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**MAKING COMPETENCIES CROSS BUSINESS
UNIT BOUNDARIES: THE INTERPLAY BETWEEN
INTER-UNIT COORDINATION, TRUST
AND KNOWLEDGE TRANSFERABILITY.**

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ABSTRACT

The strategic value of knowledge sharing has long been recognized but valuable competencies are too often locked in one business unit. This paper provides insight into the role of organizational factors in spreading complex bundles of knowledge among business units. A study in a British multinational confirms the importance of knowledge transferability, headquarters' role, the close relationship between standardization and knowledge sharing, and the ambiguous role of informal networking.

INTRODUCTION

It is generally accepted that knowledge can be the source of competitive advantages, because of its unique and sticky characteristics (Conner and Prahalad, 1996, Spender, 1996, Teece, Pisano, and Shuen, 1997). However, that advantage can be limited to a specific business unit, department, or project-team (Argote and Ingram, 2000, Gupta and Govindarajan, 2000, Szulanski, 1996). The geographically dispersed, and often autonomous, character of Multinational Corporations (MNC's) business units dramatically hinders inter-unit knowledge sharing. Nevertheless, knowledge sharing is a rationale for the existence of MNCs because, even with their knowledge-sharing limitations, MNCs still have an advantage over markets in internal knowledge sharing (Gupta and Govindarajan, 2000, Kogut and Zander, 1993). Teece (1998) emphasizes that the deployment and use of individually created knowledge by means of physical, social and resource allocation structures to reshape this knowledge into competencies on the organizational level provides the competitive advantage, rather than the knowledge itself. Such competencies are bundles of work related knowledge, abilities and skills held by organizations (Wright, Dunford, and Snell, 2001).

The need for leveraging knowledge to build competencies on the organizational level (Argote and Ingram, 2000, Szulanski, 1996, Wright, Dunford, and Snell, 2001) is thoroughly discussed theoretically but has hardly been studied empirically. As exceptions, there is interesting empirical research done on knowledge sharing (Gupta and Govindarajan, 2000, Simonin, 1999, Szulanski, 1996, Zander and Kogut, 1995) and on the relationship between organizational characteristics and possibilities for creating, using and validating competencies on markets (Gold, Malhotra, and Segars, 2001, Van den Bosch, Volberda, and de Boer, 1999, Winter, 2000, Zander and Kogut, 1995). However, Argote and Ingram (2000) argue that we need more insight into interactions as the source for transferring bundles of knowledge from one context to another. We intend to contribute to the strategy literature by exploring the role of inter-unit coordination to spread knowledge and competencies throughout the organization, taking into account the MNC's task and knowledge characteristics. Previous research only approached this topic partially. It is our objective to study the coordination mechanisms in greater depth and to rely on a broad literature base covering a range of different mechanisms from procedures to social capital. The purpose is to detect the interplay among these mechanisms and their effects on sharing competencies. Sharing is defined in our study following Argote and Ingram (2000:151) as "*the process through which one unit is affected by the experience of another*".

For organization design to be effective, the task and knowledge characteristics must be considered (Birkinshaw, Nobel, and Ridderstrale, 2002). We start by explaining these relevant characteristics, namely task interdependency, flexibility, knowledge transferability, and common knowledge. The next section discusses a classification of inter-unit coordination and the role of coordination in competence spreading. Furthermore, we review the role of trust and opportunism, the influence of the MNC's strategy, and the interplay among these factors. A case study in a British multinational company provides empirical evidence for our assumed relationships.

LITERATURE REVIEW

Task and knowledge characteristics

Strong task interdependencies requiring intense needs for knowledge sharing can only be achieved with specific types of coordination (Galbraith, 1995). Hence, we assume that interdependency serves as an important inter-mediating factor between coordination and knowledge sharing. It has a direct effect, as well as enforcing cooperation and knowledge sharing. It is well known that the need for sharing information between units is a function of the interdependency between the units (Argyres, 1995, Burckley and Carter, 1999, Thompson, 1967). However, highly interdependent tasks that also involve task-specific knowledge will not only require information sharing but also knowledge sharing. Consequently, we observe more knowledge sharing between business units when these units are interdependent.

In studying knowledge sharing, flexibility should be incorporated. Competence spreading should not aim at diffusing best practices but should establish adaptable sharing processes. Flexibility in knowledge sharing is required when the task environment is frequently changing (and hence, new knowledge or knowledge from different parts in the organization is required) (Gargiulo and Benassi, 2000) or when existing knowledge needs to be reconfigured (Grant, 1996). This is especially important in MNCs with business units that are faced with different levels of uncertainty, differences in their local markets, and changing linkages between them. Business units are taken over, integrated, repulsed, and restructured continuously. Knowledge sharing will be a burden to the corporation's dynamism when such sharing results in enforcing best practices across the organization in the form of fixed routines.

We also take the transferability of knowledge into account when studying the sharing of knowledge and competencies. The sticky and context-related character of knowledge makes knowledge sharing highly complex (Szulanski, 1996, Tsoukas, 1996). The lower the transferability, because of sticky and implicit knowledge, the fewer the competencies that will cross business unit boundaries. Furthermore, business units' knowledge should be related to allow the development of a common knowledge base that would make knowledge sharing possible. Such common mindsets allow the understanding and absorbing of each other's competencies. Whatever linkages exist between the business units, there is always a need for a minimum amount of common (shared) knowledge, e.g., in the form of shared identity, mental models, or culture (Marengo, 1993).

Inter-business-unit coordination

Several authors have highlighted the importance of coordination to provide communication and integration channels between units of large organizations (Burckley and Carter, 1999, Egelhoff, 1990, Ghoshal, Korine, and Szulanski, 1994, Gupta and Govindarajan, 2000, Martinez and Jarillo, 1989). Our approach reflects different disciplinary perspectives on structure and knowledge sharing; namely organization design (Grant, 1996, Van den Bosch, Volberda, and de Boer, 1999), organizational networks (Hansen, 1999, Nohria and Eccles, 1992), social capital (Adler and Kwon, 2002, Leana and Van Buren III, 1999, Nahapiet and Ghoshal, 1998) and community of practice (Brown and Duguid, 1991, Lave and Wenger, 1991, Liedtka, 1999). These different perspectives identify a wide range of coordination mechanisms. Our study highlights the characteristics of each of these mechanisms as knowledge-sharing facilitators. These are not exclusive to MNCs but, because of the size and complexity of MNCs, their application is more complex (Martinez and Jarillo, 1989). In Table 1, we clarify the coordination types in the different perspectives.

Insert Table 1 About Here

All coordination mechanisms can be classified into one of four groups; systems, formal networks, informal networks, and shared values. Systems are plans, rules, procedures, goals, manuals, standards, goals, policies, and hierarchical decision-making (Grandori, 1997, Mintzberg, 1989). Formal networks include teams, project groups, mutual adjustment, integration roles, and coordinators (Galbraith, 1973). Informal networking was developed within the network literature (Gargiulo and Benassi, 2000, Granovetter, 1973, Hansen, 1999) and the social capital literature (Adler and Kwon, 2002, Leana and Van Buren III, 1999, Nahapiet and Ghoshal, 1998). Shared values are used for integration through values, implicit routines, and socialization norms (March and Simon, 1958, Nelson and Winter, 1982).

The different perspectives shed some light on the relationship between coordination and knowledge sharing. Grant (1996) builds on the classic organization theory literature to explain that systems are not fit for sharing tacit or complex knowledge. The systems mode of coordination, with planning, standards, etc. as integration mechanisms, allows sharing small amounts of simple knowledge (Galbraith, 1973). Formal networks are more suitable for intense sharing of complex knowledge (Galbraith, 1995, Grant, 1996, Van den Bosch, Volberda, and de Boer, 1999). Moreover, tasks that are highly complex (Galbraith, 1995) and highly task interdependent (Thompson, 1967) require more complex integration, such as teams, coordinating roles, and mutual adjustment (Egelhoff, 1990, Grandori, 1997). Formal networking will result, in general, in more communication and information sharing both among business units and with headquarters (Ghoshal, Korine, and Szulanski, 1994). In addition, when flexibility in tasks and sharing is required, fewer systems or less systematic coordination should be used (Van den Bosch, Volberda, and de Boer, 1999). Systems adapt slowly and can cause unlearning (Levitt and March, 1988, Senge, 1994).

Hypothesis 1: Systems are negatively related to knowledge sharing between units when the knowledge is complex and knowledge sharing flexibility is high.

Hypothesis 2: The more complex the knowledge, the higher the need for formal networks to allow knowledge sharing.

Hypothesis 3: The more interdependency, the more use of formal networks, resulting in more knowledge shared.

The network literature has paid attention to knowledge sharing as well (Araujo, 1998, Hansen, 1999). It is most efficient to have weak ties between units to share codified knowledge, and strong ties to share non-codified complex knowledge (Granovetter, 1973, Hansen, 1999). This is because weak ties (i.e., distant and infrequent relationships) exist between units that have little knowledge in common, whereas strong ties exist between units with a lot of knowledge in common (Hansen, 1999). The social capital literature further emphasizes this (Leana and Van Buren III, 1999, Nahapiet and Ghoshal, 1998). Social capital, i.e., the goodwill engendered by relationships between people in organizations is, without doubt, a good knowledge integrator (Adler and Kwon, 2002). Nevertheless, arguments against social capital refer to inflexibility and power. Strong ties can reduce flexibility for a unit to behave independently and can impose too many social obligations (Burt, 1992, Gargiulo and Benassi, 2000, Hansen, 1999). In contrast to the network literature, the literature on organizational learning explains that networks allow flexibility and facilitate knowledge sharing (Ayas and Foppen, 1996, Senge, 1994, Van den Bosch, Volberda, and de Boer, 1999). However, the organizational literature is especially concerned with ‘formal’ networking, whereas the network literature emphasizes ‘informal’ networking.

Hypothesis 4: The more (strong) informal networks, the more sharing of complex knowledge.

Hypothesis 5: The more flexibility in knowledge sharing, the higher the need for formal networks to allow knowledge sharing.

Within the broader organization literature, attention has been paid to the concepts, community of practice (Brown and Duguid, 2001, Brown and Duguid, 1991, Lave and Wenger, 1991) and social identity (Albert, Ashforth, and Dutton, 2000, Kogut and Zander, 1996). This literature teaches us the importance of shared mental models and values to allow learning and knowledge sharing. Shared values have a positive effect on knowledge sharing but can cause unlearning problems as well (Levitt and March, 1988).

Hypothesis 6: Shared values have a positive effect on knowledge sharing when knowledge flexibility is low.

Social behavior

Trust is considered as a necessary condition for knowledge sharing between units (Adler, 2001, Andrews and Delahaye, 2000, Newell and Swan, 2000). It breaks down into three dimensions: reliability, openness, and concern (Mayer, Davis, and Schoorman, 1995, McAllister, 1995, Mishra and Spreitzer, 1998). Reliability is based on the competencies of the other parties and the value of their knowledge. Openness is related to the willingness to share, and concern indicates a kind of helpfulness and altruistic behavior. Trust directly influences knowledge sharing and indirectly by decreasing opportunism. Opportunism exists in all kind of organizations and organizational processes and needs to be combated with administrative and governance mechanisms. In a knowledge-sharing situation, the donating unit might lose its competitive advantage over the other units. Furthermore, knowledge has a public character and, consequently, a free rider problem (Boisot, 1998). According to the transaction cost theory, opportunism is the driving factor behind governance choices (Williamson, 1975). Knowledge-based views of the firm, drawing from resource-based theories, counter this by stating that bounded rationality is already a sufficient element to explain governance choices (Heiman and Nickerson, 2002). Sharing highly implicit knowledge is difficult because of our limited cognitive capacity (i.e., bounded rationality) but governance mechanisms, allowing the sharing of such knowledge, can result in knowledge appropriation hazards (Heiman and Nickerson, 2002). Trust, based on a convergence of interest and socialization, helps people to refrain from opportunism and hazards (Kogut and Zander, 1996).

Corporate strategy

Few indications of the role of strategy in knowledge sharing can be found in the literature. A useful exception is the study of Zack (1999), which reveals that a firm's strategy is crucial for managing knowledge. However, his focus is on the possession of the right core knowledge stock. Other literature on the relationship between strategy and knowledge sharing emphasizes the importance of knowledge protection and retention (Liebeskind, 1996, McEvily, Das, and McCabe, 2000), development of sustainable competitive advantages (Boisot, 1997, Spender and Grant, 1996) and subsidiaries' autonomy on the magnitude of communication and information sharing with headquarters (Ghoshal, Korine, and Szulanski, 1994). We build on these studies to take strategic choices of the MNC's headquarters into account. Decisions on the level of integration, autonomy, centralization, and prioritizing

competence building and spreading, can influence the other variables in our framework and the potential effects on competencies crossing business unit boundaries (Argyres, 1995).

Interplay between coordination, trust and knowledge transferability

To assess how business unit integration should be coordinated to optimize knowledge sharing, we combined coordination types and trust with the knowledge and task characteristics in the organization. Figure 1 displays these groups. We assume a direct influence of these three groups (i.e. task and knowledge characteristics, coordination and social behavior) and combined effects of coordination and task characteristics on knowledge sharing.

Insert Figure 1 About Here

Several interactions between the influencing factors are possible, e.g., between coordination and opportunism, and between networking and power. Heiman and Nickerson (2002), for example, explain the inter-relatedness between coordination and opportunism. They state that tight, rich, and high-context communication (such as in formal networks) is more suitable for transferring implicit and complex knowledge. However, such communication also opens doors for opportunistic behavior, because of the uncertainty about the property rights on the implicit knowledge in the sharing processes. In particular, informal relationships and knowledge about the network make some people more powerful than others (Krackhardt, 1990). On the other hand, strong network ties can reduce opportunism, settle trust, develop norms, and assist cooperation and integration (Burt, 1992, Gargiulo and Benassi, 2000, Pfeffer and Salancik, 1978).

Methodology

Case study

A case study of a British MNC, in the production and retail sector, provides empirical evidence. The MNC is UK based but operates worldwide. The company is listed on the London Stock Exchange and has 12,000 employees. It is growing both internally and externally. Some local units became part of the company through takeovers but were fully integrated afterwards. The structure is a traditional functional structure with two separated groups, marketing and sales versus operations. It is highly decentralized and dispersed, with HR, IT, marketing and finance functions in each business unit. The autonomy in the business units is high, although, recently, top management decided to tighten control on the business units.

Measurements

In our research, we triangulate data collection methods. Triangulation improves internal and external validity and the realism of context (Scandura and Williams, 2000). It reduces the risk of false conclusions because of bias from self-selection and common-method variance. Data were collected in the HR and marketing business units worldwide, and in the IT business units within Western and Eastern Europe, by means of interviews and questionnaires. In total, 20 open interviews, between half an hour and one hour each, were held with people at different levels in the organization. All interviews were taped and fully transcribed. These were then coded, using a coding scheme based on the variables and concepts obtained from our theoretical framework. The IT areas had been going through major changes and large parts were outsourced. Data from this group were therefore mainly limited to information from interviews.

Business unit members on different levels completed the questionnaire. The total number of correctly completed questionnaires received was 165. The response rate differed with the degree of support for the research project, from 48% in HR areas to 14% in marketing and IT areas. A large part of the business is located in Spain and Latin America. To ensure that these groups would have a high response rate, the company's regular translating partner company translated the questionnaire into Spanish. Other worldwide units received the questionnaire in English. The closed questionnaire measures several variables related to a

particular cooperation between the home unit and another unit. The other unit is that with which the home unit has most, or very frequent, contact. Hence, good and bad working cooperation is included, but the frequency of cooperation differs considerably at the level of the particular individual completing the questionnaire. The knowledge, or competency, involved in the cooperation is not specified in the questionnaire. However, the questionnaire's introduction and accompanying letter clearly indicate that only the knowledge related to the activities of the two units, or their particular cooperative project, should be considered. Examples of such knowledge in HR are sharing of a newcomer training process, or basic principles of stock-based reward systems, or assessment procedures.

Knowledge sharing is not directly measurable. Previous studies solved this problem by using proxy variables, such as the success of the sharing process (Szulanski, 2000), or transfer of knowledge (Gupta and Govindarajan, 2000, Hansen, 1999, Lane and Lubatkin, 1998). When tacit knowledge is involved, it is more appropriate to measure the success of the transfer by measuring the performance of the parties involved (Argote and Ingram, 2000). Hoopes (1999) looked for 'glitches' or (costly) mistakes due to a lack of knowledge sharing. Supported by the approach of these authors, we decided to measure knowledge sharing, both in a more subjective way and in a more objective way, by combining three different dependent variables as proxies for knowledge sharing. The first variable is measured in terms of time spent on knowledge sharing and is an attempt to quantify knowledge sharing in a more objective way. The second variable is measured in terms of success by using four items based on indications of non-sharing or insufficient sharing. Two of these four items were adopted from the work of Gresov (1993). Two additional items, inspired by Szulanski's measurements (2000) of project success, refer to the extent that time planning, goals, and standards are met. The third dependent variable takes a more subjective approach to the intensity of knowledge sharing. This is achieved by using five items asking how satisfied the respondents are with the cooperation and knowledge sharing.

To develop our coordination items, we drew from the work of Van de Ven (1976), Miller and Dröge (1986) and Millward and Jeffries (2001). Systems are measured with four items relating to the use of formal procedures, goals, reports, and rules, and four items measuring hierarchy. Another three items measure shared values. We used three items from Miller and Dröge (1986) on task forces, liaison personnel, and interdepartmental committees, to measure formal networks. However, the wording had to be adapted to recent business

terminology. In addition, one item measuring the role of (empowered) coordinators was added. We measured informal networks with five items referring to the intensity of informal personal contacts used to coordinate the cooperative activities.

'Flexibility' refers to flexibility in knowledge and information needs due to changes in tasks. Two items measure solely changes in tasks, and another three items measure the need for changes in sharing, in particular, sharing with new units and exchanging new kinds of knowledge. The construct knowledge complexity breaks down into three sub-variables: codification, teachability, and tacitness. The scale for the first variable was copied from Hansen (1999). Teachability is measured by two items based on Zander and Kogut (1995). Tacitness, in the context of our study, refers particularly to hidden knowledge of which one is unaware, or unable to express in any way. Four new items were developed referring to the difficulty in expressing one's knowledge.

We adopted Gresov's (1993) four items of the interdependency scale and added one extra item measuring the magnitude of knowledge and information needed from the other business unit to develop our task interdependency scale. Another task variable reveals the relatedness between the units in terms of their knowledge stocks. Four self-developed items look for differences in functional background, languages, skills, and experiences.

The scales measuring trust, consisting respectively of five, four and three items for openness, reliability and concern, were partly adopted from Spreitzer and Mishra (1999) and from Devos et al. (2001). One additional item, more directly related to abuse of received information, was included in the reliability scale. The scale power containing five items was adopted from the work on organizational change from Devos et al. (2001). Finally, a newly developed scale of four items relating to protecting knowledge and an item related to goal conflicts measure knowledge protection as a proxy for opportunism.

Knowledge sharing is a process that is influenced by many variables. One control variable related to task characteristics looks to what extent the tasks are routine. Routine versus non-routine tasks influences the coordination mechanisms that can be used effectively (Egelhoff, 1990). Other variables control for the case settings, namely language of the respondents, locations, number of people involved in the cooperation, functional area (inter- or intra-functional cooperation) (Cohendet, Kern, Mehmanpazir, and Munier, 1999), country, division, and level. None of the control variables disturbs significantly the relationships found. To test reliability, Cronbach alphas were calculated for each scale, with the recommended value of 0.7 being used roughly as a cut-off (Nunnally, 1978). Reliabilities of the final constructs ranged from 0.66 to 0.88, except for informal networks. The newly

developed scales were tested in separate pre-test studies to verify that the items are reliable measures (Kopalle and Lehmann, 1997). Test groups were a professional organization (n = 48), a small publishing company (n = 36), and participants in a management development program (n = 30). Figure 2 shows the measurement model and variables included in our analysis. Coordination, behavior and tasks and knowledge characteristics are measured by questionnaires and interviews; while strategic choices are only examined based on the interviews. The complexity and extensiveness of strategy does not allow measurement by closed questionnaire items.

Insert Figure 2 About Here

RESULTS AND DISCUSSION

The standard deviation, means, and correlations among the variables are listed in Table 2. The relationships among the variables were tested in path analysis using Amos 4.03 (Arbuckle, 1994) based on the Maximum Likelihood estimation. The Jöreskog-Sörbom GFI and AGFI, Bentler Comparative Fit Index and RMR are useful criteria to assess the goodness of fit (Kline, 1998). The chi-square/degrees of freedom ratio, considered as an indication of good fit when low, is 1.637 and, hence, sufficiently low (Kline, 1998). The other indices also refer to a good fit (GFI = .925; AGFI = .871; CFI = .953; NFI = .891 and RMR = .049). Hence, path indices fit the data well and are useful for exploring the data.

Insert Table 2 About Here

Coordination

Parameter estimates from our path analysis indicate a large number of relationships among our variables. We find direct effects for informal and formal networking and a negative effect for systems on the knowledge-sharing variables. The other coordination

variables have indirect effects via knowledge transferability and trust. Figure 3 gives an overview of the direct and indirect effects.

Insert Figure 3 About Here

The most remarkable result is the negative effect of informal networking on success of knowledge sharing, contradicting hypothesis 4. Our qualitative data revealed that informal networking was an important knowledge integrator when other coordination modes were missing. However, the network literature indicates that informal networks are especially interesting for knowledge sharing when the knowledge is very complex and intensive sharing is required. The latter is not the case in this organization. The negative effect indicates that informal networking was unfit for the kind of knowledge integration required. Informal networking is time-consuming. Therefore, it delays cooperation and hence results in a lower indication of success. Moreover, informal networking is not enforceable enough, and limited to a few key people. The literature suggests that systems are not fit for sharing complex bundles of knowledge and competencies and can have a negative effect on knowledge sharing when flexibility and knowledge that is difficult to share (i.e., low knowledge transferability) is involved. However, we found an indirect positive effect of systems on knowledge sharing, disconfirming our first hypothesis. Systems lead to more codification and, hence, part of the knowledge becomes more easily transferable, which has a positive effect that has often been neglected in the literature. Many interviewees complained about not knowing what exists in the other units, and how and what these units are doing. The lack of such systems leaves sharing to the existence of informal networks, which involve only a few people. The company was in such a need for more systems to help sharing and to promote communication, that systems have positive effects in the current decentralized stage. The negative relationship between systems and informal networking is evident because informal networking was filling the gap due to the lack of systems.

Surprisingly, shared values do not have a direct effect on sharing. However, this is compensated by the positive indirect effect via trust. (The standardized indirect effect of shared values on success was .21 and on satisfaction was .19.) Trust is more easily achieved among people with similar mental models. Hypothesis 6 indicated a positive relationship

between shared values and knowledge sharing but only when flexibility is low. However, the role of flexibility in this relationship could not be proved. Knowledge integration in our case study is limited by the lack of shared mental models, which are shaped by national culture. There is a general feeling of ‘we are different’, or ‘our situation is different’, and, hence, ‘we do not benefit from sharing’. Formal networking enhances systems and shared values. Through team meetings and project plans, systematic coordination is developed as well as better understanding and congruence of the mental models. Formal networks have a positive effect on knowledge sharing but we can not confirm hypothesis 3 and 5 because the interaction with flexibility and task interdependency could not confirmed.

Social behavior

The relationship between trust and knowledge sharing is large and positive, as suggested by the literature. However, more trust does not seem to encourage the business units to spend more time on sharing knowledge and competencies. Furthermore, there is a positive relationship between trust and knowledge transferability. Trust seems to make knowledge more easily transferable through the development of a subjective feeling of an easier sharing ‘process’ when the business units trust each other. However, there is not enough trust in each other’s competencies. Different regions have doubts about the quality of practices coming from other parts of the world.

Power and knowledge protection are closely related and have a strong covariance. The effects of these variables on knowledge sharing run over trust, except for the direct negative effect of knowledge protection on time spent. The latter can be explained as negative knowledge sharing time. The more people try to protect their knowledge, the longer it takes before all required knowledge is revealed and shared. Hence, it appears that a lot of time was spent on knowledge sharing but the time was used inefficiently. The organization is not strongly politicized but there are potential goal conflicts, especially between local business units and headquarters. Insights from the interviews reveal that the decentralized structure has brought some competition between regions and countries. However, obtaining knowledge is never an issue, but it does not happen pro-actively and spontaneously. Therefore, openness to the other business units is low but this is more a matter of ignorance than intended protection. Frequently, knowledge is revealed and shared when it is too late and when other business units have reinvented the wheel. Figure 4 shows the direct and indirect effects and gives the standardized parameter estimates.

Insert Figure 4 About Here

Furthermore, knowledge protection and informal networking are correlated. People making use of informal networks know the organization much better, and get much more information and knowledge than their colleagues who are not involved in networking. Networking people might be more aware of possibilities to behave opportunistically in the organization. Another explanation is that informal networking opens the way to power games. The latter has been indicated in the literature as an important drawback for informal networking (Krackhardt, 1990). Our study has confirmed that formal networks do not have to cope with the same drawbacks as informal networks.

Task and knowledge characteristics

Finally, we also suggested direct relationships between the task and knowledge characteristics and the knowledge-sharing variables. Knowledge transferability has been mentioned several times as an intermediate variable for the effect of coordination and behavior. However, it has a large direct effect as well, especially on satisfaction but not on time. Figure 5 illustrates the relationships. Flexibility was expected to negatively influence the success of sharing and cooperating. However, it has a small positive indirect effect through enhancing trust, although there is still a small negative effect on success via informal networking. The small positive indirect effect through enhancing trust is unexpected since high flexibility is expected to make the development of trust more difficult. In this case study, the need for flexibility is low because the organization is in a stable environment but when change is needed, resistance to change is high. A possible explanation might be that people with flexible tasks, or in flexible environments, who need to communicate more often with other business units, develop trust more easily. Their unusual intense need for communication and cooperation force them to network and to develop trust.

Insert Figure 5 About Here

Results for the relationships with task interdependency are also remarkable. The more business units seem to be dependent on each other to fulfill their tasks, the less

successful is knowledge sharing, the less common knowledge exists, and the more this goes hand in hand with high flexibility. We find the answer for these exceptional findings in the type of projects that typically require high task interdependency in this case study company. Such projects involve people from different business units developing a new concept, e.g., a new IT platform or a new marketing approach. These projects involve people with low common knowledge; they require high flexibility and strong interdependency to accomplish the project goals. A combination of these three factors, with the lack of sufficiently tight integration mechanisms for communication and knowledge sharing, can reduce success and require a lot of time to reach a sufficient level of knowledge sharing. Moreover, interdependency is large for business units that have very different knowledge stocks, e.g., human resource people and production people; whereas interdependency is low among similar functions and units. Furthermore, high task interdependency involves close cooperation, but also gives rise to more potential conflict situations. Business units, sub-units, and even individuals work independently. However, when high task interdependency exists, this interdependency is seen as a source of uncertainty and flexibility.

Common knowledge does not seem to affect knowledge sharing, although the literature suggests a strong relationship and that common knowledge assists coordination (Cohendet, Kern, Mehmanpazir, and Munier, 1999). This assumption does not hold for our data. The knowledge in this organization cannot be considered as very complex. Most of it, in all three areas, can be easily explained, written down and transferred; however, the lack of integration mechanisms to share knowledge and different mental models, unrelated tasks and lack of trust result in a feeling of complexity. Knowledge sharing is considered to be difficult and complex because it is difficult to achieve in the current organizational settings, not because it is tacit or difficult to codify. The respondents seemed to consider knowledge as complex and non-transferable when the process of knowledge sharing is difficult and complex instead of when the knowledge itself is complex. Hence, when such a feeling of complexity occurred, it resulted in low success and satisfaction with the knowledge sharing. The complexity can also be reduced by more codification. Many practices are not documented and disappear with people leaving or are forgotten over time. Hence, there is a feeling of complexity and of the fact that knowledge is difficult to retain and transfer. In situations where the knowledge has been codified better, we see a large positive effect on satisfaction and success, and also on common knowledge. It seems that more codified knowledge gives the impression that knowledge is more related.

Strategic choices

The distant business units are controlled in a very decentralized way. Consequently, there are few enforced systems directing cooperation and knowledge sharing between different business units. Initiatives from units at headquarters, such as, attempts by the central HR team to act more as one HR team world-wide, are very hard to achieve because of a lack of systems connecting the units and a lack of strategic orientation at the company level. The corporate strategy is unclear about whether closer cooperation and knowledge sharing is an objective and whether the organization wants to become more integrated.

There is also some resistance towards greater integration because it is interpreted as a cover for standardization and centralization leading to reduced freedom for the business units. There is a demand for knowing more about the rest of the company but not for implementing others' practices. Adoption of other best practices has happened among some closely cooperating units, but other units are reluctant to adopt the idea of using one best practice across the organization as a kind of standard. Some knowledge could become the dominant knowledge in the organization without a guarantee that it is the best knowledge and especially not the best for each particular situation. Some HR people and central units strongly promote knowledge sharing. However, local management is not fully convinced that the efforts to achieve more spontaneous pro-active sharing are worth the benefits and the sacrifice of their freedom. This doubt about the benefits is reflected in the low priority given to knowledge-sharing projects. The low level of integration mechanisms of all kinds fits with the low task interdependency but clearly leaves huge potential for more efficiency by sharing good practices. Nevertheless, there are some good examples, such as worldwide conferences, frequent discussion forums by video conferencing, temporary job rotation to have people implement practices in other locations, and project teams to develop new practices composed of people from across the company. Furthermore, knowledge sharing is considered a headquarters' task. Especially in marketing and IT units, headquarters is seen as the collector and distributor of knowledge and practices. This intermediary 'knowledge broker' role of headquarter units is questioned. Some see it as the ideal way to share knowledge combined with keeping control, whereas others find it an inefficient use of resources and an ineffective way to spread practices.

CONCLUSION

We reviewed the classic literature on organization theory and design and the literature on learning organizations, networking, social identity, and communities of practice, to discover the role of coordination in facilitating the sharing of bundles of complex knowledge between business units in a MNC. In addition, the importance of trust, opportunism and power, task characteristics, flexibility, interdependency, common knowledge, and knowledge transferability are examined. We contribute to research on MNCs by revealing the inter-relatedness of these variables and by emphasizing the role of the MNC's strategy in business units' attitudes to inter-unit knowledge sharing. This approach is proposed as an attempt to review some of the organization design elements and to provide some insights into how competencies in large organizations can be spread.

Although not all of our theoretical assumptions could be confirmed, we did find evidence of the role of trust, networking, transferability of knowledge, and the importance of a strategy supporting knowledge integration. The a strategy supporting knowledge integration leads to few shared norms, formal integration mechanisms, and different worldviews, which reduce the development of trust and result in a subjective feeling that knowledge is complex and hard to share. Competence-based trust was especially important. Trust is not a uni-dimensional concept but has different aspects. In the knowledge sharing debate, having trust in each other's competencies is a major issue that should be studied independently of openness (i.e., trust in each other's willingness to share) and concern (i.e., trust in positive attitudes towards each other).

Furthermore, the ambiguous role of informal networking needs more exploration. This ambiguous role was already identified in the literature and was clearly confirmed in our study.

In the study of knowledge sharing, the willingness to accept others' knowledge and to unlearn one's own knowledge is extremely important. Our study showed that the acceptance of company wide competencies, and using other's knowledge, was resisted. Knowledge sharing was taken for 'hidden' standardization. Different barriers to knowledge sharing have been mentioned in the literature (Szulanski, 1996). However, in a multinational company context, the role that knowledge plays after sharing becomes more important. There is a lack of research on the negative effects of knowledge sharing on business units, or individuals, which reveals their knowledge. These negative effects can go further than transfer costs and are a real consideration in the trade-off between knowledge protection and knowledge sharing. Further research should place more emphasis on the drawbacks of sharing for the

business units and the role of headquarters in supporting a knowledge-sharing strategy. Furthermore, the traditional strategic choice of MNCs between globalization and acting locally is very relevant to develop the right knowledge-management strategy.

Finally, our study indicated the importance of the task characteristics. All knowledge and knowledge sharing is embedded in daily practices. The characteristics of those 'daily practices' might be more influential than has been suggested in the literature.

Further research has to be done in empirically testing the findings of this study in other sectors, departments, and countries to avoid potential effects of the particular company settings. Nevertheless, typical characteristics of this MNC, such as the decentralization versus centralization and standardization trade-off, are common to most large MNCs. The influence of local culture increased the low competence-based trust, again a typical MNC problem. The selected organization is not atypical but can serve as a 'normal' multinational in the retail sector. The fact that we did not find significant differences in the relationships and variables among the different continents indicates that the findings might not be country or region specific. However, the inclusion of more organizations in the study would help to demonstrate this. We triangulate in the data collection methods but an extension to triangulation in research settings, such as different kinds of organization structures, would provide further evidence.

REFERENCES

- Adler, P. S. (2001) 'Market, hierarchy, and trust: The knowledge economy and the future of capitalism', *Organization Science*, 12(4): 215-234.
- Adler, P. S. and Kwon, S. W. (2002) 'Social capital: prospects for a new concept'. *Academy of Management Review*, 27(1): 17-40.
- Albert, S., Blake E. A. and Dutton, J. E. (2000) 'Organizational identity and identification: Charting new waters and building new bridges'. *Academy of Management Review*, 25(1): 13-17.
- Andrews, K. and Delahaye, B. L. (2000) 'Influences on knowledge processes in organizational learning: The psychosocial filter'. *Journal of Management Studies*, 73(6): 797-810.
- Araujo, L. (1998) 'Knowing and learning as networking'. *Management Learning*, 29(3): 317-336.
- Arbuckle, J. L. (1994) 'AMOS: Analysis of moment structures'. *Psychometrika*, 59: 135-137.
- Argote, L. and Ingram, P. (2000) 'Knowledge transfer: A basis for competitive advantage in firms'. *Organizational Behavior and Human Decision Processes*, 82(1): 150-169.
- Argyres, N. (1995) 'Technology strategy, governance structure and interdivisional coordination', *Journal of Economic Behavior and Organization*, 28: 337-358.
- Ashforth, B. E. and Mael, F. (1989) 'Social identity theory and the organization'. *Academy of Management Review*, 14(1): 20-39.
- Ayas, K. and Foppen, J. W. (1996) *The Learning Organization and Organization Learning*, Rotterdam: Rotterdam School of Management.

Birkinshaw, J., Nobel, R. and Ridderstrale, (2002) 'Knowledge as a contingency variable: Do the characteristics of knowledge predict organization structure?', *Organization Science*, 13(3): 274-289.

Boisot, M. (1998) *Knowledge Assets*, Oxford: Oxford University Press.

Boisot, M., Griffith, D. and Moles, V. (1997) 'The dilemma of differentiation versus integration in the pursuit of learning', in Sanchez, R. and Heene, A., (eds.) *Strategic Learning and Knowledge Management*, New York: John Wiley and Sons.

Brown, J. S. and Duguid, P. (1991) 'Organizational learning and communities-of-practice: Towards a unified view of working, learning and innovation'. *Organization Science*, 2: 40-57.

Brown, J. S. and Duguid, P. (2001) 'Knowledge and organization: A social-practice perspective'. *Organization Science*, 12(2): 198-213.

Burckley, P. J. and Carter, M. J. (1999) 'Managing cross-border complementary knowledge'. *International Studies of Management and Organisation*, 29(1): 80-104.

Burt, R. S. (1992) *Structural Holes: The Social Structure of Competition*, Cambridge: Harvard University Press.

Cohendet, P., Kern, F., Mehmanpazir, B. and Munier, F. (1999) 'Knowledge coordination, competence creation and integrated networks in globalised firms', *Cambridge Journal of Economics*, 23: 225-241.

Conner, K. R. and Prahalad, C. K. (1996) 'A resource-based theory of the firm: Knowledge versus opportunism', *Organization Science*, 7(5): 477-501.

Devos, G., Vanderheyden, K. and Van den Broeck, H. (2001) 'A framework for assessing commitment to change: Process and context variables of organizational change', Paper presented at AOM, Washington.

Egelhoff, W. G. (1982) 'Strategy and structure in multinational corporations: An information processing approach', *Administrative Science Quarterly*, 27: 435-458.

Egelhoff, W. G. (1990) 'Information-processing theory and the multinational enterprise', *Journal of International Business Studies*, 22(third quarter): 341-367.

Galbraith, J. R. (1973) *Designing complex organizations*, Reading, Mass.: Addison-Wesley Publishing Company.

Galbraith, J. R. (1995) *Designing Organizations*, 1st edn. San Francisco: Jossey-Bass Publisher.

Gargiulo, M. and Benassi, M. (2000) 'Trapped in your own net? Network cohesion, structural holes, and the adaptation of social capital', *Organization Science*, 11(2): 183-196.

Ghoshal, S., Korine, H. and Szulanski, G. (1994) 'Interunit communication in multinational corporations', *Management Science*, 40(1): 96-110.

Gold, A. H., Malhotra, A. and Segars, A. H. (2001) 'Knowledge Management: An organizational capabilities perspective', *Journal of Management Information Systems*, 18(1): 185-214.

Grandori, A. (1997) 'An organizational assessment of interfirm coordination modes', *Organization Studies*, 18(6): 897-925.

Grandori, A. (1997) 'Governance structures, coordination mechanisms and cognitive models', *The Journal of Management and Governance*, 1(1): 29-47.

Granovetter, M. S. (1973) 'The strength of weak ties', *American Journal of Sociology*, 6: 1360-1380.

Grant, R. M. (1996) 'Toward a knowledge-based theory of the firm', *Strategic Management Journal*, 17(Winter Special): 109-122.

Gresov, C. and Stephan, C. (1993) 'The context of interunit influence attempts', *Administrative Science Quarterly*, 38(2): 252-270.

Gupta, A. K. and Govindarajan, V. (2000) 'Knowledge flows within multinational corporations', *Strategic Management Journal*, 21: 473-496.

Hansen, M. T. (1999) 'The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits', *Administrative Science Quarterly*, 44: 82-111.

Heiman, B. and Nickerson, J. A. (2002) 'Towards reconciling transaction cost economics and the knowledge-based view of the firm: The context of interfirm collaborations', *International Journal of the Economics of Business*, 9(1): 97-116.

Hoopes, D. G. and Postrel, S. (1999) 'Shared knowledge, "glitches" and product development performance', *Strategic Management Journal*, 20: 837-865.

Kline, R. B. (1998) *Principles and Practices of Structural Equation Modelling*, New York: The Guilford Press.

Kogut, B. and Zander, U. (1993) 'Knowledge of the firm and the evolutionary theory of the multinational corporation', *Journal of International Business Studies*, 24(4): 625-645.

Kogut, B. and Zander, U. (1996) 'What firms do? Coordination, identity, and learning', *Organization Science*, 7(5): 502-518.

Kopalle, P. K. and Lehmann, D. R. (1997) 'Alpha inflation? The impact of eliminating scale items on Cronbach's Alpha', *Organizational Behavior and Human Decision Processes*, 70(3): 189-197.

Krackhardt, D. (1990) 'Assessing the political landscape: Structure, cognition, and power in organizations', *Administrative Science Quarterly*, 35: 342-369.

Lane, P. J. and Lubatkin, M. (1998) 'Relative absorptive capacity and interorganizational learning', *Strategic Management Journal*, 19: 461-477.

Lave, J. and Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*, Cambridge: Cambridge University Press.

Leana, C. R. and Van Buren III, H. J. (1999) 'Organizational social capital and employment practices', *Academy of Management Review*, 24(3): 538-555.

Levitt, B. and March, J. (1988) 'Organizational learning'. *Annual Review Sociology*: 319-340.

Liebesskind, J. P. (1996) 'Knowledge, strategy, and the theory of the firm', *Strategic Management Journal*, 17(Winter special): 93-107.

Liedtka, J. (1999) 'Linking competitive advantage with communities of practice', *Journal of Management Inquiry*, 8(1): 5-16.

March, R. M. and Simon, H. A. (1958) *Organizations*, New York: Wiley International.

Marengo, L. (1993) 'Knowledge distribution and coordination in organizations: On some social aspects of the exploitation vs exploration trade-off', *Revue Internationale De Systémique*, 7(5): 553-571.

Martinez, J. I. and Jarillo, J. C. (1989) 'The evolution of research on coordination mechanisms in multinational corporations', *Journal of International Business Studies*, 20(3): 489-514.

Mayer, R. C., Davis, J. H. and Schoorman, F. D. (1995) 'An integrative model of organizational trust', *Academy of Management Journal*, 20: 709-734.

McAllister, D. J. (1995) 'Affect-and cognition-based trust as foundations for interpersonal cooperation in organizations'. *Academy of Management Journal*, 38(1): 24-59.

McEvily, S. K., Das, S. and McCabe, K. (2000) 'Avoiding competence substitution through knowledge sharing', *Academy of Management Review*, 25(2): 294-311.

Miller, D. and Dröge, C. (1986) 'Psychological and traditional determinants of structure', *Administrative Science Quarterly*, 31: 539-560.

Millward, L. J. and Jeffries, N. (2001) 'The team survey: A tool for health care team development', *Journal of Advanced Nursing*, 35(2): 276-287.

Mintzberg, H. (1989) *Mintzberg on Management - Inside our strange world of organizations*, New York: The Free Press.

Mishra, A. K. and Spreitzer, G. M. (1998) 'Explaining how survivors respond to downsizing: The roles of trust, empowerment, justice and work redesign', *Academy of Management Review*, 23(3): 567-588.

Nahapiet, J. and Ghoshal, S. (1998) 'Social capital, intellectual capital, and the organizational advantage', *Academy of Management Review*, 23(2): 242-266.

Nelson, R. R. and Winter, S. G. (1982) *An Evolutionary Theory of Economic Change*, Cambridge, Mass.: Harvard University Press.

Newell, S. and Swan, J. (2000) 'Trust and inter-organizational networking', *Human Relations*, 53(10): 1287-1327.

Nohria, N. and Eccles, R. G. (1992) *Networks and Organizations*, Boston: Harvard Business School Press.

Nunnally, J. C. (1978) *Psychometric Theory*, New York: McGraw-Hill.

Pfeffer, J. and Salancik, G. R. (1978) *The External Control of Organizations: A Resources Dependence Perspective*, New York: Harper & Row.

Scandura, T. A. and Williams, E. A. (2000) 'Research methodology in management: Current practices, trends, and implications for future research', *Academy of Management Journal*, 43(6): 1248-1264.

Senge, P. M. (1994) *The Fifth Discipline: The Art & Practice of The Learning Organization*, 1st edn. New York: Currency Doubleday.

Simonin, B. L. (1999) 'Transfer of marketing know-how in international strategic alliances: An empirical investigation of the role and antecedents of knowledge ambiguity', *Journal of International Business Studies*, 30(3): 463-490.

Spender, J. C. (1996) 'Making knowledge the basis of a dynamic theory of the firm', *Strategic Management Journal*, 17(Winter Special Issue): 45-62.

Spender, J. C. and Grant, R. M. (1996) 'Knowledge and the firm: Overview', *Strategic Management Journal*, 17(Winter special): 5-9.

Spreitzer, G. M. and Mishra, A. K. (1999) 'Giving up control without losing control', *Group and Organization Management*, 24(2): 155-187.

Szulanski, G. (1996) 'Exploring internal stickiness: Impediments to the transfer of best practice within the firm', *Strategic Management Journal*, 17(Winter Special Issue): 27-43.

Szulanski, G. (2000) 'The process of knowledge transfer: A diachronic analysis of stickiness', *Organizational Behavior and Human Decision Processes*, 82(1): 9-27.

Teece, D. J. (1998) 'Capturing value from knowledge assets: The new economy, markets for know-how, and intangible assets', *California Management Review*, 40(3): 55-79.

Teece, D. F., Pisano, G. and Shuen, A. (1997) 'Dynamic capabilities and strategic management', *Strategic Management Journal*, 18: 509-533.

Thompson, J. D. (1967) *Organizations in Action*, New York: McGraw-Hill.

Tsoukas, H. (1996) 'The firm as a distributed knowledge system: A constructionist approach', *Strategic Management Journal*, 17(Winter Special): 11-25.

Van den Bosch, F. A. J. and Van Wijk, R. A. (1998) 'Coordination mechanisms, property rights and micro-level ties from a knowledge perspective: The case of internal networks', Paper presented at AOM, San Diego.

Van den Bosch, F. A. J., Volberda, H. W. and de Boer, M. (1999) 'Coevolution of firm absorptive capacity and knowledge environment: Organizational forms and combinative capabilities', *Organization Science*, 10(5): 551-568.

Van De Ven, A. H., Delbecq, A. L. and Koenig, R. (1976) 'Determinants of coordination modes within organizations', *American Sociological Review*, 41(April): 322-38.

Williamson, O. E. (1975) *Markets and Hierarchies: Analysis and Antitrust Implications*, New York: Free Press.

Winter, S. G. (2000) 'The satisfying principle in capability learning', *Strategic Management Journal*, 21: 981-996.

Wright, P. M., Dunford, B. B. and Snell, S. A. (2001) 'Human resources and the resource based view of the firm', *Journal of management*, 27: 701-721.

Zack, M. H. (1999) 'Managing organizational ignorance', *Knowledge Directions*, 1 (Summer): 36-49.

Zander, U. and Kogut, B. (1995) 'Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test', *Organization Science*, 6(1): 76-92.

TABLE 1:**The four coordination types**

Coordination types	Mechanisms	Disciplinary perspectives
Systems	Plans, procedures, rules, goals, manuals, standards, policies, hierarchical decision-making	Organization design, organization theory (Galbraith, 1995, Grandori, 1997, Grant, 1996, Mintzberg, 1989, Van den Bosch and Van Wijk, 1998)
Formal networking	Teams, project groups, integration roles, coordinators, mutual adjustment	Learning organization, organization theory (Galbraith, 1995, Senge, 1994, Van den Bosch and Van Wijk, 1998)
Informal networking	Personal relationships and networking	Network literature, social capital (Adler and Kwon, 2002, Burt, 1992, Gargiulo and Benassi, 2000, Granovetter, 1973, Hansen, 1999, Leana and Van Buren III, 1999, Nahapiet and Ghoshal, 1998, Nohria and Eccles, 1992)
Shared values	Values, implicit (socialization) norms, shared mental models, implicit routines	Social identity, community of practice (Albert, Ashforth, and Dutton, 2000)

FIGURE 1:

Relevant aspects for sharing competencies among business units (BU)

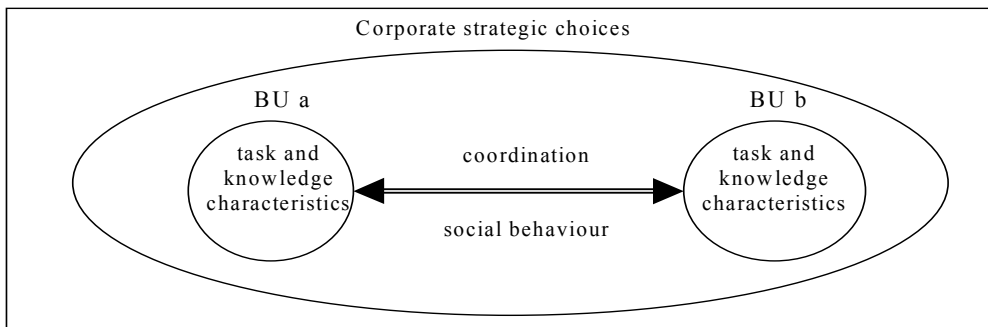


FIGURE 2:

Measurement model

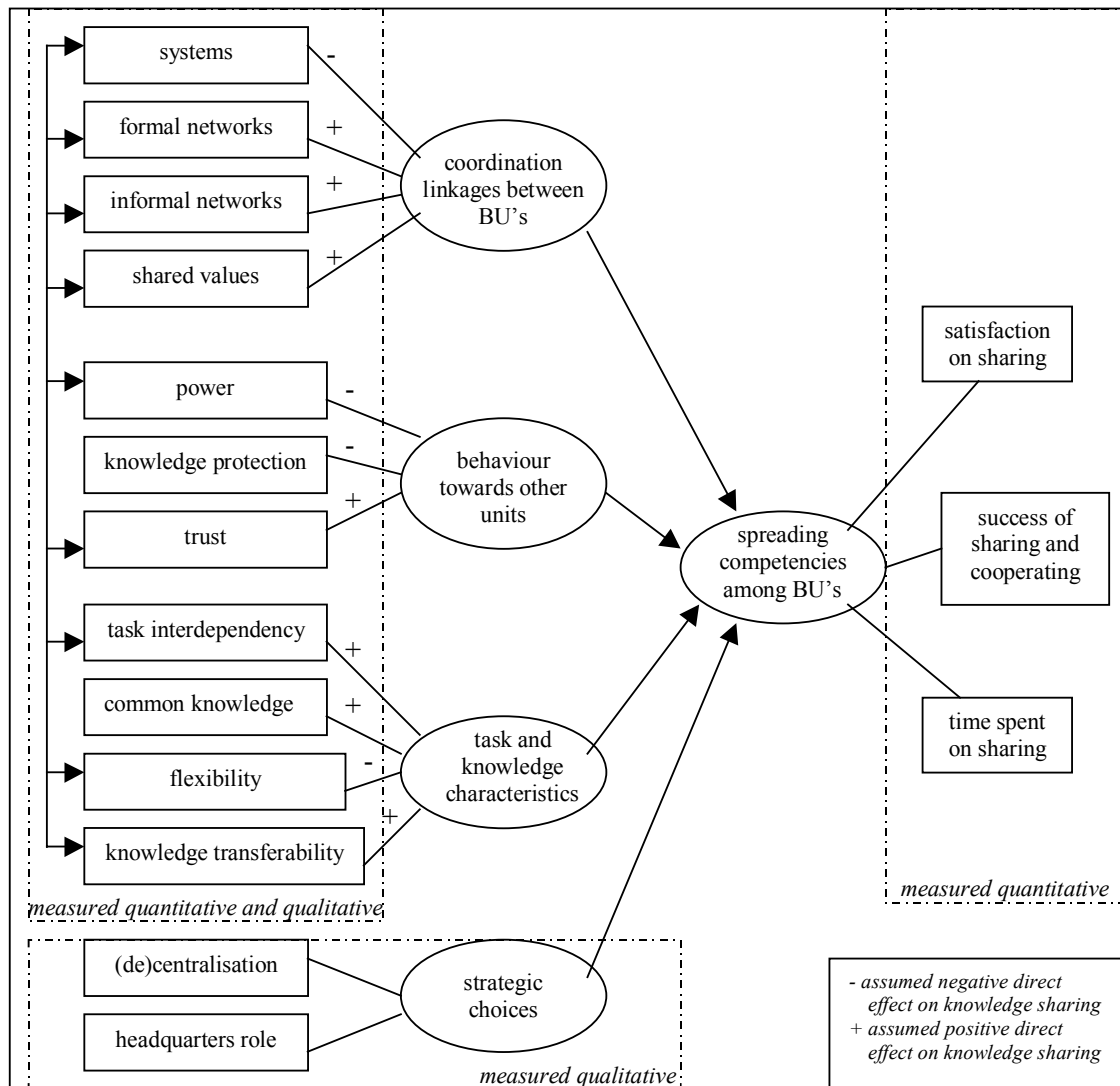


TABLE 2:**Means, standard deviations and Pearson correlations**

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Systems	3.03	0.65													
2. Formal networking	3.52	0.67	0.27**												
3. Informal networking	3.47	0.54	-0.29**	-0.09											
4. Shared values	3.69	0.73	0.16*	0.46**	-0.02										
5. Trust	3.75	0.51	0.08	0.43**	0.00	0.62**									
6. Power	2.89	0.71	-0.07	-0.36**	0.17*	-0.46**	-0.65**								
7. Knowledge protection	2.99	0.72	-0.11	-0.34	0.20*	-0.40**	-0.53**	0.73**							
8. Common knowledge	3.24	0.68	0.25**	0.41**	-0.08	0.39**	0.34**	-0.32**	-0.25**						
9. Task interdependency	2.93	0.82	0.12	0.10	0.05	0.04	-0.08	0.13	0.22**	-0.12					
10. Knowledge transferability	3.55	0.49	0.25**	0.51**	-0.9	0.48**	0.58	-0.45**	-0.44**	0.47**	0.01				
11. Flexibility	3.60	0.62	0.15*	0.03	0.21**	-0.13	0.00	0.20*	0.21**	0.00	0.24**	-0.05			
12. Satisfaction	3.69	0.65	0.13	0.56**	0.07	0.51**	0.66**	-0.36**	-0.32**	0.27**	0.10	0.64**	0.03		
13. Success	3.65	0.63	0.11	0.22**	-0.25**	0.37**	0.52**	-0.42**	-0.43**	0.21**	-0.32**	0.43**	-	0.37*	
													0.20*	*	
14. Time	3.49	0.95	0.06	0.15*	0.21**	0.11	0.05	0.03	-0.03	-0.08	0.39**	0.07	0.11	0.13	-0.12

n = 165

*P < .05

**P < .01

FIGURE 3:

Standardized parameter estimates for the direct and indirect effects of the coordination variables

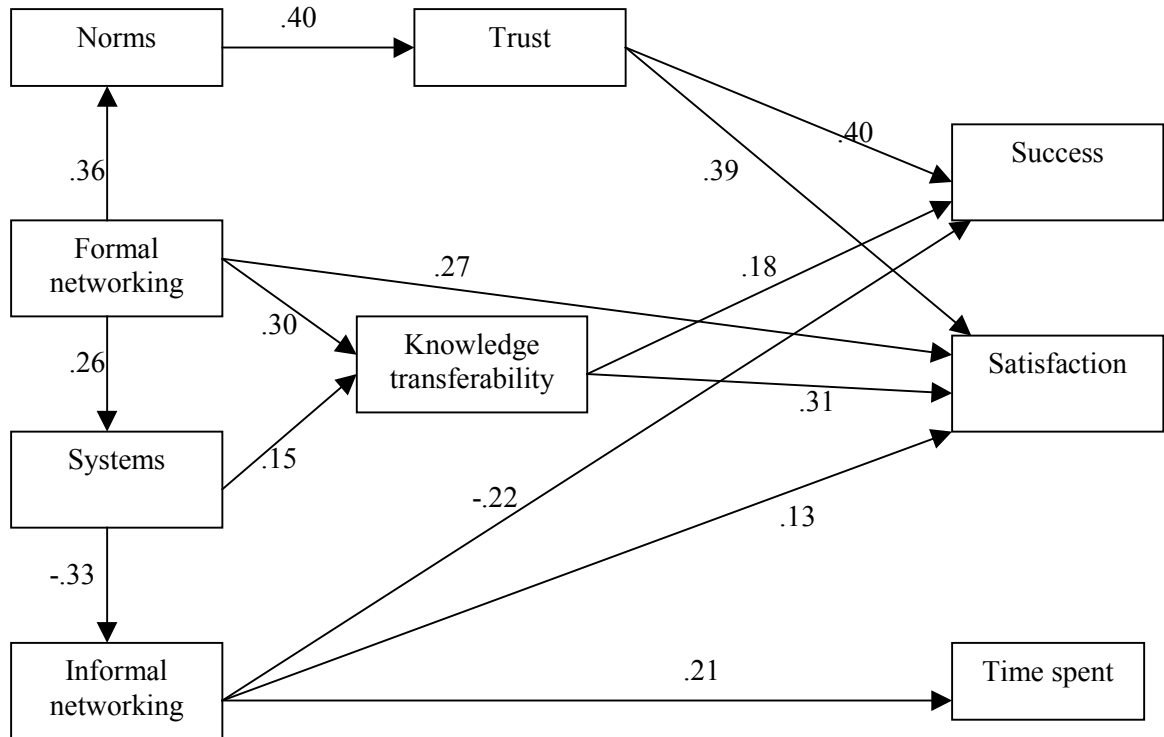


FIGURE 4:

Standardized parameter estimates for the direct and indirect effects of the behavior variables

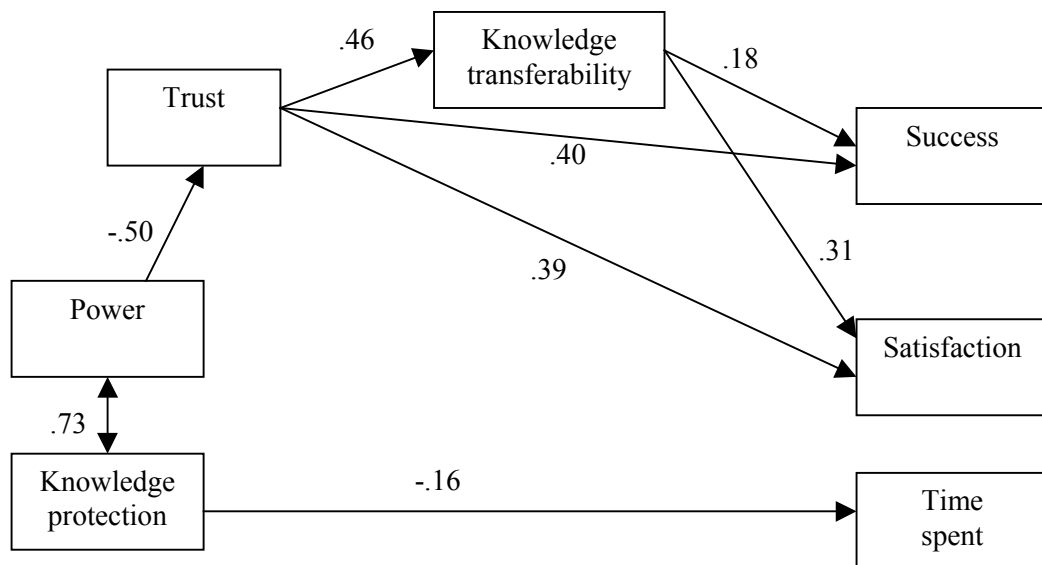


FIGURE 5:

Standardized parameter estimates for the direct and indirect effects of the task and knowledge characteristic variables

