 for random networks of 200 to 500 nodes. In his fulsome discussion of advantage by network status versus access to structural holes, Podolny (2001:44; 2005:233) expects to see high status-holes correlation: “It seems reasonable to anticipate a high correlation between an actor’s status and the presence of structural holes in the actor’s network. An actor with many structural holes in his or her network of exchange relations is, by definition, an actor that is quite prominent in the larger network of relationships — serving as a bridge and boundary spanner across numerous diverse cliques within the larger structure.”

³Kwon et al. (2020) is a recent review in this *Journal*. Our discussion in this section is abbreviated from review elsewhere: Burt (2021) is a review of the structural hole argument and evidence, with related reviews targeting entrepreneurship (Burt, 2019a), psychology (Burt, Kilduff, & Tasselli, 2013), strategy (Burt & Soda, 2019).

⁴The previous endnote cites detailed reviews. With respect to the traditional RBV resource topics of patents, culture, and brand reputation, network brokers are disproportionately the people who come up with innovative patents (Fleming, Mingo, & Chen, 2007; Fleming and Marx, 2006), network brokers are the people who suture company subcultures into an integrated corporate culture (Pachucki & Breiger, 2010; Goldberg et al., 2016; Jang, 2017), and in the process, network brokers are the people most responsible for

weaving reputational stories into constituency discussions in and outside the company (Burt, 2005:Chp. 4, 2010:Chp. 6-7, on reputation stability in networks; Oreskes & Conway, 2010, for negative examples of brokers shaping reputation). A host of network applications are likely to be useful contributions to traditional RBV research.

⁵The three levels of analogy refer to what a network broker does to structural holes, not what he or she does to resources. Brokers can refine, recombine, and redeploy resources at each level of analogy. For example, Henry Kaiser's management of shipbuilding is an example of tight integration, but his actions can be discussed as refining resources (each organization unit in his yards runs faster), recombining resources (Kaiser's yards run on an integrated form of organization that was unprecedented in shipbuilding), or redeploying resources (there is more interpenetration between units so each can anticipate and react to events in adjacent units). We put this point in a note because it is likely to be more relevant to network analysts, but it should be in this discussion to avoid confusion in future.

Table 1. A Network-RBV Analogy

Theory	Context	Broker Advantage	Motivation	In Short
Social mechanism in structural hole argument	Managers cluster with proximate others doing related work such that characteristic behavior, belief and perception develop within clusters (sticky information within clusters).	Managers who connect across clusters (network brokers) have information breadth, timing, and arbitrage advantages in detecting and developing rewarding ideas as new combinations of behavior, belief, and perceptions.	For their contribution, network brokers are rewarded with evaluation more positive than peers, compensation higher than peers, promotion faster/higher than peers, and reputation more positive/broader than peers.	Network brokers are the social mechanism that clears the sticky information market of management practices.
Social mechanism underlying dynamic capabilities in RBV argument	Managers cluster with others doing related work to define organization resources as behavior, belief, and perception characteristic of cluster (sticky information within clusters).	<p>Tight Integration: Brokers connected across groups within cluster guide transition from old to new learning curves.</p> <p>Loose Integration: Multiple clusters linked by brokers enable exploration of refined, recombined, and redeployed resources within and across clusters.</p> <p>Recombinatory Integration: Network brokers have information breadth, timing, and arbitrage advantages so they are more likely to detect and develop productive new combinations of company resources.</p>	For their contribution, network brokers are rewarded with evaluation more positive than peers, compensation higher than peers, promotion faster/higher than peers, and reputation more positive/broader than peers.	Network brokers are the social mechanism by which organizations refine, redeploy and recombine resources.

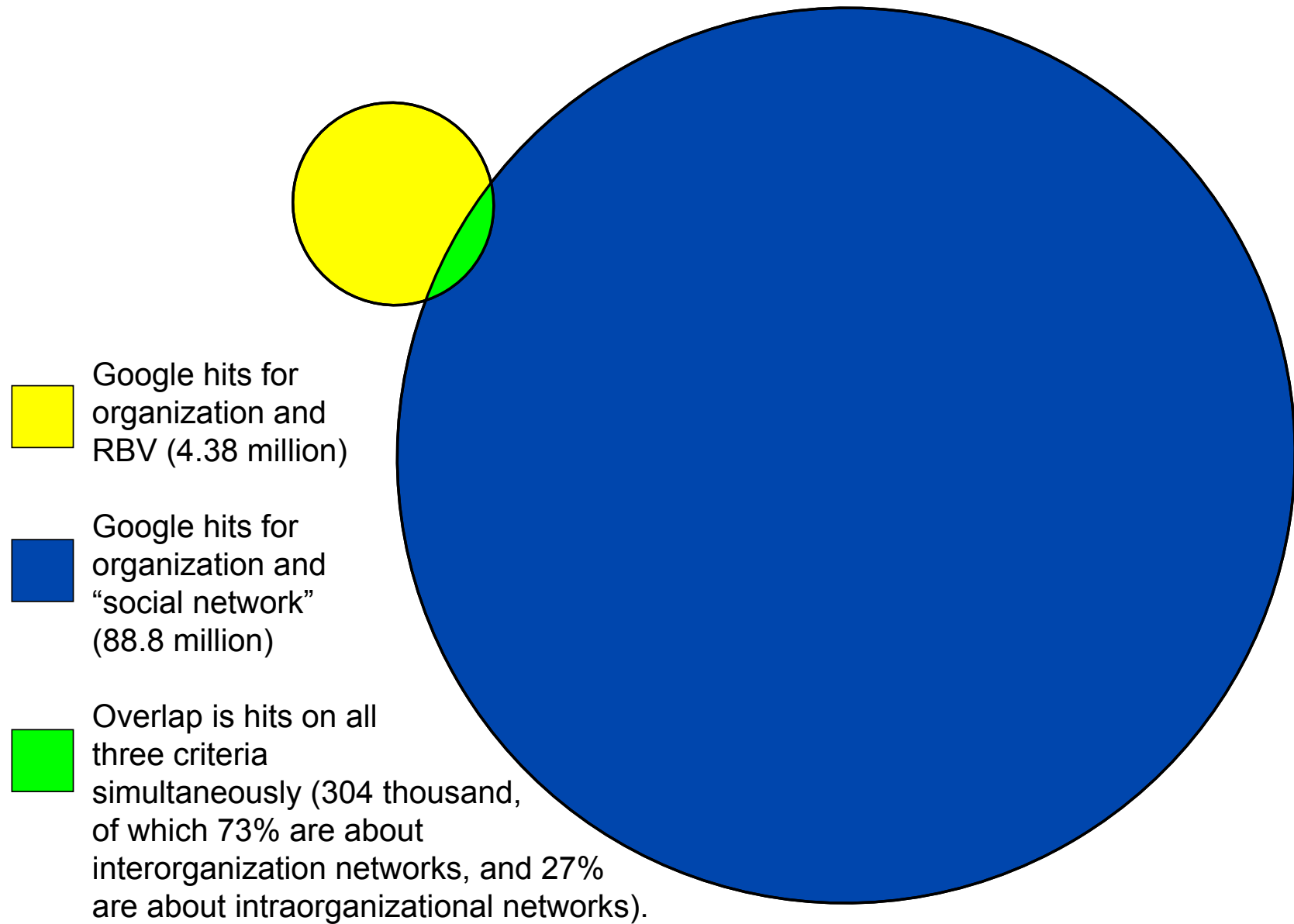
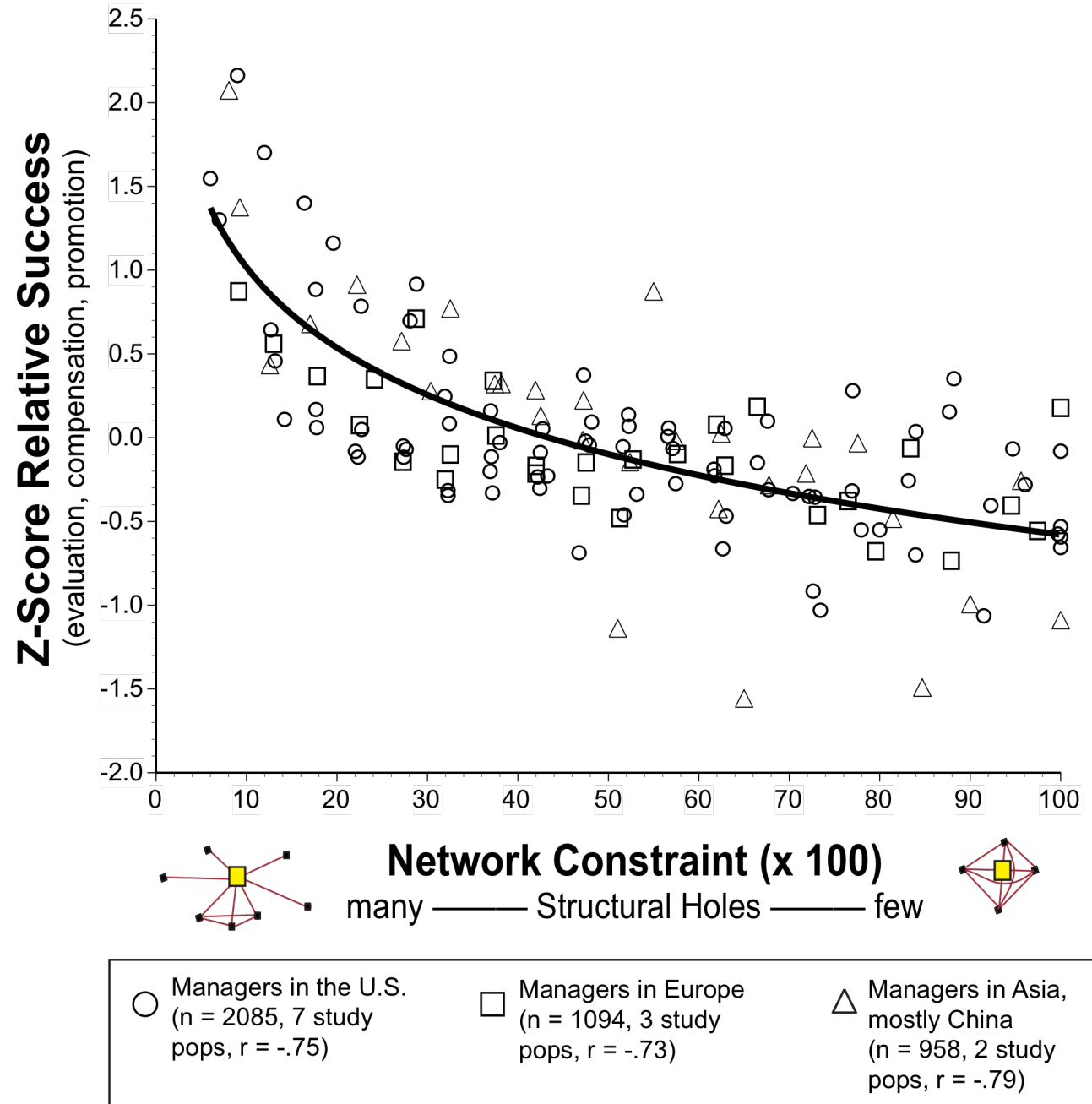


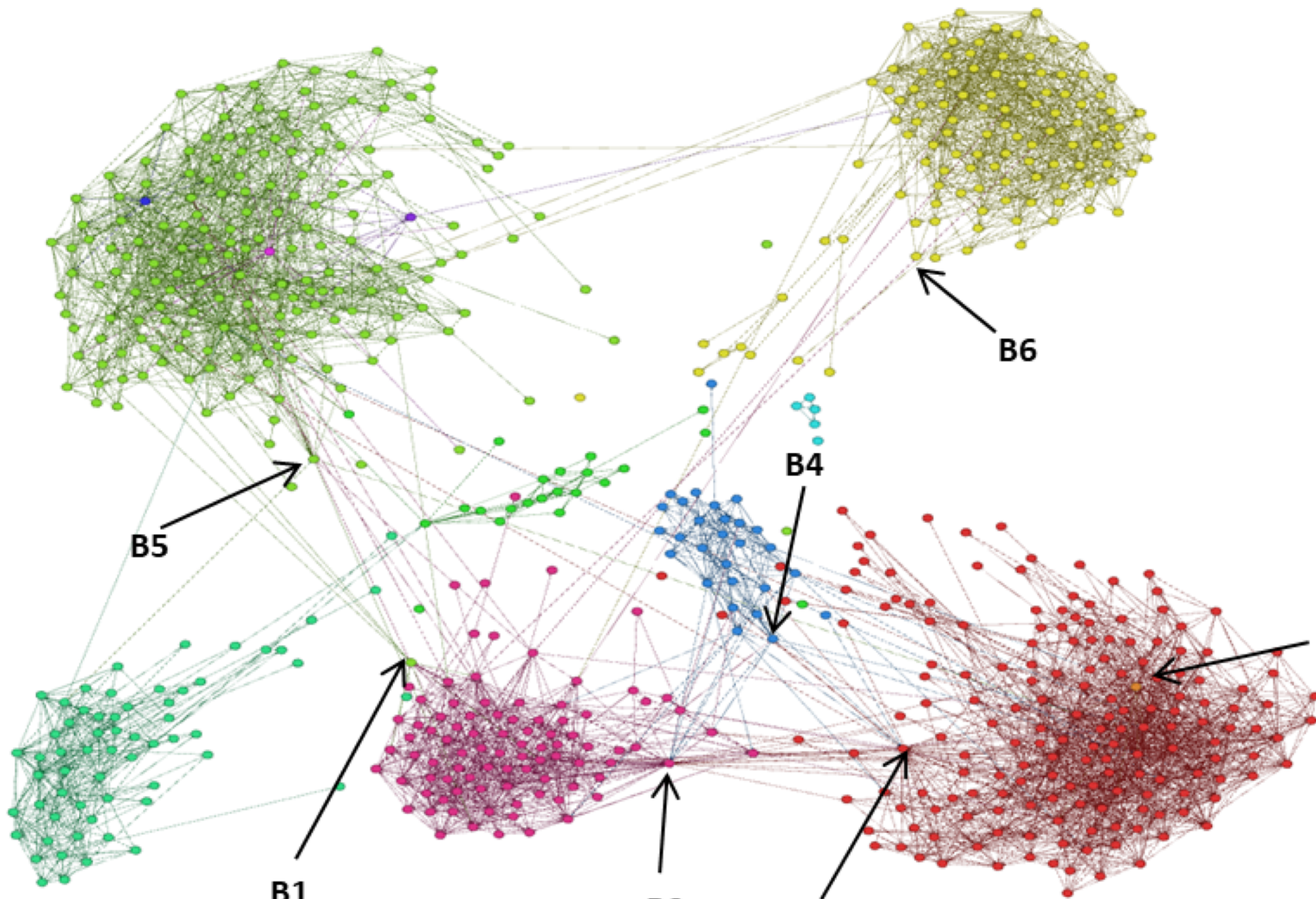
Figure 1. Venn Diagram of Attention in Organization Work to RBV and Social Networks

Figure 2. Success and Access to Structural Holes

NOTE — Plotted data are average scores within five-point intervals of network constraint within each study population (from Burt, 2019b).

Correlations are computed from the plotted data using log network constraint.





- HQ
- EMEA
- Japan
- Canada
- Australia
- China
- US
- Germany
- France

Figure 3. Supply Chain Sociogram

NOTE — Lines connect supply-chain employees who often discuss work with one another.

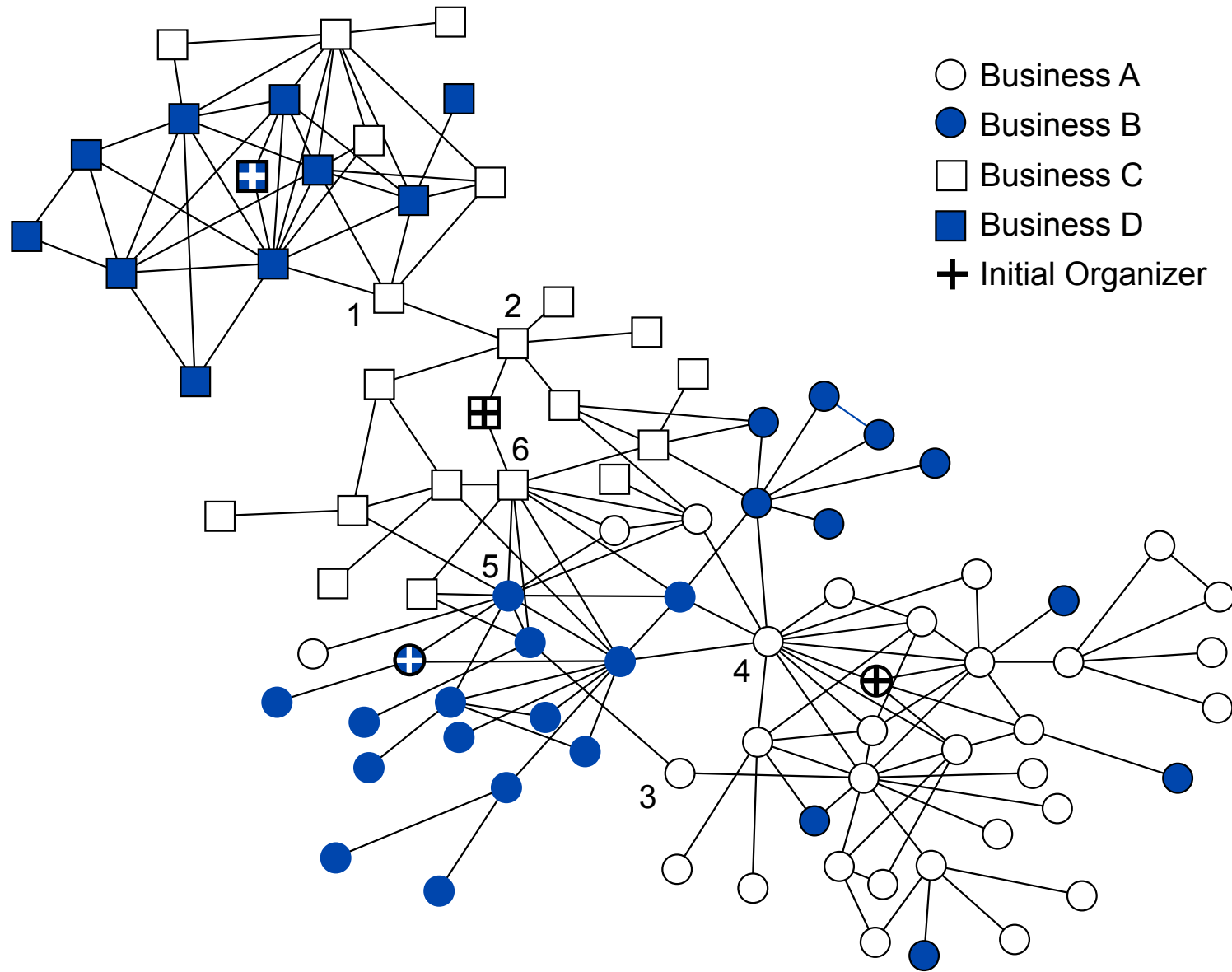


Figure 4. Network Structure of a Virtual Organization

NOTE — Lines connect key collaborators within the virtual organization.