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# EXAMINING KNOWLEDGE EXCHANGE AND ORGANIZATIONAL OUTCOMES WITHIN INTRA-ORGANIZATIONAL ELECTRONIC NETWORKS OF PRACTICE WITH RESTRICTED ACCESS

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## Abstract

*Although there has been a significant increase in networked communication and a growing interest in technology-supported knowledge management, to date the basic assumption by researchers and practitioners alike has been that individuals value the open sharing of knowledge. However, there has been little research into what happens when organizations try to promote the open sharing of “secret” or proprietary knowledge. To address this gap, we develop a theoretical model and set of hypotheses that integrate social network theories with interdependence theory. This model suggests that the sharing of an individual’s proprietary knowledge in electronic networks is influenced not only by an individual’s self interest and simple reciprocity but also by the individual’s social and organizational context. More specifically, we suggest that proprietary knowledge exchange within an intra-organizational electronic network focused on discussions of work practice is dependent upon 1) the size of the electronic network 2) the structure of ties that emerge through individual interactions in the electronic network, 3) the relational quality of ties that develop between individuals in the electronic network, 4) the relational ties individuals have with the organization, and 5) the individual attributes extended to the electronic network. We then examine the relationship between knowledge exchange within an electronic network focused on practice and organizational outcomes. We conclude with a discussion of our model and suggestions for further research.*

*Keywords: Network of practice, electronic/virtual communities, social networks, knowledge management*

# 1 INTRODUCTION

With the rapid development of internet communication technologies, individuals may now communicate and participate in discussions easily with others in their organization regardless of time and space through emergent electronic networks focused on work-related issues. As a result, many multinational organizations are implementing intranet-based communication tools, such as groupware and listservs, to promote the sharing and creation of knowledge across internal organizational boundaries. Investments in these technologies are driven by the assumption that knowledge is the firm's most valuable resource and that new knowledge and competitive advantage are created through the integration of knowledge embedded in the minds of the organization's individuals. Management hopes that by creating virtual meeting spaces, numerous geographically dispersed individuals will be able to gain access to new information, share expertise, and discuss ideas with others who are often not available locally or through their immediate social networks of friends, contacts, and colleagues within the organization. Building upon the work of Brown and Duguid (2000), we refer to these computer-supported networks as "electronic networks of practice."

While management and designers of intra-organizational electronic networks of practice expect that the users of these systems will engage in the open sharing of knowledge, generating greater knowledge flows throughout the organization, what tends to happen is that the technology is adapted to the local situations by its various users and ends up being used differently than it was initially intended (Orlikowski 1992). Researchers have clearly demonstrated that in many cases knowledge is not like other commodities, people are not necessarily willing to share all types of knowledge (Constant et al. 1994), and organizational culture and not technology has a greater impact on whether people exchange knowledge (Orlikowski 1996). Employees may or may not be willing to share knowledge as widely as technology makes possible or as much as managers desire. Different appropriations of the technology by different groups of users within the organization create some interesting dynamics that reflect an underlying split "personality" of the firm. Some organizations may develop a culture of internal norms that discourage knowledge exchange because of the fear of industrial espionage or of diverting employees' attention away from their direct work tasks (Constant et al. 1994). More specifically, there is a tension within organizations between creating an open, information sharing culture that promotes knowledge flows and innovation and keeping its proprietary knowledge secret from competitors through restricted access and formal controls. Organizations that are successful because of their ability to exploit proprietary knowledge, such as research and development intensive firms, benefit from the innovations resulting from open knowledge flows but may actually have policies and procedures (both explicitly stated and implicitly assumed by workers) that discourage open sharing. Ironically, intranet technologies can be appropriated by users to develop open, electronic networks of practice, where anyone with an interest in the shared practice can participate, or users can appropriate the technologies to create private communities, creating knowledge silos by restricting access to participation.

The purpose of this research is to compare the dynamics of open versus closed electronic networks of practice to gain insights into which format better supports knowledge contribution and the performance of the network. To investigate these issues, we selected a large, multinational pharmaceutical (Pharmaco) that is dependent upon research and development for its success. Pharmaco recently implemented a new intranet for all employees to encourage the open exchange of knowledge and ideas among researchers. One intranet application is the ability to set up electronic discussion forums, what we refer to as electronic networks of practice. However, the default setting of the technology is to restrict access to the electronic network to a select group of individuals. This has resulted in two distinct forms of electronic networks of practice. Some individuals created electronic networks of practice open to anyone with an interest in the common practice within the organization, while others used the technology to create closed communities

with restricted access to a few select individuals, which in essence created and solidified knowledge silos within the organization.

While prior research has been developed to predict knowledge exchange in electronic networks of practice where access to the network is openly available to anyone with an interest in the shared practice (Wasko et al. 2004), we focus on developing and testing a model that examines what happens when network access is restricted. Building upon prior research that focuses on information sharing (Constant et al. 1994) and knowledge exchange in electronic networks of practice (Wasko et al. 2004), we develop a theoretical framework and series of hypotheses integrating social network and interdependence theories (Kelley & Thibaut 1978). By taking a social network perspective of knowledge exchange, we describe how various properties of networks are relevant for understanding knowledge exchange. Integrating interdependence theory accounts for the additional influence of the organizational relational ties that also promote knowledge exchange. We develop hypotheses to explain intra-organizational knowledge exchange in electronic networks of practice that vary in terms of their restricted access to the network. Such inquiry makes three important contributions. First, this research empirically examines the factors influencing knowledge exchange in intra-organizational electronic networks of practice and the trade-offs between open vs. closed electronic networks of practice. Second, this research clarifies how knowledge contribution in electronic networks of practice is related to performance outcomes that are relevant to the organization. Finally, this research makes possible more precise theoretical models of how intranet-based communication technologies can be designed and deployed to support knowledge sharing and creation through electronic networks of practice to enhance organizational performance.

This research-in-progress paper is organized as follows. First, we review relevant theory in order to develop a model and series of hypotheses. Second, we present the research setting where we intend to test our hypothesized model before ending the paper with a discussion of potential areas of future research and limitations.

## **2 THEORETICAL BACKGROUND**

In this section, we discuss knowledge exchange from a social network perspective. In general, social network theories suggest that the structure of ties in the network influences the relational strength of ties, which in turn influences the behavior of actors in the network. For example, prior research on the structure of ties indicates that when the structure of network ties is characterized by dense, reciprocal relationships, the relational strength of the ties is high, where actors feel a sense of direct obligation to one another as well as promote trust that help provided will be reciprocated (Coleman 1990). We build upon prior work that examines knowledge exchange in open, extra-organizational electronic networks of practice, such as Usenet newsgroups (Wasko et al. 2004). Based upon social network and collective action theories, Wasko et al. (2004) propose that knowledge exchange in electronic networks of practice is influenced by the structure of ties in the network, the relational strength of the ties, and the attributes of the individuals participating. The model that these authors develop cites boundary conditions where the networks are fully open, enabling access to anyone with an interest in the shared practice and where the electronic networks of practice where there is no corresponding physical organization or entity. We adapt their model by integrating interdependence theory to account for the potential influences of restricting access to the network, and the importance of individuals' prosocial organizational attitudes.

As noted by Wasko et al. (2004), in order to develop a theory of knowledge contribution in electronic networks of practice, it is essential to first discuss the different properties of social networks and how these properties influence knowledge exchange. These properties result from macrostructural circumstances that lead networks to display the microstructural properties they have (Granovetter 1985). In this sense, we do not begin our theory by taking the network structure as given. Rather, we first discuss the macrostructural properties of the network that influence the microstructural properties of electronic

networks of practice and their outcomes. The first macrostructural property underlying the emergence of electronic networks of practice is the type of control. This research focuses on electronic networks of practice where there are no formal controls dictating interactions, rather the network is emergent and based upon the voluntary participation of individuals. The second macrostructural property pertains to the primary media channel used for communication between network participants. We focus on electronic networks of practice where the primary communication channel of asynchronous computer-mediated communication through a corporate intranet. The third macrostructural property is the extent to which access to the network is restricted. In some electronic networks of practice, participation is open to anyone with an interest in the practice. We focus on electronic networks of practice in which members restrict access to the network, thus limiting the network to a few select individuals. Related to the access, is the fourth macrostructural property of network size. Electronic networks of practice can range from a few select individuals to very large, open electronic networks consisting of thousands of participants. As a network grows in its number of members, the dynamics change such that it becomes more difficult to sustain ties based on personal acquaintance and familiarity. Also related to access, we introduce a fifth macrostructural property, participants in the network share are all members of a single organization.

The macrostructural properties relevant for understanding knowledge exchange in electronic networks of practice in this paper then are those related to restricted access: size and organizational affiliation. Based upon these changes to the Wasko et al. (2004) theoretical model, we posit that restricting access influences the structure of ties that develops and the distribution of individuals allowed to participate and that strong relational ties to the organization directly influence knowledge exchange in the network. The specific hypotheses are developed in the following sections.

## **2.1 Restricted access and the structure of ties**

The model presented by Wasko, Faraj, and Teigland (2004) predicts that the more an electronic network of practice is characterized by openness, a large size, and unrestricted access, the structure of the network's ties takes on a pattern of generalized exchange. Generalized exchange occurs when one's giving is not reciprocated by the recipient but by a third party (Ekeh 1974). For example, individual A helps individual B, but when individual B asks for help, an unspecified individual C responds. In contrast to dyadic exchange characterized by direct reciprocity and accountability, generalized exchange is based on indirect reciprocation and interest-based contribution. The primary reason for this prediction is that the tie connecting seekers and responders is based more on a common interest in knowledge than on personal familiarity. Seekers cannot predict potential knowledge sources, nor can contributors know beforehand what knowledge is most likely to benefit certain seekers (Wasko et al. 2004).

In contrast, restricting access to the network is likely to result in personal familiarity between participants. These restricted networks may even be characterized by a group of individuals who know one another through face-to-face interactions. This leads to a situation in which the personal identity of the individual matters, ensuring that individuals cooperate and increasing the social pressures about directly reciprocating help received from others. Personal identification of network members also limits the ability to free-ride on the efforts of others by making the contributions of each individual visible to the network as a whole (Jones et al. 1997). This creates a situation where the tie connecting knowledge seekers with providers is not solely based upon the content of the knowledge but upon the expectations that certain individuals within the network are also obliged to try and reciprocate the help received in the past. In contrast to a network structure characterized by generalized reciprocity, we predict that the structure of ties characterizing electronic networks of practice that restrict network access will take on a pattern of direct reciprocity where individuals directly return the help received. This leads to the first hypothesis:

***Hypothesis 1.*** The more an electronic network of practice restricts access to the network, the greater the likelihood that the structure of ties will be characterized by direct, reciprocal exchanges.

## 2.2 Size and the availability of resources

One research stream within the social network perspective focuses on the nature of the resources available to the network by investigating the specific attributes of the individuals within the network (e.g., Borgatti and Cross 2003). In electronic networks of practice, the primary resource exchanged, knowledge, comes directly from the individuals participating. In order for knowledge to be exchanged in an electronic network of practice, individuals within the network must be motivated to participate and have access to the required resources. Prior research has found that people who have higher levels of professional expertise and organizational tenure are more likely to provide useful advice on computer networks (Constant, Sproull, and Kiesler 1996). Other resources might include time, access to technology, or position in the shared practice. One of the potential negative effects of restricting access to the network is limiting the amount of resources (i.e., individuals) available to the network. Restricting access may exclude an individual who has vital knowledge and expertise in the practice or may exclude an individual with a strong need to know the knowledge exchanged within the network to avoid reinventing the wheel. Restricting access may also result in lower levels of creativity, insulating individuals from the cross-pollination of ideas across disparate practices. Additionally, restricting access to the network may result in not having a large enough “critical mass” of individuals who are interested enough and resourceful enough to sustain the network.

A common means of analyzing the range of resources is to investigate the level of homophily in the network. Homophily relates to the degree of similarity between network members, e.g., gender, race, age, hierarchical level (Sparrowe, Liden, Wayne, and Kraimer 2001), and social network researchers have adopted the homophily principle in their attempt to explain advice network patterns (Monge and Contractor 2003). The argument is that individuals tend to select similar others with whom to communicate since “similarity is thought to ease communication, increase predictability of behavior, and foster trust and reciprocity” (Brass 1995: 51). While electronic network of practice technology enables members to interact with an unlimited number of diverse others across an organization, restricting access to the network may follow the homophily principle, where individuals are more alike, and more likely to help one another. Therefore, we predict the following:

***Hypothesis 2.*** The more an electronic network of practice restricts access to the network, the higher the degree of homophily in the network.

## 2.3 Tie structure and the relational strength of ties

The relational strength of ties in a network refers to the nature and the quality of relations between the network’s members (Nahapiet & Ghoshal 1998: 244). The structure of ties provides the foundation for the development of the relational strength of the ties since network structures determine the spread of information about network members and their interactions. Cooperation may be easier to sustain in networks where the ties are characterized by a high degree of goodwill, collective bonds, and expectations of pro-social behavior (Coleman 1990). Other attributes characterizing the relational strength of ties include trust and obligation (Nahapiet & Ghoshal 1998) and commitment (Mowday et al. 1979).

Prior research indicates that network structures characterized by dense, reciprocal ties are likely to create strong, relational ties between individuals (Jones et al. 1997). This is because when individuals in a network know one other, dyadic exchanges result in expectations of future reciprocity and direct returns between individuals. Thus, one potential advantage of a smaller network due to restricted access is the creation of strong relational ties connecting individuals within the network. These ties not only oblige individuals to directly reciprocate help, but they are also a collective good that benefits all network members based on personal acquaintance and expectations of future interactions (Nahapiet & Ghoshal 1998). Thus, we predict the following relationship:

**Hypothesis 3.** The more the structure of ties in an electronic network of practice is characterized by direct reciprocity, the higher the relational strength of the ties between the network's members.

#### **2.4 Interpersonal relational ties and knowledge exchange**

Knowledge exchange in electronic networks of practice can be characterized in several ways. First, there is the extent to which the exchanges are helpful, indicating that the individuals participating are concerned not just about the quantity of their contributions but also the quality of their contributions (Wasko & Faraj 2005). Knowledge exchange can also be characterized by the type of knowledge exchanged. Prior research distinguishes knowledge exchange in terms of being 1) an information product, e.g., written document, computer code, or 2) personal expertise or skill, e.g., knowing how to write a project plan (Constant et al. 1994). While individuals may be willing to help others in an electronic network of practice by providing information, the degree to which they share their own personal expertise and potential "trade secrets" as opposed to organizational information products with others may differ (Constant et al. 1994). A third dimension of knowledge exchange relates to the diversity of the knowledge topics exchanged. The diversity of the ideas expressed is likely to lead to a greater degree of non-redundant knowledge. Individuals who are able to access this knowledge may be able to combine and recombine their personal knowledge with these new ideas and innovations accessed from others, resulting in new and creative solutions (Cohen & Levinthal 1990).

When networks are characterized by a high degree of trust, obligation, and identification between individuals, individuals within the network are more likely to view their interests as aligned with those of the network's, thus leading to more positive interactions (Jones et al. 1997). Additionally, the identity of individual network members is more likely to matter, thus compelling members to engage with each other with at least some minimal level of courtesy and consideration (Williamson 1991). When there are strong relational ties binding individuals together, they are likely to be more concerned about the quality and helpfulness of their contributions since providing bad advice may erode an individual's reputation in the network (Jones et al. 1997). Networks displaying characteristics of a high degree of trust, obligation, and identification have been found to facilitate knowledge exchange among scientists (Bouty 2000) and improve the efficacy of inter-unit interactions in multinationals (Kostova & Roth 2003). Prior research in online settings indicates that trust in others' ability, benevolence, and integrity is related to a desire to both give and receive information (Ridings et al. 2002). Individuals with a strong sense of identification and attachment to electronic networks are more likely to participate and assist others (Wellman & Gulia 1997).

In restricted access electronic networks of practice where individuals have a high degree of trust, obligation, and identification directly with a select group of individuals, we would expect that individuals would be more likely to be concerned about the helpfulness of their responses as well as be more likely to share their personal expertise. Additionally, individuals may be more comfortable brainstorming new ideas amongst strong tie contacts, increasing the diversity of the ideas expressed. Extrapolating this idea to the network level, we posit the following:

**Hypothesis 4.** The greater the relational strength of the ties between members of the electronic network of practice; the more helpful the knowledge exchanges, the more likely that members will contribute their personal expertise to the network, and the more diversity in the knowledge exchanged.

#### **2.5 Organizational relational ties and knowledge exchange**

According to interdependence theory (Kelley & Thibaut 1978), individuals will forego acts of self-interest and honor expectations of direct reciprocity when they feel strong ties to a shared organization. These prosocial attitudes individuals have towards their organization should spillover and affect the dynamics of intra-organizational electronic networks of practice. Indeed, prior research on intra-organizational electronic networks of practice has found that these networks are conduits of useful advice, and one of the

primary motivations cited by members was a strong organizational affiliation (Constant et al. 1996). Therefore, this research extends the Wasko, Faraj, and Teigland (2004) model by integrating interdependence theory (Kelley & Thibaut 1978) and its role for encouraging knowledge exchange (Constant et al. 1994). Interdependence theory suggests that individuals behave differently when an exchange occurs between two individuals acting alone and between two individuals who are influenced by their social and organizational contexts. When individuals share the same organizational affiliation, they may be willing to engage in exchanges that are personally costly or unpleasant because they feel that sharing knowledge is a social good and beneficial to the organization. This leads people to weigh the social good more than the individual cost (Kelley & Thibaut 1978).

Individuals who feel a strong sense of citizenship towards the organization are more concerned about maintaining the well-being of the organization and all of its employees. This additional prosocial sentiment that individuals have towards their organization should further facilitate the exchange of knowledge in electronic networks of practice. Therefore, we predict that when members of an electronic network of practice have strong relational ties to the organization, they will be more concerned about engaging in high-quality exchanges that are helpful, be willing to share valuable personal expertise-based knowledge, and make a wider diversity of knowledge available to others. This leads to the following hypothesis:

**Hypothesis 5.** The stronger the organizational relational ties of an electronic network of practice's members; the more helpful the knowledge exchanges, the more likely that members will contribute their personal expertise to the network, and the more diversity in the knowledge exchanged.

## **2.6 Availability of resources and knowledge exchange**

In addition to the structure and relational strength of ties in the network, the distribution of individual motivations and resources available to network participants affects knowledge exchange. In most volunteer networks, individuals have differing levels of interest in helping others as well as differing motives for participating, which in turn affects their levels of contribution (Marwell & Oliver 1988). In addition, individual attitudes about information sharing also influence their propensity to share information (Jarvenpaa & Staples 2001). Prior research has consistently found that enhancing one's reputation within the network is an important source of motivation (Wasko & Faraj 2005). Active participation may also be motivated due to a desire to gain recognition (Gu & Jarvenpaa 2003) or to influence others in the network (Firth 2004). There is also evidence that individuals are motivated to participate in electronic networks of practice for personal gain. This is often achieved by receiving answers to a specific question, having questions answered quickly, and finding information that is valuable and more up to date than other sources (Wasko & Faraj 2000). Prior research also indicates that intrinsic sources of motivation are relevant. For instance, it has been found that individuals participate in electronic networks of practice due to motivations such as paying back to the community, enjoyment, and learning, (Constant et al. 1996, Wasko & Faraj 2000). In terms of resources, research findings suggest that individuals with higher levels of expertise and longer tenure in the practice were more likely to contribute valuable knowledge (Constant et al. 1996, Wasko & Faraj 2005).

The distribution of individual motivations, attitudes, and resources is predicted to directly influence knowledge exchange in the network. Electronic networks of practice that have a critical mass of highly motivated, resourceful individuals with strong attitudes towards the open sharing of knowledge are more likely to support helpful exchanges as well as the exchange of propriety, individual expertise. However, electronic networks of practice that restrict access may also restrict the knowledge resources available to the network. While a network comprised of individuals with similar characteristics may lead to a high degree of valuable knowledge sharing, previous research suggests that the knowledge and the resources shared between individuals with a high degree of similarity tend to be redundant (Granovetter 1983). However, if a network's members are characterized by a high degree of diversity, then the network has a

higher likelihood of being able to access more unique resources (Nahapiet & Ghoshal 1998), such as contacts, skills, information, and experiences. In addition to individual differences such as age, gender, nationality, and work experience, individuals may also differ in terms of their organizational characteristics. For example, individuals in different physical locations are more likely to have dissimilar kinds of information than those down the corridor, as evidenced by empirical research on propinquity (Allen 1977). Social network theory has also found evidence that individuals higher in the organizational hierarchy provide access to desirable resources such as prestige, power, access to others, and information not available at lower organizational levels (Lin 1999). These higher-status associates may also legitimize both individuals and their ideas, establishing access to unique or non-redundant knowledge (Constant et al. 1996). Relatively smaller electronic networks of practice, due to restricted access, may also be restricting the diversity of its members. This in turn might limit the diversity of the resources and knowledge brought to the network. Thus, we predict the following:

**Hypothesis 6.** The higher the overall level of individual motivations and positive attitudes about information sharing and resources in the electronic network of practice; the more helpful the knowledge exchanges, the more likely that members will contribute their personal expertise to the network, and the higher the level of diversity in the knowledge exchanged.

## **2.7 Knowledge exchange and organizational outcomes**

So what can organizations expect to gain from promoting the development of intra-organizational electronic networks of practice? The growing emphasis on resources and capabilities as the principal sources of sustainable competitive advantage has directed attention towards knowledge as the most important strategic resource of the firm (Grant 1996). Assuming that knowledge is a critical input to production processes, then organizational capability stems from the ability to integrate the specialized knowledge of individuals (Grant 1996, Nonaka 1994). Integrating the specialized knowledge of individuals within the organization leads to two critical organizational outcomes: improved organizational efficiency and superior innovativeness (March 1991). Efficiency refers to how productive firms are as a result of integrating individuals' specialized knowledge. Innovativeness results from knowledge integration across different types of specialized knowledge, extending existing capabilities through boundary spanning activities (Grant 1996).

Electronic networks of practice facilitate the ability of individuals to reach across an organization to collaborate with others who face similar tasks but who may be in different geographical areas, functions, etc. The creation of ties across an organization through these electronic networks thus improves the ability to connect potentially isolated areas of individuals (Brown & Duguid 2000). Knowledge from local settings is shared across the organization as individuals mutually interact through helping and sharing their personal expertise with each other, leading to a gradual collective acceptance of local knowledge and the creation of a collective body of organizational knowledge (Huysman & de Wit 2003). As knowledge about best practices flows across intra-organizational boundaries, the organization should become more efficient as less time is spent by isolated units reinventing the wheel. However, the efficient integration and understanding of knowledge requires common language and frequent interaction (Grant 1996). This suggests that lower levels of topic diversity underlying the knowledge exchange in electronic networks of practice will lead to more efficient organizational performance. Electronic networks of practice that support the exchange of knowledge that is helpful and associated with both work product and personal expertise should lead to improved efficiency of the organization.

Research within the field of knowledge management has found that one of the necessary factors for innovation within organizations is that individuals share their personal skills and insights with one another as opposed to merely sharing information products. Effective conversations and a helpful environment facilitate the flow of ideas, often resulting in the creation of radically different knowledge. Individuals from diverse functional, geographic, and hierarchical backgrounds are more likely to have important

knowledge that is non-redundant, generating access to sources of new ideas and innovations located across intra-firm boundaries. Previous research indicates that individuals participating in intra-organizational electronic networks of practice were more creative compared to individuals relying on their collocated colleagues (Teigland & Wasko 2003) and that networks with a more diverse set of members were more likely to be involved in creating new products and processes as opposed to sharing knowledge to solve current problems (Hustad & Teigland 2005).

Researchers investigating virtual teams have found that when teams composed of diverse members had access to different sets of contacts, skills, information, and expertise, they enjoyed an enhanced capacity for the generation of new ideas and creative problem solving (Reagans & Zuckerman 2001). However, when the teams were composed of more similar members, then performance was limited by the relative redundancy of perspectives, information, and resources (e.g., Ancona & Caldwell 1992), thus reducing the team’s capacity for creative problem solving. Similar to dispersed, virtual teams, electronic networks of practice may also be characterized by a high degree of diversity, as mentioned above, which may be positively related to creative problem solving and the creation of innovative solutions. Thus, we present our final hypotheses, and we summarize our model of hypotheses in Figure 1:

**Hypothesis 7a.** The more helpful the knowledge exchanges, the more that members contribute both information product and personal expertise to the network, and the less diversity in the knowledge exchanged; the higher the level of efficient performance of the organization.

**Hypothesis 7b.** The more helpful the knowledge exchanges, the more that members contribute personal expertise to the network, and the more diversity in the knowledge exchanged; the higher the level of innovative performance of the organization.

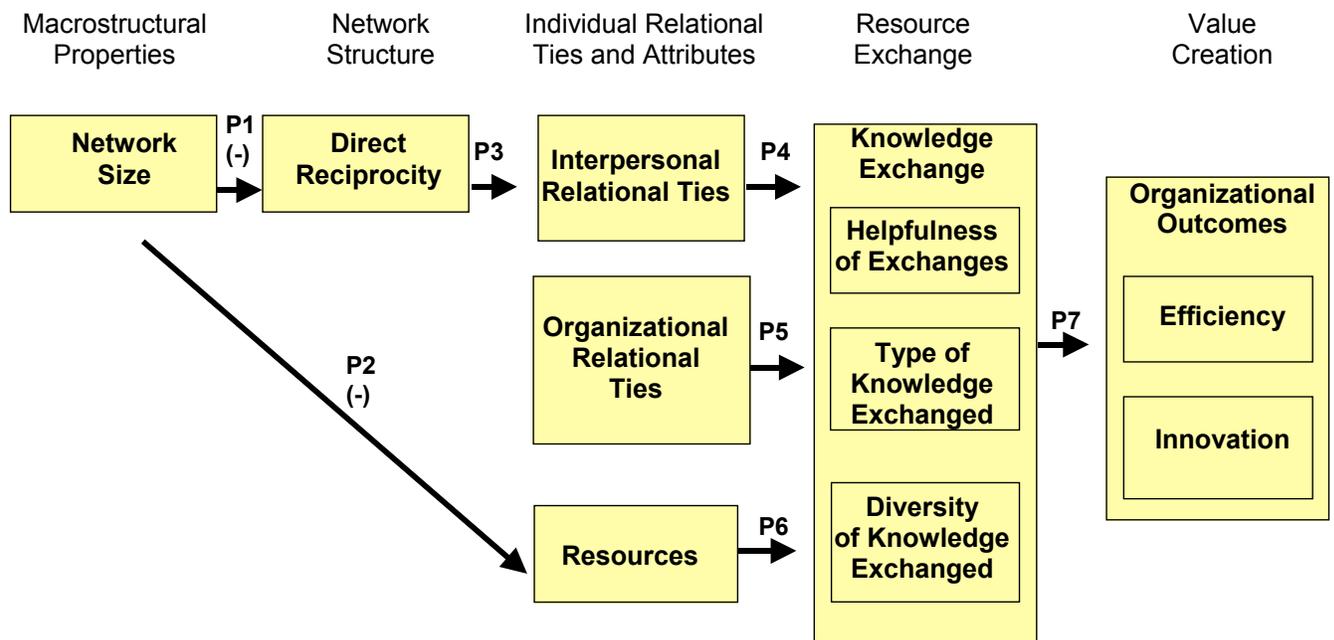


Figure 1. Factors influencing knowledge exchange and organizational outcomes in restricted access, intra-organizational electronic networks of practice.

### **3 RESEARCH SETTING AND DATA COLLECTION**

This research is to be conducted in the R&D operations of one of the world's largest pharmaceutical multinationals, referred to here as Pharmaco. This setting provides a fascinating test of our model since the pharmaceutical industry is one in which the protection of intellectual property is of utmost importance to competitive advantage; however, R&D scientists in this industry generally belong to inter-organizational professional networks that are characterized by strong norms of openness and knowledge sharing across an organization's external boundaries, activities that are generally not governed by contracts or other market mechanisms (Liebeskind et al. 1996).

Pharmaco has approximately \$24 bln in sales (2005), 64,000 employees, and sales in more than 100 locations across the globe. R&D expenditures in 2005 were \$3.4 billion, and the company employs roughly 12,000 people in 11 R&D centers in seven countries: Canada, France, India, Japan, Sweden, the UK, and the US. For a number of years Pharmaco has implemented a series of corporate information and knowledge management initiatives with the use of modern intranet/internet technologies such as groupware and corporate portals as one of the primary means.

The focus of this research is eRooms, or virtual meeting spaces that facilitate collaborative work. Each Pharmaco eRoom offers a set of very simple collaboration tools, such as file sharing, discussion forums, polls, simple databases, calendars, and project planning. eRooms can be created by any individual within the organization through a request made to a business owner. The request includes information regarding the coordinator and purpose of the eRoom as well as a brief description of the eRoom and some topics derived from the corporate taxonomy tree. Business owners are individuals who have been appointed to validate all incoming requests due to their seniority within their business domain. These individuals then approve the eRoom request if it does not overlap with the focus of an already existing eRoom and has a sufficient degree of specificity. The information of approved eRooms is then made available to all individuals within Pharmaco. Individuals may either be asked to join the eRoom by the owner or coordinator or individuals may ask to become a member. To date there are more than 2400 different active eRooms within R&D at Pharmaco, varying in terms of their collaborative activity.

During the summer of 2006, we plan to conduct a questionnaire of all R&D individuals within Pharmaco. One section of this questionnaire will focus on eRooms with the explicit purpose of quantitatively investigating the model and hypotheses presented in this paper.

### **4 DISCUSSION**

In this paper, we hope to make a theoretical contribution to the general understanding of the social and organizational processes underlying intra-organizational electronic networks of practice. We extend prior theoretical work by introducing a theoretical framework that examines intra-organizational electronic networks of practice that restrict access to the network. Our model is not without limitations. Our perspective operates at the network level and does not offer much explanation as to why certain individuals take on specific roles or participate the way that they do. While previous research has found that higher levels of electronic network of practice participation positively impact an individual's performance within the firm (Teigland & Wasko 2003), we know little about the minimum number of individuals nor the distribution of motivations and resources at the network level necessary to sustain an electronic network of practice. A related limitation of our theory is that we have not investigated the impact of negative participation and what that would consist of, beyond suggesting that this type of participation creates less value. Further research that focuses on the resilience of electronic networks of practice in the face of adversity, such as high levels of spam, the effects of rapid changes in membership, and the adaptability of the network to changes to the environment is also needed.

In conclusion, we have offered a model of electronic collaboration that explains how knowledge exchange is sustained in intra-organizational electronic networks of practice, and the potential implications of restricting access to the network. Much research remains to be done to understand individual behaviors and how the different macrostructural properties of networks generate different dynamics. By defining constructs and developing clear hypotheses, we plan to test our model in the R&D operations of a large pharmaceutical multinational. Moreover, we suggest that the framework provided here is an early step in understanding electronic networks of practice and the dynamics of these new organizational forms based on networks of individuals enabled by computer-mediated communication.

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