

Social-agency-embedded Forms of Collective-value Production: Network Modes of Organizing

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ABSTRACT

Collective-value production theory is combined with trust theory and the theory of social exchange to explain why network organizations evolve and how they differ in terms of driving forces and key characteristics. The examples are based on field material collected in an egalitarian and team-oriented Scandinavian context. The ability to connect to strategically important clusters of networks is a critical managerial skill. Managers must recognize that the relationships between the different actors in a network are multiplex and dynamic. From a managerial point of view, this also calls for other skills than traditional administrative and managerial skills, e.g. social skills.

Introduction

Increasing pressure to develop and commercialize new technological and market opportunities has resulted in a broad spectrum of interorganizational collaborative activities, ranging from traditional business-to-business joint ventures, strategic alliances and different licensing arrangements, to the emergence of third-party institutional settings, such as science parks and business incubators. This development has also been accompanied by a growing academic interest (Holm et al., 1999). Put another way, different approaches to organizing economic activity have emerged, involving a rich repertoire of collaborative and relational approaches based on social interaction and value creation at both the individual and collective level.

Network structure and governance have long attracted the interest of scholars. While some researchers have focused on the structural aspects of networks (cf. Mitchell, 1969, for an early contribution), others have concentrated more on networks as forms of governance (e.g. Powell, 1990; Williamson, 1996; Provan & Kenis, 2008). The interplay between social agency and social embeddedness refers to the interconnectivity between social agency (interrelations, interactions and activities) and organizational form (structural representation). This relationship has been of particular interest in the discourse on the structural aspects of networks (cf. Emirbayer & Goodwin, 1994; Salancik, 1995). Organizational form refers to those attributes of a collectivity that distinguish it as a distinct entity (Romenelli, 1991). Here, the term network mode of organizing is used to describe relationships that, typically, are not based on legal arrangements, but which are influenced by highly institutionalized norms and values regarding collaboration and shared organizational identities.

Organization theory has been influenced by economic as well as sociological approaches, including attempts to bridge the two (Granovetter, 1985). However, as pointed out by Uzzi (1999), these approaches do not easily mix due to the implicit assumption of the former that processes of socioeconomic exchange are dominated

by opportunistic rather than collaborative behavior. In classical transaction cost economics (Williamson, 1985), social interaction in processes of economic exchange is an external cost that must be included in the economic equation. However, more recent contributions (Williamson, 1991) have placed a greater emphasis on dimensions of governance related to structural alternatives. This author welcomes such a development, arguing that, in some situations, the social dimension is a precondition for exchange. Put another way, it addresses collaborative aspects of economic agency that are at odds with the purely rational and self-interest premises on which mainstream economic theory is based. Here, collaboration refers to the voluntary co-acting of two or more parties in order to benefit one, some, or all involved parties in a way that would not have been possible through individual actions (Brosnan & de Waal, 2002, p. 130). One example of this is when an SME in self-organized network-based incubator leaves the incubator to negotiate a new external contract that would require the inclusion of one or more SMEs from the incubator. Such an arrangement not only allows the SME in question to close a contract that it would be unable to close by itself, but also creates benefits other SMEs in the incubator involved in the deal.

Notwithstanding, more elaboration is needed to explain the social mechanisms behind such collaborative processes of exchange. This in turn requires theory that can conceptualize collaborative processes of value production. The term network organization has been used to describe organizations that are neither idealized market nor hierarchy (Powell, 1990). By interorganizational arrangement is meant a socially embedded and collaborative arrangement formed through the interaction between individual and collective actors (Sydow & Windeler, 2003). Along with Benu (1977), it is argued that social exchange theory provides a useful frame of analysis at both the collective and the individual level, and helps us understand why network modes of organizing are emerging and how they are structured and governed. However, focusing on relationships not exclusively based on private ownership or legal means of regulation not only implies the absence of formal contractual and/or equity-based arrangements, but also that quite different means are used to regulate the behavior of collaborating interactants. Narrowing the focus further to only include identifiable and collectively recognized (by the members) network organizations also excludes loosely coupled networks, such as industrial clusters, from the analysis here.

Network organizations have recently been described as complex relational systems involving individuals, organizations, behaviors, procedures and technologies (Ibarra et al., 2005). However, this paper will show that the term network organization is far too broad to encapsulate the richness and diversity of network approaches to organizing in terms of drivers, structure and modes of governance. To further elaborate this assertion, four generic approaches to network organizing are introduced. Organizational evolution, as will be shown below, allows for the emergence of more differentiated network organizations based on transitory and flexible structures while at the same time serving different purposes. The paper investigates different network modes of organizing and their rationale. However, the four examples of network organization have each developed their own distinct repertoires of collective agency in response to various environmental constraints and/or opportunities. Although all four examples are based on longitudinal in-depth case studies, they primarily serve to illustrate the conceptual points proposed in the paper.

The aim of this paper is to propose a framework of collective-value production stemming from network approaches to organizing. Collective-value production theory (Cole & Teboul, 2004; Erikson et al., 1999; Peppard & Rylander, 2006) will be combined with trust theory (Gambetta, 1988; Hirsch, 1978; Lewis & Weigart, 1985; Parks & Hulbert, 1995) and the theory of social exchange (Blau, 1964; Cook & Emerson, 1978; Emerson, 1972; Homans, 1958) to explain how value that goes beyond the individual level can be produced. The paper investigates why network organizations emerge while at the same time showing that generic categories of network organizations can be typologized. Inspired by Park (1996), the paper is based on the premise that the choice of network organization approach is strongly influenced by the type of incentives, interdependency, nature of the exchange process, and choice of governance during the collective-value production.

The remainder of the paper is structured as follows: The next section develops a theoretical framework to account for collective-value production, and shows how the involved social behavior is regulated. In the following section, the theoretical framework is further expanded to include the creation of collective value stemming from processes of social exchange in different approaches to network modes of organizing. However, due to considerations of space, an in-depth empirical account of the four examples is beyond the scope of this paper. In closing, the paper discusses the implications for research, decision-making and policy-making in the field.

Social agency, social exchange and normative regulation (trust)

Social agency is intimately related to the term social network, a term which can be traced back more than half a century. For example, in his study of social communities in Norway, Barnes (1954) found that, despite an abundance of formal organizational arrangements, individuals often made decisions based on personal contacts and relationships (networks) which transgress traditional organizational boundaries. Non-contractual network organizations involve both social capital (Coleman, 1988), and, unlike formal alliances, which are typically regulated by legal contracts, psychological contracts, i.e. a person's understanding of the terms and conditions of a reciprocal exchange, typically in the form of an obligation to provide future benefits (Rosseau, 1989). This in turn emphasizes the embeddedness of individual exchanges within larger socioeconomic system interactions (Granovetter, 1985).

The evolution of interorganizational interactions can be seen as a process of social exchange (Holm et al., 1999). The processes of social exchange and collective-value production considered in this paper are thus not regulated by contracts. Rather, they are regulated by unwritten and predominantly nonverbal sets of congruent expectations and mutual assumptions shared by the exchanging actors, and by socialization processes that transform the exchanges into socially embedded relationships by infusing them with norms and values (Ring & Van de Ven, 1994).

The seminal contributions to the development of social exchange theory (SET) date back half a century (Blau, 1964; Gouldner, 1960; Homans, 1958), and include studies on professional and/or business exchanges from the point of view of different organizational roles and functions (Macaulay, 1963). SET, which allows for an analysis of the interdependencies between actors and the conditions for social exchange (Cook, 2000), is based on the key premise that the exchange of valued

social and material items is a fundamental form of social interaction. Apart from tangible goods and services, exchangeable items also include intangibles such as information, affection, approval or advice. Furthermore, it often includes the exchange of information with veracity and meaning beyond its face value (Uzzi, 1997). The exchange process is a voluntary action of the individuals involved, the motivation for which, e.g. feelings of personal obligation and/or gratitude, stems from the return they expect to get either immediately or later.

Emerson (1972) has taken the original dyadic approach to social exchange a significant step further by developing SET to address social exchanges in networks, exchange ratios, and the role of power and dependencies. He defines social relations as being connected when exchange in one relation affects exchange in another. Dependence, i.e. the degree to which one network member is dependent on another for resources relative to alternative sources, is therefore a central issue in social exchange theory. Interdependence has long been recognized as important in, for example, exchange situations, where stable exchanges can be terminated by one of the interactants involved (Eccles, 1981).

The inverse of dependence is power, and the distribution of power in exchange networks can thus seriously affect the relative access to and/or extent of exchange processes in the network organization. In this context, power is seen as the ability of one actor to control resources that other actors in the network desire (Burke, 1997). As will be shown below, the role of power differs from network organization to network organization.

However, social exchanges are also very vulnerable to repeated recrimination (Kollock, 1993). The failure to meet a social obligation is likely to result in a collective sanction, although this does not have to be carried out immediately, but can in some situations be delayed. Delayed reciprocations (Trivers, 1971, p. 39) differ in several ways from economic transactions. For example, such exchange processes include unspecified obligations, which, in consequence, create a sense of diffuse future obligation. Ekeh (1974, in: Yamagishi & Cook, 1993) further distinguishes between two basic forms of social exchange: (i) direct or restricted exchange, and (ii) indirect or generalized exchange. Where the former is normally related to 'tit for tat', or strict reciprocity, the latter allows for more 'relaxed' accounting systems (Kollock, 1993). Moreover, as pointed out by Bearman (1997), in the former values are exchanged back and forth, whereas in the latter values have to flow through all parties in a cycle before coming back to the provider.

Trust links modes of governance with actual behavior during the processes of social exchange. Trust has long been known to reduce opportunistic behavior, since the emergence of mutual trust among members of a network is reinforced by a strong collective social norm of reciprocity (Gouldner, 1960), i.e. an inherent need to return benefits received from the other part(ies) during social interaction. Addressing the productive function of a social network has led to the notion of social capital, which has been described as the result of changes in relations between individuals which facilitate action (Coleman, 1988).

Trust thus works as a highly influential moderator of social behavior. However, it also necessitates the acceptance of dependence on another agent during an exchange

process, where the provider uses the opportunity to demonstrate his or her perceived trustworthiness of the recipient. Zucker (1986) has referred to trust as a set of social expectations shared by those involved in the exchange system. In a review of trust theory, Hosmer (1995) noted that trust is associated with voluntary cooperation and with the benefits resulting from such cooperation (p. 390).

Trust has also been found to be highly critical to the outcome of social interaction (Lewis & Weigart, 1985). For example, research has shown that a higher degree of trust tends to lead to increased collaboration (Parks & Hulbert, 1995; Gambetta, 1988). Thus, the presence of trust in social interactions has been found to influence actors' degree of openness in sharing knowledge with each other (Napapiet & Ghoshal, 1998), while at the same time allowing for personal disclosure and confidential knowledge exchange (Dirks & Ferrin, 2001) and learning (McEvily et al., 2003). Put another way, trust can be seen as a governance structure that resides in the social activities between and among individuals (Uzzi, 1997).

The network as a nexus for collective-value production

In line with social exchange theory, the context within which social exchange takes place includes the exchange network, which is defined as two or more connected interactants (Cook & Emerson, 1978). By focusing on the network outcome (collective-value production), participants have come to consider networks as value networks, or processes of co-created value (Peppard & Rylander, 2006, p. 131). More importantly, it directs the focus away from the individual actor (firm) towards seeing value-creating networks as value-creating systems of complementary nodes and links.

Value can relate both to tangibles, such as physical resources, joint contracts and/or market-related activities, and intangibles, such as knowledge, learning and experience-sharing. Including the issue of network outcome (value) focuses attention on how and which types of value are produced for whom and in which type of network organization. Put another way, a value-producing network organization is characterized as being not only a host for the exchange of tangibles and intangibles, but also a nexus for the production of value beyond the value and interest of the individual member.

Research has shown that the actual level of obligations, expectations and norms related to processes of social exchange affects the performance of the overall social system (Coleman, 1988). Putting network in front of organization, however, also points to the importance of specifying the analytical level. In this paper, the level of analysis focuses primarily on the interface between the dyad and the network or collective level, i.e. a focus on the network as an identifiable system of production and/or exchange that can benefit both part of the network and the network as a whole.

In order to support the overarching premise of the paper – that there are different types of network organizations– the four examples will be briefly discussed in relation to possible differences in terms of structure and governance. In so doing, the following generic properties are particularly relevant: authority, coordination, composition, spatiality, temporality and outcome. Authority refers to how decision-

making power and the right to make executive decisions is distributed, and will thus reflect the relative degree of 'flatness' within the individual network organization. Coordination reflects how activities and exchanges are regulated and managed among the interactants, and represents internal rules and procedures. By composition is meant the relative distribution of different types or categories of network participants (variety). Spatiality refers to the physical or geographical extension of the arrangement in question, and represents the relative degree of proximity and/or distance between the exchanging actors. Temporality denotes duration, i.e. the relative persistency of the network (over time). The last dimension, outcome, refers to the value being produced and/or exchanged within and/or by the organizational arrangement in question.

Recognizing that network organizations often appear in the form of non-contractual, autonomous and collaborative arrangements that are neither purely hierarchy nor purely market, this paper argues that it is time for a more detailed analysis of the way in which different network modes of organizing emerge and how exchanges take place in them. Provan and Kenis (2008) have taken an important step by proposing three generic forms of network organization: (i) self-governance (participant governance); (ii) lead organization, and (iii) network administrative structure. This paper proposes a fourth generic form - the virtual community network. While the first three types have existed for some time, the latter has emerged as a result of the development and commercial adoption of Internet technology. Unlike the three (out of the four) forms conceptually proposed by Provan and Kenis (2008), this paper attempts to identify interesting structural, governmental and motivational differences and similarities, based on real examples.

Self-governed network (SGN): The networked business incubator case

The SGN organization considered here consists of a number of micro organizations. It functions as a collective entity with no formal authority, governance structure and/or administrative unit, but takes care of all the responsibilities of the network members. This network organization relies strongly on the commitment and involvement of members and the degree to which they comply with collectively held norms and values. The specific context considered here is what has been labeled the networked business incubator (Bøllingtoft & Ulhøi, 2005). Business incubator (BI) theory argues that incubator environments primarily offer financial, human and social capital, in the form of managerial and legal know-how, to the start-up (Mian, 1997). Up to now, the predominant approach to business incubation has been based on a top-down approach, in which BIs offer their services to interested parties in full competition with other BIs.

The networked business incubator discussed here emerged at the beginning of 1999, when two recently established small firms joined forces and rented the first floor of an empty office building. This not only resulted in economies of scale and improved opportunities for teaming up to win large contracts, but also created a professional community of peers. Soon, the two firms realized that there were a lot of advantages in sharing the same building, ranging from increased collaboration, a shared lunch arrangement and Internet access, to access to each others' networks. This network organization comprises micro and small firms from the ICT and multimedia sectors.

New members in this SGN organization are required to share the same values and attitudes to collaboration and sharing. More specifically, it was agreed from the very beginning that: (i) all members of the network should share knowledge and opportunities; (ii) members should be seen as colleagues rather than competitors; (iii) members should be willing to spend time together socially; (iv) joint development should be given priority; (v) both experienced and new firms would be invited. The type of relationships involved here are what in a Granovetterian vocabulary is called multiplex or multi-stranded, since they typically involve social as well as economic relationships. The key facts about this first example of an archetypal network organization are shown in Box 1.

Box 1: Facts about the networked business incubator case (self-governed network)

- The network was established in 1999.
- Data was collected from a single longitudinal 6-month field study inside the network organization, followed by a 3-month stay with in-depth interviews.
- During the first few years, the self-organised network consisted of 12-16 firms, stabilising later at around 40 firms.
- The typical firm in the network has between three and ten employees.
- The network is not supported by public or private funds. It is owned by a private limited company, which in turn is owned by the firms in the incubator.
- A volunteer-based group takes care of joint activities, such as updating web pages, marketing the joint brand, arranging social gatherings, etc.
- Decisions affecting the network as a whole are made at meetings with representatives from all member firms.
- The aim of the network is further collaboration between members.

To be included in this SNG organization, new members must not only be in the same overall sector (ICT-related branches), but also comply with a set of shared norms and values, some of which are explicitly mentioned on the network's website, while others are communicated during the selection process, which takes place at a joint monthly meeting of network members.

This networked incubator is not supported by public or private funds. All participating members of the business incubator share a joint physical location. The firms borrow from and exchange competencies and favors with each other, and collaborate in a kind of symbiotic and trust-based relationship based on the complementarity of intangible resources available in the incubator. Participating in the incubator means: being part of a professional community of peers (socially and professionally); utilizing a common well-established brand; the prospect of economies of scale (joining forces when attracting larger external contracts); flexibility (in relation to market demands); collaboration based on synergy and symbiosis (based on their mutually complementary skills and competencies)

This SGN example is based on a bottom-up approach with a high degree of distributed authority and control and a low degree of bureaucratization. Secondly, it is rooted in a set of what Beckert (1999) has termed institutionalized practices, in this case translated into certain norms and values about social connectivity and collaboration. Thirdly, it allows firms to stay in the incubator as long as both parties

benefit. This business incubator has never been subjected to government intervention or received a government subsidy. With regard to authority and governance, the incubator has adopted a fairly simple and flat structure, with regular plenary meetings where all major decisions regarding the incubator are taken, and where incubator activities and those of ad hoc groups are coordinated. Coordination of commercial activities, including the emergence of new opportunities, is carried out on an ad hoc basis via the intranet and/or daily contact during lunch time, coffee and/or smoking breaks, etc. The choice of this particular form of network has been laid down in the founding principles from the very beginning, in the hope that this would provide the necessary incentives to comply with the relatively high degree of collectiveness.

Generalized forms of exchange take place on an ad hoc and sequential basis. This implies that if one or two firms in the incubator are invited into a new venture by a third firm, then the invited firms will be expected to return the favor in the future. The collective value of production benefits each participating member in various ways, ranging from a joint pool of collectively held resources to both internally and externally perceived legitimacy, here defined as the perceived status and credibility of the network and network activities (Human & Provan, 2000). The development of the SNG macro culture is supported by a structural embeddedness, based on a widely shared system of assumptions and values (Abrahamson & Fombrun, 1994) that translate into belongingness and collaboration.

Lead organization network [LON]: The industrial symbiosis case

Industrial symbiosis (IS) was first introduced in the late 1980s by researchers who argued for the necessity of increasing the recycling, reuse and substitution of materials (Frosch & Gallopoulos, 1989), and who conceptualized the industrial system as an industrial ecosystem. The industrial ecosystem concept is based on an analogy with natural ecosystems, which are interacting and interdependent systems of organisms of varying degrees of complexity that live off each other, either consuming each other or each other's waste (Frosch, 1992). Thus, the system evolves in such a way that any available surplus of and/or waste production of material or energy will be used by at least one of the participating organisms in the system. Such ecosystems are typically symbiotic.

In biology, the term is used to describe the close association of two or more dissimilar organisms, or so-called symbionts. By and large, such systems are both self-contained and self-sustained. The smaller and simpler symbiotic systems are, the more fragile they become. Hence, symbiosis will cease if one of the symbionts withdraws. Conversely, the larger and more complex symbiotic systems are, the less likely they are to break down if one element is suddenly destroyed.

Industrial symbiosis refers to the organizational principle of symbiotic mutualism (e.g. all symbionts benefit from the association) or commensalism (e.g. only one or more will benefit, but nobody is harmed). The concept of industrial metabolism refers to the total pattern of input and output processes in man-made industrial systems. Industrial symbiosis can be approached in one of the following ways: (i) a material-specific approach, i.e. selecting a particular material or group of materials and analyzing the ways in which they flow through the industrial ecosystem; or (ii) a

product-specific approach, i.e. selecting a particular product and analyzing the ways in which its different component material flows can be modified or redirected in order to optimize product-environment interaction (Jelinski et al., 1992). What is important is that, with industrial symbiosis, the focus is on optimizing the total material cycle from virgin material, through finished material, component, product and waste product, to ultimate disposal. Factors to be optimized include (physical) resources, e.g. energy, and capital (Graedel & Allenby, 1995; Graedel et al., 1993).

In the LON example considered here, the lead organization is a major power plant, a refinery, a pharmaceutical company and a plasterboard manufacturer, without which this network would probably not have been started. Since such a network is dependent on a certain degree of waste production, a typical initiating agent would be a lead organization like a power plant with a considerable waste production problem. An industrial symbiosis is thus a system where industry reuses products and/or recycles waste materials during manufacturing, thereby maximizing the exploitation of resources and minimizing the generation of waste.

The example discussed here is the Kalundborg symbiosis (Jacobsen, 2006), which can best be described as a co-located cluster of firms that converts redundant output from some firms, e.g. waste, water and energy, into useful input materials for other firms, and which was initiated by four major firms that were located next to one another (lead agents). The lead agents were: a power plant, an oil refinery, a pharmaceutical company and a plasterboard manufacturer. During the last couple of decades, various symbiotic relationships have developed between the firms, first and foremost between the lead agents, and more have joined since then. Today, the symbiotic network of firms involves about 20 different projects (Jacobsen, 2006), including firms (and projects) of varying size. The key facts about this second example of an archetypal network organization are shown in box 2 below.

Box 2: Facts about the industrial symbiosis case (lead-organization network)

- The network was created artificially as a top-down initiative sponsored and managed by a network broker appointed by the government.
- Data was collected from a longitudinal 3-year multiple-case study of 4 LONs.
- All firms came from the same industry (furniture industry) and were SMEs (< 50 employees).
- Each LON included between three - five SMEs.
- The typical firm in the network has between three and ten employees.
- The network is supported by public funding (a Network Programme).
- Although not physically located next to one another, the members of the LONs were relatively close to each other.
- Decisions affecting the entire NAO are made by the network broker.
- The aim of the network is to boost innovation and growth through increased collaboration.
- Trust is not only a key antecedent of collaboration, but also an important mechanism that links the formation, maintenance and transformation of inter-firm relationships within the network.

According to key players in this LON case, the following criteria must be met for the symbiotic relationship to succeed: participating firms must fit one another (in terms of input-output requirements), so diversity is a key feature; physical proximity; and, last but not least, trust and openness. In this example of symbiotic mutualism, unavoidable waste products become useful inputs for a participating network partner. This in turn reduces the total consumption of energy and resources of the network, which, apart from having company-specific economic advantages, also results in environmental advantages at societal level.

The four main firms (the lead agents) in this symbiosis later established a joint centralized coordinating entity (a centre for industrial symbiosis), which was entirely run and paid for by the firms. Apart from improving the basis for coordination, the aim was to show the external world that this is a local network of dissimilar firms utilizing waste produced in the network as a raw material (Jacobsen, 2005). Contractual arrangements adopted during large-scale processes of material exchange ensured that the agreed amount of material recycled was delivered, and a joint logo was used to market the network to external parties. Furthermore, the firms developed a common vision to further promote symbiotic relationships within the network. Along with these rather formalized sets of interactions governed by traditional contractual arrangements, a set of parallel, informal organizational relationships emerged as a result both of the membership of local business associations and/or clubs and of the opportunities and experiences and informal relationships. This allowed for supplementing the processes of restricted exchanges – so-called tit-for-tat exchanges (Ekeh 1974, in: Yamagishi & Cook, 1993).

Over the years, a growing environmental awareness in society at large, together with an excess of waste energy (gas) and a shortage of groundwater for industrial purposes, have turned into critical drivers of different symbioses. On the other hand, increased formal and informal interaction in conjunction with the collectively-owned centre paved the way for growing insight into the industrial processes of the participating firms. This points to the creation of an increasing joint pool of knowledge, which in turn improved the conditions for future specific material symbioses.

Although the original incentive for its development was purely economic (Edgington, 1995), there is reason to believe that motives other than purely techno-economic also underlie this LON. Such motives have been referred to as the human side of industrial symbiosis (Cohen-Rosenthal, 2000). Recent investigations in the Kalundborg symbiosis have thus documented the existence of social processes of awareness and repeated interorganizational interaction, suggesting that interpersonal trust has emerged as a result of formal and informal interactions (Jacobsen, 2005).

Network administrative organization [NAO]: The network program

A third generic form of network organization identified and discussed in this study is the network administrative organization (Neergaard & Ulhøi, 2006), with a separate administrative entity to manage the network and coordinate its activities.

In 1989, in an attempt to increase competitiveness, the Danish government launched what became known as The Network Program, based on the Italian industrial district

model. The aim of this program was to stimulate greater interorganizational collaboration by superimposing strategic business networks onto existing SMEs with little or no prior history of collaboration (ibid.). For the participants, interorganizational collaboration was expected to generate an increase in joint initiatives, resulting in increased economies of scale, innovation and entrepreneurial behavior. The key facts about this third example of an archetypal network organization are shown in Box 3 below.

Box 3: Facts about the government-funded network programme case (network administrative organization)

- The network was established in the late 1960s and early 1970s.
- It was started by 4 co-located large enterprises from different industries (lead agents).
- All members are physically located next to one another.
- A variety of symbiotic exchanges have taken place over the years, only some of which involved formal contracts.
- About 20 different symbiotic relationships exist today, including various firms and projects.
- A centralised coordinating unit (Centre for Industrial Symbiosis) has been established by the lead agents.
- The overall activities and strategies of the cluster of symbiotic relations are coordinated at meetings with representatives from all member firms.
- The aim of the network is to 'copy nature' by using and developing interfirm symbiotic relationships while at the same time creating a brand of environmentally responsible firms.

To achieve the objective and facilitate the monitoring of subsidies, a number of network brokers were appointed. Their task was to build local networks, based on the industrial district rationale, i.e. that local agglomerations of small firms would be able to create some of the economies of scale enjoyed by large firms by pooling their resources and thus increasing their competitive advantage. By brokerage is meant a mechanism through which an actor (the broker) facilitates transactions between other actors lacking access to, or trust in, one another (Marsden 1982, in: Obstfeld, 2005). Brokers, or network administrators, have been found to be quite common in networks of small firms (Liston, in: Human & Provan, 2000). The network consists of firms from the furniture industry, which were analyzed in the pre-program, program and post-program stage.

In this NAO, geographical proximity proved to have less influence on building a trustful relationship than is generally assumed by industrial district theory. However, closeness in terms of similar levels of trust and commitment tended to be much more important, possibly because the government-appointed brokers selected partners on the basis of nothing more than their ability to produce compatible products.

Firms participating in NAOs tended to sacrifice both the right to make crucial decisions and flexibility of action. Such sacrifices seem to be appropriate when all participants in a network are committed, and when participation translates into useful and recognized reciprocity effects. However, if the outcome is any reflection on the lack of commitment and reciprocity, it serves to illustrate the importance of their cultivation for building trustworthiness. This example points to the fact that it may not

be business exchanges as such that further trust, but the development of personal relationships beyond such transactions. However, reciprocity does not necessarily have to be simultaneous - it can also be sequential.

Virtual community networks [VCN]: Collaborative commons enterprising

The theory of learning in communities-of-practice (Brown & Duguid, 1991) has pointed to the importance of professional communities in relation to learning. Open-Source Software (OSS) projects can be characterised as communities of users where information, assistance and innovation are freely shared (Bonaccorsi & Rossi, 2003). Community and network are common metaphors for OSS, and appear frequently in the literature on online computer-based technology.

Open-source innovation offers a different way of organizing software development. Since OSS projects are based on online communication, collaboration and coordination, they can be characterized as virtual organizations or communities. Virtual communities are defined by Rheingold (1993, in: Hemetsberger, 2001) as social aggregative manifestations that emerge when enough individuals engage in public discussions long enough, with sufficient human feeling, to form virtual alternatives to personal relationships.

VCNs, a fairly recent phenomenon among software producers, consist of a community of organizations or organizational actors involved in common activities and subject to similar reputational and regulatory pressures (Powell et al., 2005). Open-source development, which has emerged in different settings across time and space, challenges several of the existing micro foundations of innovation theory (Ulhøi, 2004). The example considered here is taken from the field of software development. The key facts about this network mode of organizing are shown in box 4 below.

Open-source communities are non-profit professional communities consisting of highly specialized programmers who are also users voluntarily participating in the development work. The products are accessible and available for everyone to use. The best-known example of open-source innovation is open-source software, e.g. Linux, Apache, Debian, etc., which has been thoroughly analysed and described elsewhere (e.g. Franke & Von Hippel, 2003; Hars & Ou, 2002; Hertel, Niedner, & Herrmann, 2003).

The underlying rationale of open-innovation activities is to build collaborative organizations in order to create value for the collective as well as the individual contributor. Open-innovation activities are found in a rich, knowledge-intensive environment, where actors, artefacts, tools, practices, resources, meanings, etc., interact in a loosely integrated structure (Lanzara & Morner, 2003). Open-source projects thus use the principles of parallel and distributed development during the process of knowledge creation, which means that the speed and diversity of resources become critical factors of development and innovation.

This interaction redefines the boundaries between organizations, and between organizations and users. However, the concept of open-source innovation is not only about bringing customers into the innovation process; it is also about sharing critical knowledge components both intra- and inter-organizationally, and between

individuals. A key feature of open-source innovation is thus the flow of resources between the involved parties.

The idea behind open-source software is that programmers can swap files and ideas based on the principles of generalized exchange and adapt and modify the source code (i.e. work freely on it). This facilitates faster development and improvement of the software than in the traditional, closed model of innovation. Having access to the source code allows users to adapt and customize software to their own needs, fix their own bugs, write their own code, as well as greatly reduce potential supplier lock-in (Weber, 2004). The boundaries of open-source software projects are open, with users/contributors being granted access to the source code in return for keeping the modified code open. Open-source software projects are formal entities, which users/contributors join voluntarily and contribute to as well as utilize the developed software according to their own needs. Thus, cooperation with users as external sources of knowledge takes place at intraorganizational level, in the sense that they enter the network (project) independently. The larger an open-source software project (and the longer it has existed), the more well-defined the project infrastructure and organizational structure. The websites of such projects include explicit information on the motivation and philosophy behind the projects, as well as about the administrative/project structure. Smaller and/or newer projects do not usually have such information available and/or written down. The larger projects also appear to be more organized and structured (e.g. roles, division of work, and activities).

Discussion

The four cases discussed above provide the basis for a new and more nuanced conceptualization of network approaches to organizing in general, and for understanding why network organizations exist in particular. The network modes of organizing discussed here are the result of collective value creation that can be characterized by: (i) mutual commitment and trust; (ii) multidimensional and relatively long-term relationships; (iii) normative rather than contractual regulation of behavior. Furthermore, each of the generic forms identified is perceived as 'an organization' by all the actors involved. In the literature, such arrangements have certain similarities to the concept of the quasi firm, i.e. a loosely coupled and enduring set of interorganizational relationships of significant importance to the participating members (Luke et al., 1989). However, contrary to the quasi firm, network organizations do not, to the same extent, share a predisposition to intertwine their destinies (pp. 13).

While most existing research in the field of interorganizational relations and networks (Jarillo, 1988; Sydow & Windeler, 2001) has focused on vertical relationships and networks (Ford et al., 1998; Huggins, 2000), some research has addressed horizontal cases of relationships, which also includes competitors (Bengtsson & Kock, 1999). The implicit assumption behind this research tends to regard economic activities which do not fit either the market or hierarchy model of organization as a third and distinct form of organization – the network organization. This paper takes a more nuanced view, however. As is shown, the phenomenon of network organization is too broad or meaningless to encapsulate the variety and richness of network approaches applied to organizing economic activities. Network organizations are

driven by different motives, ranging from the desire to create and utilize advantages of scale among newly established micro forms (as in the self-governed network case), through addressing environmental constraint in the form of waste production and use (as in the lead organization case), to increasing innovation in an industrial sector characterized by stagnation and lack of innovation (as in the network administrative organization case) and/or address market imperfection by developing an alternative and significantly less costly do-it-yourself-by-collaborating-with-other-open-source-software developers (as in the virtual community network case). As summarized in table 1 below, each generic network organization differs in varying degree across most of the considered properties.

Table 1: Summary of cross-example network properties

Network Property Network Types	Authority	Coordination	Composition	Spatiality	Temporality	Outcome
Self-governed network (SGN)	Decisions are made collectively	Coordinated ad hoc via intranet, joint meetings and smaller groups	Relatively homogeneous (ICT-related sectors)	All participants are physically co-located 'under the same roof'	The organization has existed for about seven years	Economies of scale; liability of newness
Lead-organization(s) network (LON)	Founding and major decisions made by the lead organizations	Minor ad hoc symbiotic exchanges; centralized coordination; contracts used in major exchanges.	Very inhomogeneous and diverse mixture of participants; large firms and SMEs from very different sectors	All firms were already located on-site prior to the formation of the network organization	Has been in existence for decades (since the 1970s)	Resource efficiency; resource security; positive environmental image/profile
Network administrative organization (NAO)	Key decisions are made by government-elected network brokers	Activities coordinated by the network administration; trust often substituted by contracts	Relatively homogeneous; all participating firms from the same sector	All firms were physically dislocated, albeit from the same part of the country	The network organization lasted for the duration of the network programme)	Innovation and opportunity exploitation
Virtual community network (software) (VCN)	Major decisions in major projects are centrally made (board of directors)	Centralized coordination of strategic issues	Very homogeneous group of highly skilled software programmers	Participants normally do not know one another or meet physically	Varies from project to project	Handle market imperfection; learning

It often is assumed that network modes of organizing involve little or no hierarchical authority and/or coordination. As can be seen from table 1, however, such assumptions can be challenged. Network modes of organizing may indeed involve hierarchical authority and coordination. Authority and coordination range from being decentralized to being rather centralized processes of decision-making. And as regards network composition, network age and the physical distribution of the different network forms differ quite a lot. Recent research on alliance formation, for example, shows that history matters when individual actors make alliance decisions (Gulati, 1999), i.e. the ease and extent of exchange processes are strongly influenced by previous experience and related level of mutual trust (e.g. especially in the cases of network administrative organizations and lead organization networks).

As also documented in other studies, social trust is recognized as a property which not only offers distinct governance benefits (Uzzi, 1999), but which to a great extent also substitutes (e.g. in the case of self-governed networks, network administrative networks and virtual collaborative networks) and/or supplements formal contracting (e.g. in the case of LON). Firms increase their collaborative capability not only by entering dyadic relationships, but also by developing routines for synergetic partnering. This is a common trait found in all four generic types of network organizations.

According to Uzzi (1997), networks involve multiplex links between actors. In turn, such arrangements increase the likelihood of creating integrative arrangements that pool resources and encourage mutually beneficial solutions. On a micro-behavioral level, actors seem to pursue heuristic and qualitative decisions rather than calculative ones, and to engage in the long-term cultivation of ties rather than a short-term pursuit of self-interest (Uzzi, 1997). This was common to all of the various types of network organizations identified in this study.

Conclusions

The rationale of this framework goes beyond the positivistic cause-and-effect approach to organization-environment relationships. Rather, organization-environment relationships are seen as outcomes of social relationships and interdependencies (Morgan & Smircich, 1980).

Two important conclusions can be drawn. Firstly, it is not sufficient to refer to a single network form of organizing. Rather, the network approach to organizing varies significantly in terms of incentives, interdependency, the nature of exchange processes taking place, and the choices of governance approach used to coordinate the exchange activities. Secondly, network modes of organizing are interesting from the point of view of outcome, since they can often lead to collective outcomes rather than exclusively individual outcomes.

Contrary to much research on social networks in business, which tends to view networks as a universal form of organizing, this paper accepts that there can be a variety and richness of network approaches to organizing business activities. The paper also argues that networks can be perceived as organizations by the interactants involved. It has offered new insights into some of the key processes and mechanisms underlying the creation and governance of network organizations and related processes of social exchange and collective-value production.

Limitations

The network organizations discussed in this study are all rather small, ranging from a few firms up to several dozen. Although this seems to suggest that there is a negative correlation between network size and members' benefits, this important issue is not really addressed here. Future studies should therefore examine whether there is an optimal or upper limit for network organizations.

An understanding of the mechanisms of network organizations and related types of exchange has some methodological implications. Relying solely on one approach to

studying network organizations would make it difficult to capture the multiplicity of the phenomena at work. The empirical approaches used during the four field studies include in-depth semi-structured interviews, observation studies and archival studies over a period of 6-18 months per network organization. The four examples are all based on field material collected in a Scandinavian context, which is known to be rather egalitarian and team-oriented. Future research involving different cultural settings would therefore allow for testing the relative robustness of this framework. However, such studies will require a dynamic model of culture which includes both macro and cultural stability and instability dimensions along the lines suggested by Gattiker and Ulhøi (2000).

Future studies should also focus more on the role of power. As could be seen from at least one of the cases considered here (the lead organization network case), some network actors have more power and/or may be more dependent on either getting 'rid of' or receiving a certain amount of 'intake' to function optimally. This was also the case where traditional formal contracting was used quite extensively. More interestingly, power related to asset specificity may be so important in a network organization that it might either become a barrier to entry (as in the virtual collaborative network case) or create a kind of dependency for other network members.

Trust appears to be an instrumental and widely disseminated mechanism underpinning the collective processes of value production throughout the different network organizations, not only as a key antecedent of collaboration, but also linking the formation, maintenance and governance of social interaction and exchange. However, trust is difficult to measure in any precise way. For trust to become institutionalized, it must be transferred from the interpersonal to the interorganizational level. Further longitudinal data could clarify this issue.

Implications for Management Practice

Business actors in general could benefit from a greater awareness of the role and importance of social networks, including how they can improve their rather limited insight into the actual constituents of their networks.

Networks are crucial to managers. Thus, the ability to connect to strategically important clusters of networks is a critical managerial skill. Managers must recognize that the relationships between the different actors in a network are multiplex and dynamic. In networked organizations, members will have to realize and accept that the line of demarcation between 'private' and 'business' can become increasingly blurred. From a managerial point of view, this also calls for other skills than traditional administrative and managerial skills, e.g. social skills.

Entrepreneurial SME managers in particular may benefit from being more aware of the role and importance of social networks during the process of establishing and/or expanding their venture, including how they can develop their rather limited insight into the actual constituents of their networks. The capability to choose the right network mode of organizing to fit their objectives, situation and context is thus expected to be of increasing importance for SMEs struggling with a lack of resources.

Acknowledgement

The author greatly appreciates the contributions from I. B. Nehm, A. Bøllingtoft, H. Neergaard and S. Vujovic to the empirical part of this longitudinal process study. The author would also like to thank the reviewers and the editor. Their suggestions are gratefully acknowledged, and, of course, they are in no way responsible for any shortcomings of the paper.

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