

MANAGING AND ORGANIZING CONCURRENT KNOWLEDGE EXPLORATION AND EXPLOITATION

**On the organizational antecedents and outcomes of
inter-unit knowledge exchange and the role of IT***

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ABSTRACT

Both in theory and in practice insight is limited about how firms in dynamic environments could organize to manage concurrently the strategic processes of exploring new knowledge *and* exploiting existing knowledge. To contribute to this issue, a conceptual framework is developed which considers the ability to exchange knowledge across organization-units within a firm as a prerequisite to achieve both the goals of exploring and exploiting organizational knowledge. This framework shows how awareness and interest towards exchanging knowledge across units, internal knowledge transfer mechanisms, prior knowledge of the organization units and their organization form, influence the processes of exploration and exploitation within the firm.

The conceptual framework and the propositions are illustrated by two case studies of Novartis, one of the leading European life-science companies. The first case is about exchanging knowledge between Novartis' divisions in the actual organization context. The second case is about an experiment of Novartis' top management to stimulate the horizontal exchange of knowledge via the company's intranet. These two contexts of 'organization-enabled' and 'web-enabled' knowledge exchange appear to be complementary. While in the first case mainly the exploration of new knowledge is stimulated by exchanging tacit knowledge, the second case is more conducive to exploiting existing knowledge by exchanging explicit knowledge.

As such, the conceptual framework and cases give insight into (1) possibilities about how firms could organize to deal with the tension between knowledge exploration and exploitation, (2) how managing the organizational antecedents of horizontal knowledge exchange can contribute to changing a firm's actual mixture of exploration/ exploitation processes into a more desired mixture, and (3) about the possible role of IT in this respect.

Keywords: horizontal knowledge exchange, knowledge exploration and exploitation, organization enabled versus web-enabled knowledge exchange

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INTRODUCTION

The question why and how certain firms are more successful over time than others is one of the most fundamental questions in strategy, both from a researcher and a practitioner point of view. By adopting the “exploration/ exploitation theory” (March, 1991; Lewin et al., 1999), the central crux in the paper is that, for being successful over time, a firm needs to engage in both knowledge exploration and exploitation. Achieving and sustaining a competitive advantage is assumed to depend on the firm’s ability to simultaneously engage in enough exploration to ensure profits for tomorrow and enough exploitation to ensure its current viability (Levinthal and March, 1993; Lewin et al., 1999; March, 1991). March (1991) associates exploration with search, variation, experimentation and innovation, whereas exploitation is associated with refinement, efficiency and application.

Research problem, goal and structure of the paper

It appears to be difficult however, both in theory and practice, to manage and organize concurrently the processes of knowledge exploration and exploitation. There seems to be a trade-off between the two strategic options because they compete for scarce resources and the returns from the two differ. Compared to returns from exploitation, returns from exploration are systematically less certain and more distant in time (March, 1991). It further appears to be difficult for firms to decide about the precise mix of exploration and exploitation activities, and to maintain that decided-for mixture. Apparently, there is a tendency for firms to fall into a “competence trap” (Leonard-Barton, 1992) or into a “failure trap” (Levinthal and March, 1993).

This paper argues along with other authors that knowledge exchange, and especially the *horizontal exchange of knowledge* within a firm (Hedlund, 1994; Nohria & Ghoshal 1997; Van Wijk & Van Den Bosch, 2000), plays an important role for managing the above described knowledge exploration/ exploitation problem. The horizontal exchange of knowledge takes place between divisions, between business units and between operating units. Vertical exchange of knowledge is associated with the vertical lines of hierarchy and follows a top-down or bottom-up direction (Van Den Bosch & Van Wijk, 1999). Horizontal knowledge exchange may contribute to exploring new knowledge through cross-fertilization of knowledge across an organization’s units and new knowledge combinations based on existing knowledge (Grant, 1996; Kogut & Zander, 1992). It may contribute to the exploitation of existing knowledge by improving the utilization, duplication and replication of knowledge assets throughout the firm as illustrated e.g. by the study of Szulanski (1996) about the internal transfer of best practices.

The *goal* of this paper is to create insight into, (1) how a firm could manage to change its actual mixture of knowledge exploration/ exploitation processes into a more desired mixture, and (2) how firms might organize to deal with the associated conflicts between these two processes. The focus will be on the role of intra-corporate horizontal knowledge exchange, by addressing as *research question*: ‘How do key organizational factors influence

horizontal knowledge exchange processes and how do these processes impact on the incidence of exploration/ exploitation activities of an organization?''.

To address this research question we first specify the building blocks of the basic conceptual framework of the paper. Then we illustrate how these building blocks are assumed to determine a firm's knowledge exploration/ exploitation mixture. As a next step, two case studies of Novartis, one of the leading European life-science companies, illustrate the conceptual framework. In the first case, the focus is on knowledge exploration. The second case deals with knowledge exploitation. Finally we discuss the findings and investigate the role of ICT in this research.

THEORY

Conceptual research framework

We describe the intra-corporate exchange of knowledge as a process, based on several previous studies about knowledge exchange between persons, groups, departments, units and plants within the own organization borders (Boone, 1997; Szulanski, 1996; Von Krogh and Köhne, 1998). Three distinctive phases are distinguished. First, a *Decision Phase* which comprises all activities that lead the potential donor and recipient to decide to start exchanging knowledge. When both a need and the knowledge to meet that need coexist in an organization, the decision can be made to start exchanging the knowledge. Discovering the knowledge(-need) is an important activity in this phase. Second, a *Transfer Phase* in which resources are allocated to actually transfer the knowledge. This can be done by use of different means such as meetings, conferences, multimedia computing, databases, etc. We label the final phase *Integration Phase*, where the recipient assimilates the newly received knowledge in its own knowledge base and starts using it.

Based on a literature review, several organizational factors are identified, which are assumed to influence the above mentioned three phases of the knowledge exchange process, be it in a more exploratory or exploitative direction. These organizational factors are shown in table 1 with illustrative references.

Insert table 1 about here

Figure 1 shows the major building blocks of the conceptual framework. It shows the horizontal exchange of knowledge as a three-phase process. The exchange processes are assumed to be the main internal determinants of the incidence of a firm's exploration/ exploitation activities. The organizational factors as shown in table 1 are linked to the horizontal knowledge exchange processes. Propositions are developed below based upon this figure 1, about how the organizational factors influence horizontal knowledge processes in terms of knowledge exploitation (upper part of figure 1) and in terms of knowledge exploration (lower part of figure 1).

Insert figure 1 about here

Propositions

The decision to start exchanging knowledge from one unit to another, originates in the awareness of a potential knowledge donor or recipient about where in the organization knowledge resides or is needed (Boone, 1997). This awareness may be shaped by the *Search Practices* for knowledge as employed by the potential donor or recipient. Such search practices may be diffused across individuals or quite centralized at unit of firm level. According to Cohen and Levinthal (1990), the interface function should be diffused if environmental turbulence is high and signals from the environment unclear: 'When information flows are somewhat random and it is not clear where in the firm or sub-unit a piece of outside knowledge is best applied, a centralized gatekeeper may not provide an effective link to the environment. Under such circumstances it is best for the organization to expose a fairly broad range of prospective "receptors"' (Cohen and Levinthal, 1990: 132). As environmental turbulence is associated with a need for exploration, we argue that when the need for exploration is high, the search practices should be diffused rather than centralized.

Proposition 1: *In the Decision Phase of the horizontal knowledge exchange process, Search Practices conducive to knowledge exploration are more diffused as compared to those conducive to knowledge exploitation.*

The second determinant of the Decision Phase, *Interest*, is about the willingness of the units to participate in knowledge exchange activities. At first sight, it seems that the donor unit only could lack interest because of such reasons as a possible negative trade-off between cost and benefit, an assumed loss in power base or fear for inter-unit competition (Boone, 1997, Von Krogh and Köhne, 1998). However, it seems that stimulating the interest of the recipient unit to engage in knowledge exchange activities, becomes important as well in the case of knowledge exploration. The benefits for the recipient in that case are less certain and more distant in time, as compared to knowledge exchange aimed at exploitation. March (1991: 73) expresses it in this way: 'compared to returns from exploitation, returns from exploration are systematically less certain, more remote in time, and organizationally more distant from the locus of action and adaptation'. These considerations give rise to the following proposition:

Proposition 2: *In the Decision Phase of the horizontal knowledge exchange process, stimulating the interest of the recipient-unit is more important for knowledge exploration, whereas stimulating the interest of the donor-unit is more important for knowledge exploitation.*

During the transfer phase, *Transfer Mechanism* related factors play a role. Knowledge exploration is associated with higher uncertainty and higher complexity than knowledge exploitation because desired and possible outcomes are unclear. We therefore argue that knowledge exchange aimed at exploration requires more 'media richness' than exploitation. Media richness can be defined as 'the communication medium's capacity to exchange mental representations within a specific time interval. It has two underlying dimensions—the variety of cues that the medium can convey and the rapidity of feedback that the medium can provide' (Huber, 1991: 103). The argument may also be based on the tentative assumption that exploration may be related to exchanging tacit knowledge while exploitation may be related to exchanging explicit knowledge. Sanchez et al. (1996: 8) e.g. relate 'qualitative changes in the existing stocks of assets' with competence building and 'quantitative changes in stocks of like-kind assets' with competence leveraging. The transfer of tacit knowledge requires mechanisms which allow for more intense, frequent, open and dense communication and personal interactions as compared to the transfer of explicit knowledge (Boone, 1997; Gupta & Govindarajan, 1991, 2000). These considerations lead to the following proposition:

Proposition 3: In the Transfer Phase of the horizontal knowledge exchange process, the transfer-mechanisms contain more 'media richness' in the case of knowledge exploration as compared to knowledge exploitation.

The first determinant of the Integration Phase is considered to be the *Prior Knowledge* base of an organization unit (Cohen & Levinthal, 1990; Leonard-Barton, 1992). It seems useful to distinguish between the level of depth and breadth of the knowledge base (Van Wijk, Van Den Bosch, & Volberda, 2001) for understanding how an organization's knowledge base could offer potential for knowledge exploration versus exploitation. Cohen & Levinthal (1990: 150) pointed out that, for an organization unit to be able to absorb knowledge from unrelated domains, the unit needs first to acquire the requisite breadth of knowledge. As such, an increase in the variety of an organization unit's knowledge base can be assumed to increase the potential of that unit to explore new knowledge (March, 1991). An increase in depth of the knowledge base offers an increased potential to exploit related knowledge. These considerations lead to the following proposition:

Proposition 4: In the Integration Phase of the horizontal knowledge exchange process, an increase in the breadth of the knowledge base of an organization-unit increases the potential for that unit to knowledge exploration, whereas an increase in the depth of the knowledge base increases the potential for knowledge exploitation.

The last determinant of the Integration Phase is the *Organization Form*. De Boer et al. (1999) and Van den Bosch et al. (1999) give a rationale for the impact of several basic organization forms on the ability of the organization to integrate knowledge. They assume that some organization forms such as the matrix-form offer potential to integrate knowledge conducive to the exploration of the organization's knowledge base, while other organization forms such as the functional-form offer potential for exploiting existing knowledge. These considerations lead to the following proposition:

Proposition 5: In the Integration Phase of the horizontal knowledge exchange process, a matrix or innovative organization form offer most potential to explore knowledge, whereas a functional organization form offer most potential to exploit knowledge.

CASE STUDIES

Case Company and Research Methodology

To illustrate the empirical applicability of the framework, case research has been performed within Novartis. Novartis is one of the top three European life-science companies (Cf. Forbes, 2002). Regarding the selection of this industry, several challenges in the life science industry provide an interesting context to investigate abilities to exchange, explore and exploit knowledge for firms who want to survive and succeed in the industry. The need to exchange knowledge across units is recognized by senior management, as the following quote from an interview emphasizes: 'Sharing knowledge across divisions becomes increasingly important for us. Take for example the functional foods in the industry; they actually are the result of cross-fertilization between pharmaceutical and "normal food"-knowledge'. Increased competition, changing legislation and fast technological developments force the incumbents to strategic renewal and the exploration of new knowledge (Volberda et al., 2001). Other pressures, like shareholder value creation, force the firms to focus on short-term costs and profits and demand an efficient exploitation of their current knowledge.

Two case studies are conducted. The first study is about how the organizational factors of figure 1 influence the various phases of knowledge exchange across Novartis' divisions when this exchange is aimed at exploring knowledge. This first study is mainly based on

interviews with 11 top and middle managers in the areas of research, development and knowledge management of two of Novartis' divisions. This choice is made because of the central role of top and especially of middle management concerning inter-unit knowledge flows (Nonaka & Takeuchi, 1995; Van den Bosch & Van Wijk, 1999) and the importance of research and development in the life-science industry. The interviews were conducted in the period of April to June 2000. The second case study concerns an experiment of Corporate Knowledge Management to stimulate the corporate wide exploitation of existing knowledge by an intra-net based knowledge sharing conference. The event took place at the same time as the interviews for the first study were held. The framework as developed in this paper was used to guide the preparation, conduct and evaluation of this conference. Contrasting the two cases allowed us not only to analyze to what extent they provide support for the propositions, but also to illustrate how organization-enabled knowledge exchange at Novartis (case 1) and web-enabled knowledge exchange at Novartis (case 2), relate to each other.

Case 1: Organizational-Enabled Knowledge Exchange Aimed at Knowledge Exploration

Impact of the organizational factors during the decision phase. It appeared from the interviews that both the potential knowledge donor and the recipient consider it very difficult to find out where potential knowledge exchange possibilities are situated within the organization for exploring new knowledge. All interviewed division managers said that personal contacts between people of various divisions are very limited and that this lack of personal contact seriously hinders the awareness of cross-division knowledge exchange opportunities when new knowledge needs to be explored (see box 1, quote 1).

Insert box 1 about here

Other factors, which may hinder cross-division knowledge exchange initiatives within Novartis, seem to be related to the interest determinant. Six of the eight division managers indicated that cooperation with respect to knowledge exchange is received well by their division or other divisions, but is not actively searched. Three reasons were found during the interviews. The most important reason for not being willing to engage in a knowledge exchange activity is that acting as a donor is assumed to take time that cannot be spent to profitable activities. This is an example of an efficiency rationale in terms of Boone (1997). Opposition by the donor because of personal reasons (no reward, knowledge considered as a power base or a personal property) and opposition by the receiving division because of fear to lose its independence play also a role. The underlying reason for both the efficiency rationale of the donor-divisions and the fear of the recipient-division could be the need for every division to run its business independently of others and the responsibility to make its own profit (see box 1, quote 2).

Corporate Knowledge Management tries to increase the interest for cross-division knowledge exchange among the divisions and their associates. They mainly do this by demonstrating, to the division managers and scientists, corporate management's commitment to such knowledge exchange activities. For instance posters and brochures can be found throughout the company showing slogans of the CEO, encouraging scientists and managers to have an open attitude towards each other and to share knowledge with each other, e.g.: 'our success in building a high performance organization will also be based on the capability of

sharing and exploiting or professional knowledge better and faster than our competitors' (company brochure Novartis, 1998).

Impact of the determinants during the transfer phase. The 'Research Advisory Board' and 'Technology Advisory Board' are two units within Novartis aim at stimulating the transfer of knowledge between divisions for exploring new knowledge. Top managers in the field of research, development and other disciplines of all the divisions have a seat in these boards. The goal of both boards is to launce, finance and monitor long-term, explorative, cross-division projects. About ten projects were initiated in 1999. All interviewees recognized these roles of the boards (see box 1, quotes 3 and 4).

The interpersonal relations stimulated by the Boards and the exploratory nature of the projects funded and coordinated by them, matches with the high need for tacit knowledge of the divisions and their focus on exploring knowledge. There seems to be a fit between the nature of knowledge in use (tacit) and the goal of the knowledge transfer activity (new competence building) on one hand and the richness of the transfer mechanism on the other hand. It should be remarked however, that the Boards do not directly bring the divisions' operational managers and scientists together; only top management of the divisions are involved in these activities. Since 1996, Corporate Knowledge Management experiments with the possibilities the Novartis' intranet offers to transfer knowledge between 'people at the front'; the scientists. One of these possibilities may be offered through the organization of web-based-conferences. This is what the second case study will be about.

Impact of the determinants during the integration phase. During the final phase of the model, the transferred knowledge is being integrated and put into use by the recipient. A difference between the two divisions under study appeared in this Phase. The interviewed managers of Pharma indicated that they actually hardly integrate knowledge from other divisions (see box 1, quote 5). If their division engaged in cross-division knowledge exchange, they almost always acted as a donor and not as a recipient. The managers of the Animal Health division indicated that their division acts mostly as a knowledge recipient (see box 1, quote 6). This corresponds with the assumption of the Senior Officer Corporate Knowledge Management that 'Animal Health is assumed to use more than the other divisions knowledge from other divisions'.

This observation could be substantiated during the case study research by developing an indicator of the breadth of knowledge in a particular division. The analysis of all the product and therapeutic areas of all the divisions of Novartis shows that about 67 different scientific and technological disciplines such as Gene Technology, MicroBiology, Chromatography, etc. lay at the basis of the life-science products. Some divisions use most of these disciplines as e.g. the Pharma division (about 52 of the 67), while other divisions use a limited number of these disciplines as e.g. the Animal Health (about 19). If the number of scientific and technological disciplines within a certain division are considered to be an indicator of the breadth of the knowledge base of that division, then it could be plainly stated that '67' is the maximum breadth of knowledge a division could reach through cross-division knowledge integrating activities. In that sense, Animal Health has more potential to increase its breadth of knowledge base by integrating knowledge from other divisions than Pharma has. Figure 2 shows graphically the number of scientific and technological disciplines in use at Pharma and Animal Health as a part of the total number of disciplines in use at Novartis.

Insert figure 2 about here

The Pharma division used in the period investigated a functional organization form. Such an organization form enables economies of scale, but the potential for scope and flexibility of knowledge integration is rather low because of communication difficulties between the functions (Volberda 1998: 138; De Boer et al. 1999). The organization form of the Animal Health division relates to the 'innovative form' (Volberda, 1998: 140). This organization form possesses a high potential for both exploring and exploiting knowledge. As De Boer et al. (1999: 384) pointed out: 'the underlying principle of the innovative form is, (...), to gather currently profitable, established product markets into a current business group and to place the development of new product-market positions into a team based innovation group. Thus the innovation group focuses on increasing the scope and flexibility of knowledge integration, while the current business exploits its efficiency of knowledge integration'.

Case 2: Web-Enabled Knowledge Exchange Aimed at Knowledge Exploitation

Introduction. Being aware of how difficult inter-division knowledge exchange takes place in the organizational setting as described in the first case, Corporate Knowledge Management experiments with possibilities to stimulate knowledge exchange throughout the company with help of the Novartis intranet. The 'virtual forum' is an electronic platform at the intranet where group discussions and conferences take place about specific themes, problems and products between scientists of Novartis from various divisions, countries, functions and background. During the period of the research, an electronic conference was organized and moderated by Corporate Knowledge Management, the first author of this paper and the head of a unit of the Pharma Division. This unit delivers analysis tools, databases and information sources to the scientists of the Pharma division and is located at Basel, Switzerland. Some general information about this conference can be found in box 2.

Insert box 2 about here

The goal of the conference was to improve the products of that organization unit and to find opportunities for extending the application of their existing products by stimulating the exchange of best practices about how to use the products among the scientists from all over the world. This inspires us to contrast this case with the previous one, which was mainly about intra-corporate knowledge exploitation. To facilitate this comparison, it was decided to organize the conference with help of and along the theoretical framework as developed in this paper. Below it is shown what specific managerial and organizational determinants for the phases of the knowledge exchange process were identified. The Decision and Transfer Phases are emphasized because these two phases could be finished within the limited time period of the research (from April to June 2000).

Impact of the determinants during the decision phase. The level of awareness and interest determine the success of the Decision phase according to the framework in figure 1. According to Jansen & Bach (1999), a certain critical mass of participants is *continuously* needed during a web-based conference. This means that potential participants have to be made continuously aware of and interested in the conference. To achieve this, before and during the conference, several informative and motivating newsletters, signed by Pharma middle managers, were sent to the potential participants to raise their awareness and interest about the conference to motivate them to visit the conference several times and to stimulate

those people who had not come yet, still to visit. Figure 3 shows the impact of these newsletters. All substantial increases in visits and readings took place within 24 hours after a newsletter had been sent.

Insert figure 3 about here

Thiesse & Bach (1999) mention as the most important factor why people lack willingness to participate in ICT-related knowledge sharing-tools such as an electronic conference, a lack of trust because people don't know each other and/or the tool. To increase trust, a physical conference setting was replicated to make the conference more familiar; there was a 'bulletin board', a 'plenum room' and various 'break out rooms'. A kind of community feeling was created among the participants -who indeed did not know each other- by sending announcements and news letters only to a selected limited number of (about 180) people, all who were familiar with the products of the group. Finally, a short video-clip where the head of the product-group presents him and the conference provided the conference with a 'friendly face'.

Impact of the determinants during the transfer phase. Transfer mechanisms related factors determine the success of the second phase of the framework. Farag (1998: 46) mentions a *limited ability to communicate* with each other as a typical barrier for a transfer mechanism as an electronic conference. People can face difficulties in transferring knowledge via the medium because there is a limited ability to interact; they do not see and hear each other and the discussions are asynchronous. For this reason, about ten middle managers of the Pharma division were asked to act as 'challengers' during the Transfer Phase of the conference. Their task was to post some 'challenging' documents in the conference's rooms that provoke discussion and interaction among the participants. Finally, a potential lack of transfer skills to handle the medium among the participants was tackled by providing them with instructions and guidelines about how to subscribe, how to read, post and comment on documents in the electronic conference.

Figure 3 can also be seen as a visualization of the knowledge being transferred during the conference. The exchange of knowledge took place by posting and subsequently downloading explicit knowledge in the form of research data, documents and pictures. Novartis' Corporate Knowledge Management considers the conference as successful in terms of participation, interaction and knowledge exchanged. It is decided to continue to organize and moderate web-based knowledge exchanging. Electronic conferences seem to be a very effective tool for bringing Novartis' scientists together and make them exchange and use existing knowledge.

DISCUSSION AND CONCLUSION

Changing the Mixture of Knowledge Exploration and Knowledge Exploitation

One of the main conclusions of this paper is, that if a firm wants to change its current exploration/ exploitation mix towards either more exploration or more exploitation, it should change the organizational factors in the direction as indicated by figure 1 and the propositions, in order to stimulate the horizontal knowledge exchange processes towards the desired direction. As such, this paper gives an argument for *what* the internal determinants of an organization's mixture of exploration/ exploitation activities are, and it illustrates in *what way*

and form these determinants favor the mixture towards the explorative and in what way and form towards the exploitative side. We will now contrast the two cases and analyze to what extent they provide support for the formulated propositions. Contrasting the cases is interesting because knowledge exchange in the first one was mainly focused to explore knowledge by recombining knowledge from different divisions while the second case has as a main consequence the exploitation of existing knowledge.

First proposition. A serious hinder in the first case for deciding to exchange knowledge between divisions, is that the search practices are not elaborate enough according to the managers of the divisions. The search practices are centralized at headquarters (the “YellowPages”). This may indicate that increasing the level and extent of search practices may be beneficial for knowledge exchange initiatives with the goal to explore knowledge. Personal networks, which are actually absent, would be the preferred awareness facilitator according to the interviewees. Centralized awareness facilitators work sufficiently well in the second case.

Second proposition. The interview results of the first case indicate that serious barriers exist with respect to the interest of both the recipient and donor units to exchange knowledge from each other. One of the reasons is that the recipient unit fears to lose part of its independence when receiving knowledge from other divisions. Stimulating both the donor and recipient seems to matter in the exploration case. In the exploitation case, only stimulating the donor’s interest to participate in the knowledge-exchange event was considered as a requirement for the event’s success.

Third proposition. In both cases the transfer mechanisms in use were found to be adequate. The mechanisms in the knowledge exploration case (the meetings and projects facilitated by the Research and Technology Advisory Boards) allow for more ‘media richness’ than the mechanism in the exploitation case (the electronic platform that allows only asynchronous interaction and the exchange of explicit knowledge).

Fourth proposition. Management indicated that the Animal Health division is more active in integrating knowledge from other divisions conducive to knowledge exploration than the Pharma division. This can be related to the fact that Animal Health has more opportunities to increase the breadth of its knowledge base by exchanging knowledge from other divisions: only 28 percent of all scientific and technological disciplines of Novartis are in use at Animal Health, while 78 percent at Pharma.

Fifth proposition. It is illustrative in the first case that Animal Health, which absorbs more knowledge than Pharma, has an innovative organization form, while Pharma has a functional form.

Although the case studies provide partial support for the propositions as derived from the conceptual framework, this support can only be called preliminary. This framework should be further refined however and the relative importance of the managerial and organizational factors could be assessed with help of (quantitative) research in other companies and/ or other industries.

Organizing for Both Knowledge Exploration and Exploitation: Complementary of Organization-Enabled and Web-Enabled Knowledge Exchange

At this point we did not yet address explicitly the issue of how firms might organize to deal with the associated conflicts that conducting both the processes of exploring and exploiting knowledge might create within the firm. With respect to this issue, the paper at first sight seems to favor the conclusion that these processes cannot be synthesized but should rather be separated in place and/ or time. This conclusion can be illustrated with help of the identified organizational antecedents of horizontal knowledge exchange, whose attributes

seem to be mutually exclusive for knowledge exploration versus exploitation (figure 1). Spatial separation is for instance illustrated in the literature on internal corporate venturing where a firm develops explorative modes and exploitative modes in different portions of the organization (Volberda, 1998). However, there are problems involved as well, for instance re-assimilating or exploiting the newly created knowledge into the parent organization (Burgelman, 1983). In the oscillating organization for example, separation of time takes place by alternating periods of stability (exploitation) with periods of renewal. However, in an environment of frequent change, the oscillating firm has the risk of becoming extremely chaotic or rigid (Volberda, 1998).

Comparing and contrasting the two case studies again, might give some interesting insights into how firms could organize to deal with the tension between exploration and exploitation processes. Organization and web-enabled knowledge integration appear to be complementary ways to stimulate knowledge exchange between organization units. The complementarity of organization and web-enabled knowledge exchange is not only illustrated by the focus of the first case on exploration and the focus of the second case on exploitation, but also because mainly tacit knowledge was being transferred in the organizational setting of case 1 and integrated at unit or division level, while mainly explicit knowledge was being transferred in the second case and integrated at individual level. An interesting direction for future research could be about the reciprocal influence of the organizational context and intranet-context. Newell, Scarbrough and Swan (2001) already indicated a number of ways in which the organizational context influenced intranet developments.

Currently, the authors address the same research question as addressed in this paper to the Dutch financial services sector. Both qualitative and quantitative research is being conducted. Special attention is paid to the organizational versus intranet context through which knowledge is being exchanged.

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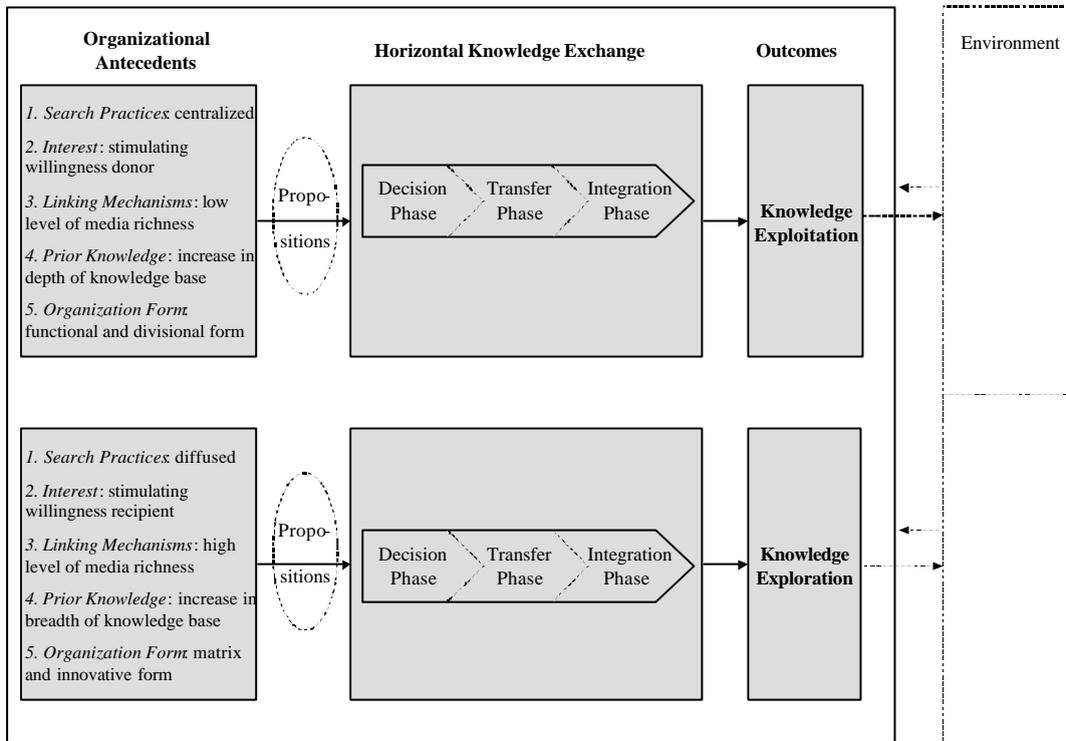
Tables

Table 1- Key organizational factors influencing horizontal knowledge exchange processes in a more exploratory or exploitative direction

Organizational factor	Illustrative references
1. Search Practices	Cohen and Levinthal (1990) Levinthal and March (1993) March (1991); Sidhu et al. (2001)
2. Interest	Burgelman (1994) Ghemawat and Ricart I Costa (1993) Gupta and Govindarajan (1991) Levinthal and March (1993); McGrath (2001)
3. Linking Mechanisms	Benner and Tushman (2002) De Boer et al. (1999) Grant (1996) Leede et al. (2002) Van den Bosch et al. (1999)
4. Prior Knowledge	De Boer et al. (1999) Cohen and Levinthal (1990) Leonard-Barton (1992) March (1991); Van den Bosch et al. (1999)
5. Organization Form	Benner and Tushman (2002); Burgelman (1988) De Boer et al. (1999) Ghemawat and Ricart I Costa (1993) James, Brockbank and Ulrich (2002) Van den Bosch et al. (1999)

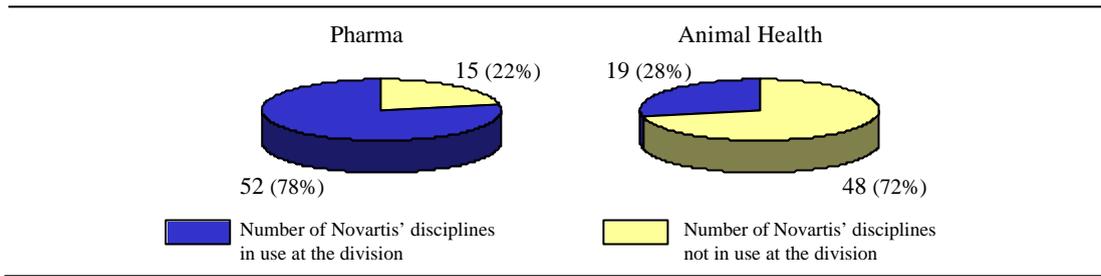
Figures

Figure 1- Impact of organizational factors on horizontal knowledge exchange processes and the resulting influence on knowledge exploration/ exploitation activities in a multiunit firm



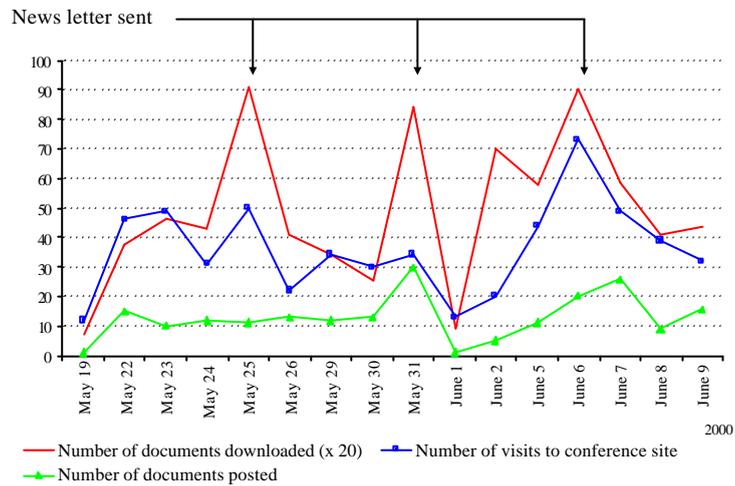
Source: Based on Boone (1997), Szulanski (1996), Von Krogh and Köhne (1998), and table 1

Figure 2- Tentative Visualization of Actual and Potential Breadth of Divisions' Knowledge Base



Source: Novartis' intranet life-science network

Figure 3- Transfer of Knowledge and Impact of Newsletters During the Conference



Source: Corporate Knowledge Management Novartis

Boxes

Box 1- Excerpt Interview Quotes Concerning Case 1

1. As a manager of the Animal Health division pointed out: *'It is difficult to know what knowledge is where. There clearly is a lack of whoknows what. I think a major reason that knowledge sharing initiatives are not started is that people don't know each other across divisions; there are too less interpersonal relationships between divisions for really knowing who knows what'*. (Interview, May 2000)
2. As a Development manager of one of the divisions states: *'We have to be able to run our business independently of other divisions. If we borrow too much knowledge from others, we might loose that capability'*. (Interview, June, 2000)
3. A manager of Pharma for instance comments: *'The Research and Technology Advisory Boards are very useful for maintaining a long-term, innovative and inter-division view because their projects are explorative and long-term focused. The most valuable of the RAB and TAB are the people from other divisions we get to know who work on related problems as we do'*. (Interview, May 2000).
4. An Animal Health manager pointed out: *'The Technology Advisory Board opened some doors for our division to other divisions. We met people who helped us solving problems we had'*. (Interview, May 2000)
5. As an interviewee of the Pharma division comments: *'When we join cross-division projects, we spend most of the time in providing other's with knowledge while we do not learn that much'*. (Interview, May, 2000)
6. As a manager of the Animal Health division states: *'Our division tries to use as much as possible knowledge from others; that is the way we have grown'*. (Interview, June, 2000)

Source: Interviews conducted at Novartis, May-June 2000

Box 4- Data of the Web-Enabled Conference

- Duration: launch May 22, end June 9 2000
- 140 participants, 33 nationalities
- 225 posted documents (comments, data, drawings, etc.)
- On average 5 visits per participant and 118 documents read per participant