

**ADVANCING RESEARCH ON INTER-FIRM NETWORKS: RECONCILING
PARADOXES VIA CONCEPTUAL CLARITY AND BRIDGING
METHODOLOGICAL PLURALISM**

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Abstract

Extant research in inter-firm networks offers several contradictions and paradoxes. After a review of 213 key articles in this area covering significant conceptual ground and using diverse methods, we believe that research in this area offers several paradoxes that can be viewed as opportunities to clarify the field conceptually and methodologically. Some of the key paradoxes were identified as follows:

Heterogeneous versus homogeneous? Is a heterogeneous network for outcomes such as innovation or a specialized network? In spite of empirical tests to determine this issue, this issue remains divisive in current research.

Develop reputation versus preserve secrecy? What is the role of network reputation in predicting performance of individual members? On the one hand, network reputation transfers to individual members' reputation, leading to preferred tangible and intangible outcomes. On the other hand, if part of the gains come from production of private information within the network, then secrecy instead of reputation may be the desired state.

Strong versus weak boundaries? Should networks build strong boundaries around them and create tight core groups leading to greater appropriability of current gains, or should the boundaries be flexible, allowing for rejuvenation of group membership via

new members with competency enhancing capabilities to increase potential for future gains?

Sparse networks or dense? Sparse networks with structural holes reduce redundancies, and improve efficiency. Dense networks preserve flexibility and benefits of network positions.

Altruism, transaction, or selfishness? Altruism builds long-term network health, but could encourage free-riding. Transactional approach reduces the networks to arms-length controlled markets, while reducing opportunism at the margin. Selfishness increases individual firm's benefits immediately, but hurts network health and productivity in the long run.

We offer two conceptual as well as two methodological approaches to resolving these paradoxes and contradictions. Conceptually, we trace the development of network over time. Making the study of inter-firm networks time-dependent reconciles many of these paradoxes. In addition, we link the temporal development of network to qualitative ecological development in the relationships between individuals and their contexts. The seeming paradoxes then appear as products of natural evolution of inter-firm networks as well as qualitative ecological development of actors and their contexts.

Methodologically, we are alarmed at the growing disconnect between the 'story' emerging from inductive and deductive approaches to studies of inter-firm networks. We believe that these two approaches need to initiate a dialog to develop contingency constructs (that are 'invisible' in the current nomological network of constructs) that would reconcile these paradoxes and contradictions. In addition, we call for multi-level analyses to complement the existing research which at best controls for other levels of

analysis. We offer methodological suggestions that lead to development of tighter connections between inductive and deductive approaches (where necessary) to studies of inter-firm networks, while preserving the unique and orthogonal contribution of each to theory development and testing. In doing so, while we preserve the necessity of methodological pluralism, we also call for innovations in methods.

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Introduction

Enhancing knowledge about strategic inter-firm networks has been a central issue for strategy and organization theory researchers. The concept of firm-level networks has benefited from contributions multiple academic disciplines such as organization theory, economics and sociology that investigate the issue of boundaries of the firm. It is no exaggeration to highlight inter-firm network as one of the primary and dominating forces to understand both global movements; and growth of firms; and as conduits for transmitting policies to facilitate survival and prosperity in specific regions or among a group of firms that are striving for survival and growth (Powell, 1990). Firm-level strategies involve networks as integrators to pool resources as well as to reduce redundancies of excess capacity (Powell and Smith-Doerr, 1994).

The ontological questions about networks are a natural extension of the debate about the boundaries of the firm and can be traced back to Coase (1937) and emphasized by Williamson (1979) - both used markets and hierarchies as an alternative form of governance of the firm. Extending the firm beyond the natural administrative boundaries has led to a development of building blocks of new theory (Penrose, 1959). New and revolutionary technologies such as information technology (IT), increasing globalisation and emergence of new economies such as east Europe and pacific rim are individually and in combination providing the impetus to the empirical and conceptual development of inter-firm networks (Chandler, 1990; Nohria and Eccles, 1992). The emergence of

inter-firm networks has also challenged traditional academic positions on strategic behaviour (Nohria and Eccles, 1992)

Inter-firm networks are constituted in many different settings. The overall inter-firm network concept could be understood as a system of nodes and relations (Burt, 1980; Hörte, 1995). The components refer to individual actors or organizations that are linked together in a system of relations. Inter-firm networks differ depending on: how strong and how many relations are embedded in the system; how close both geographically and conceptually the firms are to one another; and how power is distributed among the system.

The research approach and objectives addressed will require the researcher to formulate stricter definitions of networks. However since network systems consist of two or more nodes interrelated to one another the question of purpose for which the nodes are tied to one another still remains. Murto-Koivisto, Routamaa. and Vesalainen (1996) use the concept of a net as a definition to identify horizontal and vertical interrelationships. Horizontal networks mostly constrain entry of new firms (Noteboom, 1998) and to enlarge a specific service or product. Vertical networks have hierarchical relations constituted to yield scale and scope benefits (Chandler, 1990). As a contrast from these two alternatives lateral networks are composed without any specific structural order (Johannisson, 2000) these inter-firm constellation often serve broader purposes such as regional development and informational collection. Clusters and inter-firm networks are created to serve regional purposes. These are recognized by their “geographical concentration of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important (Porter, 1998 p 78)”.

Despite increasing knowledge about how inter-firm networks are constituted and how they operate, a number of challenges still remain. The network concept still focuses on describing the network and contributing to a descriptive theory development. We believe that the lack of developing methods to understand the trajectories of networks is partially due to the scarcity of modeling moderators that possibly could bridge paradoxes within the field of inter-firm networks. Heeding the calls for the importance of highlighting and approaching inter-firm networks with totally new approaches (e.g. Nohria and Eccles, 1992) this paper discusses some paradoxes within the field of inter-firm networks and aims at exploring possible moderators to reconcile the found contradictions.

The theory below will discuss each paradox followed by suggested moderators.

Heterogeneous versus homogeneous

Evolutionary perspective is one of the most powerful tools to understand evolving organizations, and it offers several explanations for success of firms. According to Aldrich and Zimmer (1986); Aldrich (1999) the creation of success require heterogeneous environments. For instance, medical industry invests in spots in the middle of the “jungle” in order to get access to heterogeneous spots creating new species and to understand the evolving environment. In the same way environments of a high level of heterogeneity among businesses creates the needed critical mass in order to survive and prosper. The paradox of the homogeneous and heterogeneous is studied by Foray (1991); who found that the ability to reconcile specificity of resources is the base of creating complementary networks. These complementary networks apply to innovative regional clusters.

On the other hand regional milieus create groups sharing homogeneous shared values, strategic groups. Foray (1991) argue that the fully integrated network require specification of goals and a shared strategy to obtain economies of scale. The low intense competition that few big companies face is supported by a value-chain of outsourced small companies under long-term contracts with big companies. The resources of the dependent outsourced company does not have the ability to reverse its dependence and the risk of such action tends to keep the company in its given position (Foray, 1994). The large company can, therefore, in the current power position control the network almost as a hierarchical authority without the downside of being locked-in that hierarchy entails. According to Richardsson (1993) firms utilizing resources do so in order to produce more of the same in chain composed by homogeneous companies. The agglomeration of resources (more of the same) provides an ability to produce complex products (Poon, 1998). The homogeneous networks respond accurately to the standards set by the market. Metcalfe (2000) emphasize that the capitalistic standards stress such purpose oriented successful behavior.

We believe that modeling the following moderators would resolve this paradox: age of the industry and the nature of core technology of the companies in inter-firm network.

Younger industries may require more diverse and heterogeneous networks to overcome their liability of newness by selecting partners carefully. Heterogeneous networks may offer credibility, reputation, and institutional legitimacy that may be critical resources for nascent industries to get sustaining resources such as customers and suppliers – especially if these groups are required to make investments of their own as a

precondition to using the industry's output. On the other hand, older industries may require more homogeneous networks to explore scalar economies and efficiency, as well as establishing standards for the next generation of products and services, usually controlled by a strong strategic center or broker.

Nature of core technology could be another moderator to reconcile the heterogeneous-homogeneous paradox. The more specialized and sensitive the core technology of the firm is, the more a heterogeneous network would be favored. This follows from the classic arguments of Thompson (1960), about protection of the technical core as the key aspect of organization. A heterogeneous network would tend to buffer the specialized technical core better than a homogeneous network, which may not be adaptable to changing conditions.

Develop reputation versus preserve secrecy

Developing reputation can be extremely important for the creation of success and reputation. The concept of reputation and creating such could either be externally driven or internally. On the other hand, competitive advantage of unique, secret, and underground (hidden from public view or open membership) network also holds a lot of appeal as a distinctive resource – in the sense of resource based view (RBV) of being rare, valuable, imperfectly imitable, and relatively non-substitutable (Barney, 1991, 1995).

The externally reputation is commenced on the basis of personal networks created for purposes of sharing information and developing ideas (Johannisson, 1995). Prematne (2001) points to the fact that small businesses to a large extent are dependent on such networks for survival and growth. The concept of developing the inter-firm network

underpins the strength of the individual node as well as the whole system. For instance, Ingram and Roberts (2000) exemplify how interlocks between hotels in Sydney, minimizing the customers' perceived structural holes and consequently increasing the reputation of the entire network. It has been argued in the context of corporate governance that risk assessment of losing reputation governs the choice of affiliating oneself publicly with another body, and hence affects the development of reputations, and hence, reputations could lead to better outcomes (e.g. Goel and Enkel, 2003). The secrecy serve the risk minimizing and preserve a mature position in the market.

Younger industries and networks may seek to build reputation for their networks – a network that no one wishes to join may not be very valuable. A reputed network also may have other benefits usually associated with reputed companies – lower resource acquisition costs, and higher pricing power. Reputed networks may also provide rare credibility, and institutional legitimacy to its members. On the other hand, older industries may prefer secret networks to explore new bases for differentiation and to create/maintain barriers to new entry. Secrecy may be enhanced by complex and fluid structures, that keep even the members unaware of all the nodes in the inter-firm network. Because of this, no one can appropriate or imitate the benefits of an embedded structure, and yet, everyone is free to enjoy the benefits as an individual member of the network (Lumpkin & Dess, 1996).

The role of tacit knowledge in competitive advantage of a firm may play a key role in the network's decision to seek reputation or to strive for secrecy. Since reputation has some benefits as outlined above, the decision to seek reputation would seem to be predicated on the degree of downside risk associated with it. If competitive advantage of

the firm is based more on explicit knowledge, then there may be an inclination to keep the network secret on balance. On the other hand, if the competitive advantage of firms is based on more-difficult-to-imitate tacit knowledge, firms may seek reputation for their network rather than secrecy. High-tech firms may gravitate toward highly visible and reputed science parks, incubators, and geographic clusters because they are assured of better resources due to network reputation and may not fear loss of knowledge because of tacitness of their resources.

Strong versus weak boundaries

Highlighting weak respective strong boundaries follow a long tradition among strategic and -firm research. The boundaries of the individual firm as well as a group of firm arrange to a certain extent the nature of the competition. A common topic among researchers is to understand the prerequisites of a loose conglomeration characterized by weak ties, and a tight cooperative network with more formal and strong ties (Murto-Koivisto, Routamaa and Vesalainen, 1996). By identifying both horizontal and vertical networks Murto-Koivisto, Routamaa and Vesalainen (1994) conclude in a qualitative longitudinal study that strategic intensity determines the mode of cooperation without actually defining strategic intensity. However strategic identity (or coherence) within groups of companies will occur when there is cohesion among the group in terms of strategic intent. Duncan (1972) separate forces outside the individual node using the number of components (nodes or clusters of nodes) and factors (variables or set of variables) as determinants to what extent the company perceive intensive competition. Duncan (1972) suggests that intensive competition with a large number of components

and factors demand dynamic incremental change, while the opposite demand static revolutionary change.

The components are found in different settings and are carefully approached by a number of researchers (Emery and Trist, 1965; McGee and Thomas, 1986; Langfeld and Smith, 1997). Emery and Trist (1965) identify four different categories of companies that suspend the strategy to meet the environmental change in different ways: (1) The first group are related to a calm environment and is not differing between tactic and strategy; (2) The second group is dependent on the sluggish movements of the major players in the industry and is very much changing with a group behavior; (3) The third group is changing with dynamic capabilities; (4) and the fourth group change find is defining and acting upon indicator they found by them self. Langfeld and Smith (1997) have a similar grouping by characterizing: (a) defender as a strong node defending the taken positions; (b) while prospector identify new needs and is more driven to organize the node to new structural positions; (c) analyzer is following new trends by accurate analyzes and apply these on new markets with careful precision; (d) and the reactor is copying the successful movements. Excluded in this grouping is firms with blurred and with a lack of purposely oriented action.

According to Murto-Koivisto, Routamaa and Vesalainen, (1996) the propensity to unconditionally share occurs less in loosely held informal network such as a development circle and on the contrary a Joint Venture with strong formal agreements and a foundation to share risks and costs will demand cohesion in the agreed agreement among the involved nodes. Network perspective offer explanations of how such action is carried out (Håkansson and Johansson, 1988; Håkansson and Snehota, 1989; Gulati, 1998). The

inter-firm network perspective also puts forward several contradictions in this sense.

Self-organizing procedures create powerful platforms for innovation and learning. The boundaries to such forum are to a certain extent open (Nonaka, 1994). Open systems create opportunities for learning and creating strong innovative platforms. According to Benassi (1995) the successful networks will position themselves in such environment with strong network awareness. However the effective weak loosely held tie (or porous boundary) will encourage regional development, idea sharing and quickly offer access to resources needed for the start-up (Powell and Smith-Doerr, 1994). On the contrary the strong tie creates co-alliances with traditional long-term focus to strength the competitiveness within a certain industry (DeToni and Nassimbeni, 1994). The strong network boundaries creates obstacles for entrance of new firms but could also reflect the presence a mature knowledge of working out new opportunities - for example embedded in a family tradition (Malecki, 1997). Locally this boundary can ensure a regional survival and also maintain a competitiveness that expel or at least minimize threats outside the local market.

Thus the regional or global nature of the industry and the nature of the solution needed becomes central moderators' in determining whether the boundary will encourage and let in new partners or keep up with the current network structure.

Sparse networks or dense?

The dense network supports the idea of a lot of autonomous nodes. The dense network ratio assess a large number of links in a large number of possible links and could be expressed in following formula $(n(n-1)/2)$ (Tichy, Tushman and Fombrun, 1979). The dense network ratio does not measure whether the links reach important strategic nodes.

The dense network includes a lot of relations, many of which are redundant. To the extent that power distribution among the nodes is well-balanced the concept of dense network supports strong competition and shapes a shared network community with fewer dominant players. From a customer perspective the myriad of relations offer a large freedom of choice to select service. From the business perspective this serve the small entrepreneurial network of a lot of small businesses with specialized units almost impossible to unveil (Dess and Lumpkin, 1996).

Sparse networks include “few” relations and supports the idea of a strategic center with skewed power or a lot of dualistic relations. Maintaining a strategic center costs a lot of time and requires a lot of resources. The network with a large number of relations will quickly be supported by a magnitude of input in key decisions and will be able to control and monitor the strategic situation. An effective sparse network is exposed to few redundant contacts (Burt, 1992, 2000a, 2000b). The redundancy refers to few structural holes (Powell and Smith-Doerr, 1994). Bridging structural holes increase not just the internal effectiveness but also the efficiency to cover the perceived customer need. Creating a close interrelated relationship with a lot “friendship” support the idea of success trough alliances sharing risk or business strategies including relations with commitment instead of opportunism (Mavondo and Rodrigo, 2001).

In the sense of these two controversies we know that some industries demand a lot accumulated resources. For example establishing ironwork will demand a huge amount of money and activities in a specific sequence, hence the strategic center is more functional to coordinate the different activities. On the contrary industries like tourism

demand both strong players establishing a culture and tradition to serve customers but also a myriad of different niches serving sensitive customer needs (Porter, 1998).

We suggest degree of industry interdependence, and relational trust as moderators for whether a sparse or dense network would emerge. To the extent the industry is specialized (along value chain or customers), a dense network may be preferable by players. A dense network may involve redundancy in nodes, but also provides a strong deterrence against exploitation of any one node via small numbers bargaining. A more self-sufficient industry (in the sense of firms internalizing most functions, and/or serving a variety of customers), may support a sparse network. This division however does not resolve the evolutionary problem of how the industries developed as specialized or “generalized.” We believe that relational trust may provide clues to this evolution. Networks with greater relational trust among members may be more comfortable with specialization with sparse networks. This is because relational trust would tend to magnify the cost of redundancy in networks – there is no point having the advantage of verification via multiple nodes, and the advantage of choices, if there is low likelihood of ever being unpleasantly surprised by one’s usual associates. Networks with lower relational trust (and greater deterrence-based trust characterized by formal contracts and transactions) may be observed in dense networks with “generalized” firms. Lower relational trust makes the deterrence and insurance offered by dense networks very attractive and less expensive relative to cost of unpleasant surprises.

Altruism, transaction or selfishness?

Collaboration in general is always vulnerable to free rider problems since there always are nodes not paying for the shared interests (Ingram and Roberts, 2000). However we

know individuals join network for different reasons and some do join the networks to share ideas and to support and strengthen a regional body. The complexity of irrationality in the human behavior such as altruism, generosity, cooperativeness, integrity, truthfulness basically may be the opposite to the general assumptions of more proscribed range of human behavior – specifically, rational behavior including elements such as opportunism and behavior based entirely on selfishness (Jones and Wicks, 1999).

Creation of successful inter-firm networks based on strong autonomous players competing in a way perceived as selfish is strongly supported by Benassi (1995). The autonomous local authorities enhance the territorial development by benefiting from resource complementarity; increasing the critical mass by intentionally trying to optimize decisions; and by a mutual dependency sharing competence blocks supporting the strength of the local community (Maillat, 1995). Malecki (1997) argue that successful environments are based on a well-established institutional climate, based on a shared willingness from other firms and institutions to build a shared body. But we also know from extant strategy research that key people benefit from supporting the environment including irrational nodes building the business climate (Nutt, Backoff and Hogan, 2000).

We believe the key moderator resolving this issue is the degree and development of trust and cultural orientation. Networks that are able to develop and sustain trust as a value will be able to develop a long-term outlook and a more generalised reciprocity resembling the selflessness of altruism. Networks in the process of developing trust may initially use transactions to protect themselves from downside risk and use the relationship created as an opportunity to signal their intent and divine their partners' (Gulati, 1998). Trust itself could per se be defined as a matter of risk (Mayer, Davis and

Schoorman, 1995). Selfishness can be used by network members as cashing in their reputation if the stakes are high enough, although this may not be a stable solution for everyone, as network adapts to the emergence of selfishness as a possible member behaviour.

Cultural orientation may be another moderator resolving this issue. Research using Hofstede's (1980) dimensions has shown that individualistic cultures are more comfortable with hands-off transactions, whereas collectivistic cultures are more likely to cooperate and be less transaction-oriented (Steensma, Marino, Weaver, & Dickson, 2000). This suggests that some networks may differ in members' orientation toward each other from inception, and may be more or less altruism or transaction oriented. What would be of interest is to see how a clash of these cultures in emerging *global* network of firms plays out – which value comes to dominate, and how?

Figure 1 summarizes the paradoxes, and our suggested moderators.

Discussion

Resolving paradoxes at one level requires viewing the phenomenon from a different perspective. Understanding a course of how networks evolve force extent research to capture catalyst involving in the process here called the moderator.

Figure 1

Paradoxes and moderators of inter-firm networks

Paradox	Moderator
Heterogeneous versus homogeneous	Age of the industry Nature of core technology
Develop reputation versus preserve secrecy	Age of the industry Nature of knowledge used in competitive advantage
Strong versus weak boundaries	Geographical dispersion of the industry Nature of solution demanded
Sparse networks or dense?	Industry interdependence Degree of relational trust between the nodes Degree of relational trust in the network
Altruism, transaction or selfishness?	Degree of relational trust between the nodes Degree of relational trust in the network Cultural orientation

Bacharach (1989) states that evaluation of organizational theory should aim at organizing parsimoniously and communicating clearly. Further Bachrach (1989) explicitly argues that relationships systems of constructs and variables should be viewed clearly in order to understand all underlying assumptions. Such theory map will enable an estimation of the

boundaries of the theory. Falsifying such theory will terminate at least some of the usefulness of the theory building blocks. We therefore believe that understanding *evolving* inter-firm networks push theory development to find new ways of organizing this complex system of relations between blocks of variables and components and resolve the paradoxes that differentiate the relationships in one stage of evolution from the other. We also believe that research on inter-firm networks can benefit from multi-level analysis. Theory development linking networks of individuals in specific positions at different levels (for instance, networks of directors of companies, networks of the CEO and other top management, networks of technical people employed by the company, etc.) and inter-firm networks of various degrees of formality could inform the evolution of decisions on various strategic options, for instance. In knowledge-intensive high – technology companies with weak appropriability regimes, networks of directors of a company could influence the kind of partners a firm has as options to partner with, as well as the number of partnerships a firm can enter into.

The acceptance of multi-level analysis also would lead to efforts to make tighter connections between inductive and deductive approaches (where necessary), and development of rich mid-range theories with enticing generalizability and predictive power. Review works on case studies on individual networks could provide list of generalizable variables and their ranges. This list should then be conceptualized to develop parsimonious constructs inductively. The output from this exercise can then be compared to deductive approaches to compare the additional constructs uncovered via the inductive approach. The incremental contribution of these constructs in a deductive theory can then be conceptualized and empirically tested on specific samples.

Conclusion

In this paper, we outline some paradoxes that emerge from a review of literature on inter-firm networks. We offer suggestions on “complicating” the theory by adding moderators/contingencies, that may resolve the paradoxes, including the contingency of time (or an evolutionary approach to inter-firm networks). Furthermore, we wish to promote both deductive and inductive approaches, as well as a conversation between the two, in developing a mid-range theory of inter-firm networks. We offer some suggestions on how this may be approached, to promote a discussion and debate. We hope that the output will constitute “better” theory, and a “better” story, on a wide-ranging set of criteria.

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