Making Knowledge Work: Intra-firm Networks, Gifts, and Innovation*

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Abstract: Exchanging knowledge between individuals working in a firm, between but even within divisions, does not occur automatically (Szulanski 1996). It is not obvious that people exchange ideas, point each other to information that the other might use, or give feedback, even when they have no evil motives for not cooperating in such a manner. As a firm's competitive advantage is closely related to its innovative capacity, however, largely based on how it uses knowledge that is already available, the question then is: How does knowledge flow within a firm? What can be done to stimulate or re-direct knowledge flow within a firm?

In recent years, increasing attention is given, by scholars in social sciences in general and in management in particular, to the networks of relations between individuals within firms involved in knowledge transfer and development. Consultancies too are scrambling to set up units that can analyze these networks for firms. In addition to the structural issue of who relates how to whom, I will argue that there is a need to look at why relations are established and maintained. This article thus discusses insights from both the literature on social networks and the anthropological literature on gift and favor exchange. As such, the how and the why of knowledge transfer

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1. Knowledge flows

Different, possibly partly overlapping networks can be distinguished, most important of which are the formal and the informal ones. Informal contacts are believed to stimulate knowledge flow in particular (Cross et al. 2002, Stevenson and Gilly 1991). Figure 1 presents the informal network of people (the dots or 'nodes') working in a daughter company of a large European multinational firm in the field of electronics and electrical engineering. (This figure is from Aalbers et al. (2006); also consult this source for a discussion of data collection and analysis that is entailed in this kind of approach.) A similar picture could be shown for the formal network. This company, in reformulating its corporate strategy, emphasizes cooperation between the different divisions to stimulate innovation. Dots are individuals, and colors of the dots indicate the divisions in which the persons are based; the circles do so as well. Figure 1 is typical in the sense that only a few individuals bear the brunt of the entire communication flow both within but especially between units.

A visual inspection of the network figures is illuminating, but network data can be statistically analyzed as well. Even before doing statistical analysis, it is obvious that there is a surprisingly small number of individuals who are involved in knowledge ex-

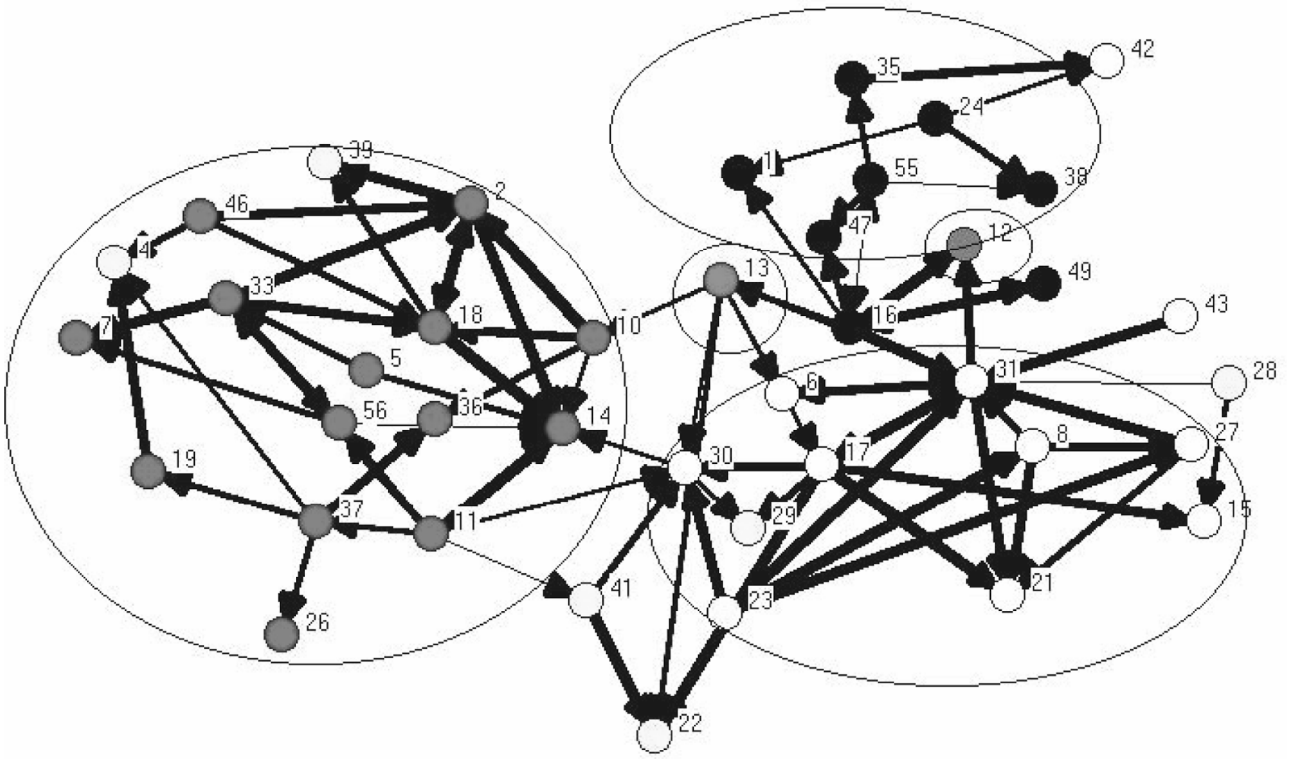

Figure 1. *Informal network (Aalbers et al. 2006)*

change across division boundaries. Only a few people thus are the linking pins or structural holes between divisions (Burt 1992). Visualizing this has caused something of a shock when senior management at this company saw this picture. For better or for worse, they are in a position to influence the flow of communication to a large degree. In addition, Burt (2004) has claimed that such individuals can come up with new ideas themselves, combining ideas from two or more separated fields.

In addition to such an immediate, in-your-face finding, statistical analyses can bring out other insights and address further questions. Such analyses can be done at the level of the network or at the level of individuals. One example of the former approach may be: Is the knowledge transferred within the company primarily exchanged through formal ways, or through informal routes? We have found (Aalbers et al. 2006) that both these networks contribute, but that the formal network might even contribute more than the informal one. The formal contacts within an organization that go beyond the organizational chart do affect knowledge flow and thus a firm's innovative capacity. An example of the latter approach, focusing on individuals within the network, could be: does the centrality of an individual matter for knowledge exchange? Are individuals who have many connections, or who connect otherwise disconnected cliques able to tap into separated but complementary sources of knowledge, or are they only distracted by too frequent interactions and meetings? Substantial work developing specialized new knowledge may be hampered by the number of relations maintained or because of the translations that have to be made between fields? People centrally located in the formal structures of an organization, we have found, seem to be better positioned to transfer knowledge between units, while people centrally located in informal interactions are better placed to transfer knowledge within units (Aalbers et al. 2006). Given that where knowledge from diverse sources of knowledge comes together new knowledge is more likely to be developed (Burt 2004), formal networks set up by management are relevent for innovation. This goes against some of the intuition in the field of organisation studies and knowledge management today (Granovetter 1973, Hansen 1999, Reagans and McEvily 2003).

Increasingly there is thus recognition that certain features of a network might suit some purposes, while other goals are best attained if the network has different characteristics (Reagans and McEvily 2003; Schulz 2003; Stevenson and Gilly 1991; Kilduff and Brass 2001). For instance, if someone working in a

firm is in need of much and diverse information, a few close relations will not do. Employees in such a company will need many weaker ties (Granovetter 1973). One can only maintain a limited number of strong ties. If a firm is dependent on employees working on a (technologically) complex issue, at the frontier of a scientific field, there is likely to be much tacit (taken-for-granted, unarticulated) knowledge involved. Strong ties where people have learned to understand each other without much ado are required (Hansen 1999).

Especially in recent years, then, social network analysis has offered a wide range of important insight into the workings of organisations, not in the least about how people in organisations cooperate, transfer knowledge and thus how organisations innovate.

2. Action problem

Will the knowledge that is exchanged through the network actually be used? Will the knowledge exchanged set in motion a sustained interaction between people, possibly involving more people over time that would benefit from the exchange, or who might contribute to it? Network analysis has looked primarily at the structure of exchange. Recently the ability to exchange is discussed at length as well (Hansen 1999), for instance in terms of tie strength. However, the willingness to or motives for exchange are ignored: network analysis is confronted with an action problem (Obstfeld 2005). When will people draw in (rather than exclude) others? The structure of the network does not compel action, while innovation requires that dispersed individuals and knowledge is actively brought together.

One is inclined to relate this to the way in which people are motivated: intrinsically or extrinsically. Even though we know that the two types of motives are possibly contradictory, and playing into one of them might offend or put off those who are motivated by the other (Le Grand 2003), in many cases people have more than one motive to act in a certain way. Certainly in the case referred to above no relation between knowledge transfer on the one hand, and the motives of people involved could be established. This leaves us with a nagging feeling: What does resolve the action problem? When will knowledge flow within a firm, be put to work?

3. Gift Exchange

When cooperating in an innovation project, the outcome is uncertain, the relation between one's input and the innovative output is highly obscure, and thus the incentive to shirk is strong. No (labor) contract will be able to cover every possible contingency. Certainly when people are called upon to be creative, the usual command and control measures within a firm have limited use (Hodgson 2005).

In a recent paper (Dolfsma and van der Eijk 2008) we draw on the anthropological literature on gift exchange to tackle the action problem. We argue with Marcel Mauss in his essay *The Gift* (1954) that there is a strong obligation for people to give, accept, and reciprocate. Those unwilling or unable to do so will not be allowed to become a member of a community or will be ex-communicated. Objects of material value may be given, but so may compliments, hints and tips, pieces of information, feedback on another person's plans even if they are still in an early stage of development. People will not give, or will not give something of value to someone who is not part of their group. A group may but need not equate to a division; there can obviously be social boundaries within a division. Giving an improper (sexist) gift can for instance create a schism between groups (men and women).

Ferrary (2003) reports on Silicon Valley venture capitalists and the gifts they exchange among each other. They are in a situation of great uncertainty—information about the options they face, the likely outcomes of these and their chances of occurrence is absent. These players will have to rely on the soft information they receive from people in their network. The information given can be crucial, but its value can only be established with hindsight.

Giving information about the students that they have supervised to a venture capitalist that is about to invest in the firm of these former students signals that the Stanford professor values the relation with the VC as well as with the former students. He may expect something in return too, at a later date. Accepting a gift—in this case information about the former students when deciding to invest in their venture-entails accepting the perspective of the giver—an improper first gift might alienate a romantic partner as much as it will the possible business partner in a deal among venture capitalists. A gift not given can alienate too. The core group of venture capitalists in Silicon Valley will not accept the offer of a newly established VC firm to participate in a deal

(Ferrary 2003). One might find this irrational as business is foregone, but one might also interpret it as a rational concern for their reputation that pays off in the long run (Dolfsma 2006). Where uncertainties abound yet where being perceived as a reliable partner is of profound importance, it pays not to do business with newly established undertakings that might not be sufficiently embedded so as to be able to obtain the necessary information (Podolny 1993).

However, if players view each other as belonging to the same group, one such company failing to involve another venture capitalist in a deal, for instance because it can handle the business itself and does not want to share the prospective profits, will alienate the other. The first firm will be kept out of the loop for future deals by the other firms, even if there is a cost involved in doing just that. Relations between firms may be rational, but they established and maintained by concrete individuals (Child and Faulkner 1998). Rational considerations thus play an important role, as well as personal relations. Rational calculation must however remain unspoken in gift exchange.

In gift exchange, it is essential that the return gift is not immediate. Having given in the past means that you have credit slips outstanding, but they cannot be called on at will. A gift may never be returned—if that is the case, the relation will surely suffer.

4. Gift Exchange and Knowledge Transfer Between Scientists

Reciprocal gift exchange establishes a transactional relationship between individuals (Sherry, 1983) and allows actors to forge and personalize relationships and to develop guarantees of personal bonding (Zucker 1986; Shapiro 1987). As these relationships develop and the exchange interactions progresses actors learn to cooperate with these particular others (Starpoli 1998; Gulati 1995) and establish a common frame of reference allowing actors to incorporate new (tacit) knowledge (Hansen 1999; Kogut and Zander 1992; Von Hippel 1994).

In every empirical piece of research on gift giving, in whatever context, the Matthew Effect is found to be true: to those who have shall be given. This may hold in particular when the individuals who exchange are involved in the uncertain business of knowledge development (cf. Merton 1968). Those in a powerful position thus receive more than others. They also give more than many others, if only because their networks tend to be more elaborate. What is an appropriate gift or what is the appropriate value of a gift then depends on the understanding of the position of giver, receiver and their mutual relationship.

In studies looking at what determines the success that some corporate scientists have and others lack some noteworthy findings emerge. Those who actively engage in the publication of papers, giving to the scientific community at large, are more successful than those who don't. This is, obviously, partly due to the fact that this is a means for them to be up-to-speed with the most recent developments in their fields, keeping their own and their organization's absorptive capacity high (Cohen and Levinthal, 1989). There is more to this, however. These scientists claim themselves that they also receive more from others, working elsewhere, formally and informally, in the form of access to scientists in other organizations and unpublished tacit knowledge (Furukawa and Goto 2006; Hicks 1995). Most of the knowledge at the frontier of advanced research may be tacit (Hicks 1995); such knowledge can be shared with researchers whom one has established a longer term relationship of trust and understanding with, a relationship of strong ties (Hansen 1999). This active behavior in publishing of some scientists in an organization boosts their effectiveness within their own organizations as well. The resulting flow of knowledge encourages innovation in which they themselves and their co-workers are involved, thereby benefiting the organization as whole (Furukawa and Goto, 2006). Corporate scientists, creating goodwill and establishing obligations 'by building a relationship of give and take with the scientific community' (Hicks 1995), can act as technological gatekeepers and serve as a bridge between external sources of knowledge and their co-workers.

The story of successful corporate scientists cooperating informally through gift exchange continues. Bouty (2000) has shown that they are involved in relations with scientists they know in other, sometimes competing, organizations helping each other out in ways that may counter explicit organizational regulations, and if taken advantage off could seriously hurt the organization. Still, for specific others, laboratory tests, feed back, hints and the like are exchanged. The gift element is clear: if a person is not known, no gifts are exchanged; if a person is not known well, gifts of low value such as commonly available knowledge is exchanged; if a person is known well and for a long time very valuable knowledge can get to be exchanged. In each of these cases,

of course, no guarantee of a counter-gift, of equal value, is available. Opportunism remains possible at all times, but would lead to excommunication and a loss of reputation. These relations between corporate scientists within and between firms is not an unknown observation (see Allen 1977; Kreiner and Schultz 1993; Von Hippel 1987; or the communities-of-practice literature Wenger and Snyder 2000; Wenger 2001; Brown and Duguid 1991, 2001), but tends not to be conceptualized in terms of gift exchange.

Even in markets where standard products are exchanged, however, gift giving is rife. One well-researched example is that of electronic parts (Darr 2003). Sellers representatives try to build a relationship with buyers not just because they like to personally, but also to stabilize sales and to further increase the volumes sold. Buyers hope to be kept up-to-date about developments better than they might otherwise (as it is not stipulated in any contract) and hope to be given special consideration in unforeseen circumstances. Sudden additional supplies may not be available (at attractive conditions) when buyers have had a tendency to buy 'on the street'.

Gift exchange is more risky, can backfire more easily, but at the same time, cannot be avoided and is a prerequisite for innovation in modern organizations.

5. Some implications for Management

While much of the academic work that is done studying networks is highly theoretical and at the same time using complex statistical tools in their analyses, there is an indispensable mundane element to it as well. Pictures such as those of Figure 1 never fail to amaze even those who have worked at the firm for which the picture is drawn for many years: "Does communication within my firm really depend on so few individuals? What happens when they leave? Do these few individuals have the company goals in mind all the time? Are the few linking pins sufficiently recognized, let alone rewarded?"

What should be a relief to managers is that formal networks within their organization does play an important role in knowledge exchange and will contribute to innovation. Setting up teams is one example of this. Network analysis also allows one to pinpoint the weaknesses in the communication structure of a firm: which individuals are important for the flow of knowledge? Are these recognized and rewarded sufficiently, or are they disgruntled? Are certain divisions cut-off from others? Is there enough redundancy in the networks so dependence on a single person is reduced? The communication profiles of people in the organization are not necessarily those one would expect given their position. Is the staff organization that should be stimulating innovation and exchange among divisions—represented by node number 13 in Figure 1—doing a proper job? Do some people under-communicate, can their communication be redirected in a way that is more beneficial to the company? Perhaps informal relations can be build on to develop formal relations.

The evolution of the networks over time can also be scrutinized: are more links emerging? Is there too much communication going on, particularly across division boundaries, after the early phases of an innovation project have been concluded and when there should be a focus on the development of the product (Ancona and Caldwell 1992)?

But will the knowledge exchange that one would expect given the networks that are there actually take place? Do employees of a firm contribute to knowledge transfer to the extent that might be expected of them, including division heads and members of staff departments? Will the 'action problem' be overcome in a firm? The exchanges in a firm relating to innovation and knowledge development are best understood as a gift exchange. Gifts of ideas, tips, feedback and the like are typically exchanged between people in an organization. These create bonds, trust and mutual obligations. However, putting too much explicit emphasis on the need to exchange, on the instrumental value of gift exchange, is counter-productive. What is 'too much' in one context or for one person can be acceptable in the next. Management, finding command and control instruments of decreasing use when it comes to persuading people to be creatively involved, must be sensitive to possibly diverging meanings attached by persons to contexts and signals.

From a perspective of gift exchange, the skewed nature of the knowledge exchanged in networks is not surprising and not necessarily problematic. That those in central positions are given much more than peripherals is to be expected. But a lack of reciprocity in knowledge exchange leaves the firm vulnerable too. Is a bias in the pattern of knowledge transfer introduced because some individuals are more involved than others? Are some people out of the loop even though they may have important knowledge to offer but they have not been allowed or able to enter a group? These are questions that managers may want to address, and can only answer in the context of their organization. People on both sides of the divide may not recognize what the peripherals have to offer. Stimulating infor-

mal contacts can help, but so can making sure that procedures for establishing the value of proposals are formalized so as to prevent peripherals from bringing new ideas and proposals to the table.

Formal measures and structures do seem to contribute a bit more to knowledge exchange than informal ones. Occasions can be created where people have to give and accept, where they would want to avoid such. Formal meetings might even be an occasion for informal relations between people to develop (Aalbers *et al*. 2006). Gift exchange does not stop when the department meeting formally starts: there is gift exchange in formal settings too (cf. Ferrary 2003). And gift exchange can continue after the meetings if the circumstances are conducive to it. Individuals who do not or cannot contribute to knowledge exchange, even in formal settings, may however hurt the firm. Was an initial meeting frustrated because gift exchange has gone bad?

Thinking this over in general terms is all good and well, but high theory is easily forgotten when you are stuck with you feet in the mud. Giving the problems a real feel can for instance be done by using a teaching case where a stylized though real-life description is given. Fortunately, there are such cases in increasing numbers. (R. Aalbers, W. Dolfsma (2004) Crossing internal borders: Inter-divisional communication networks at Siemens Netherlands, ECCH (RSM) teaching case 404-090-1.)

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