# Alliances for innovation

## A structural perspective on new business development in cooperative ventures

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## A structural perspective on new business development in cooperative ventures

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*EFI, The Economic Research Institute*

**To Lisa, Henrik, Oscar, and Gustav**

# PREFACE

# ACKNOWLEDGMENTS

Writing a thesis is more than just writing a book, it is a personal adventure that requires the author to call into question many of his own assumptions and values. It is also a social process inasmuch as it involves capturing a new scientific language and new analytical tools. This challenge is not possible to accomplish alone, thus I owe a great debt of gratitude to those many individuals that have helped and supported me in making this thesis possible.

First, I want to express my deepest gratitude to the members of the Thesis Committee. You have worked as a team, creating an atmosphere characterized by acumen and humor which has been important as regards supporting me and has made this strenuous work so much more enjoyable. Professor Christer Karlsson, my principal supervisor, comprehended my way of thinking and motivated me to explore important avenues that I would otherwise have ignored, as well as giving me the strength to pursue in uncertain situations. Andreas Werr, my assistant supervisor, has shown incredible patience regarding all my confusing ideas and has systematically helped me to enter the world of scientific writing and reasoning. Peter Hagström joined the team at a later stage and was crucial in the finishing of this thesis by indefatigably helping me to understand what is great with this thesis and by generously suggesting different strategies for improving the other parts of it.

Second, I want to thank my employer[1] for generously financing both the research program and my participation in it. My special thanks go to Corporate Human Resources, personified by Gudrun Bager who, despite the recession in the telecom industry, secured the financing for the entire project. My superiors during these years have also played an important role in enabling this journey. My special thanks go to Magnus Sjölund for creating a context enabling me to combine various exciting tasks at Fusion with the research program in an integrated way. I would also like to thank, in chronological order, Bo Carlsson, Thorbjörn Eklöf, and Göran Olsson for their unfailing support during my Ph.D. studies. I also want to thank my colleagues for all the discussions which secured

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[1] My employer is described in paper III and is called Fusion to retain anonymity. Fusion is a wholly own subsidiary to the corporation that has been given various names in the different papers (TeleProvider, Eurotel and TeleSoft).

# LIST OF CONTENTS

## APPENDED PAPERS

Paper I    Linnarsson, H. and A. Werr (2004). "Overcoming the innovation — alliance paradox: a case study of an explorative alliance." European Journal of Innovation Management 7 (1): 45-55

Paper II   Linnarsson, H. (2005). "Patterns of alignment in alliance structure and innovation." Technology Analysis and Strategic Management, Forthcoming

Paper III  Linnarsson, H. (2005). "Managing the relation between system integrator and their product suppliers." Under review in Journal of Change Management.

Paper IV   Linnarsson, H. (2005). "Outsourcing Service Innovation." To be revised and submitted for a second review in Creativity and Innovation Management

Paper V    Kling, R. and H. Linnarsson (2003). "Outsourcing R&D for flexibility – Experiences from the telecom industry" The 10th International Product Development Management Conference, Brussels


## LIST OF FIGURES

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# CHAPTER ONE

# ALLIANCES AND INNOVATION

## THE PROBLEM

### A rise in innovation-based alliances

Innovation is recognized as a key source of competitive advantage in modern economies (Wheelwright and Clark 1992b). Many other sources of competitive advantage, and barriers to competition, have decreased in significance during recent decades due to deregulation and liberalization, e.g. barriers to international trade. Deregulation and liberalization have also supported the globalization of the world economy. In a globalized world, innovation has become more important to firms as a way to escape price competition This increased focus on innovation has increased requirements for innovativeness, entailing shorter product lifecycles and escalating R&D costs. The increased costs and risks associated with innovation have made this difficult to manage within the individual firm.

Forming alliances with other firms provides an opportunity to deal with the dual challenge of increased requirements for innovativeness and increased costs and risks regarding innovation. Alliances provide access to knowledge that would be very difficult and expensive to develop in-house. Innovations of a more systemic nature require many different knowledge fields and it is difficult for one firm to master them all. Cooperation with other firms possessing complementary knowledge enables a firm to focus on its core competencies, which is a common recommendation as regards enhancing competitiveness (Prahalad and Hamel 1990). Doz and Hamel (1998) argue that this need to obtain complementary knowledge and resources, as well as the need to share investments and risks, explains the high level of interest in creating innovations in cooperation with other companies.

The increased importance of innovation and the opportunities associated with alliances have turned innovation-based alliances into an increasingly common strategy for product development, as Figure 1-1 illustrates.

Number of alliances
announced
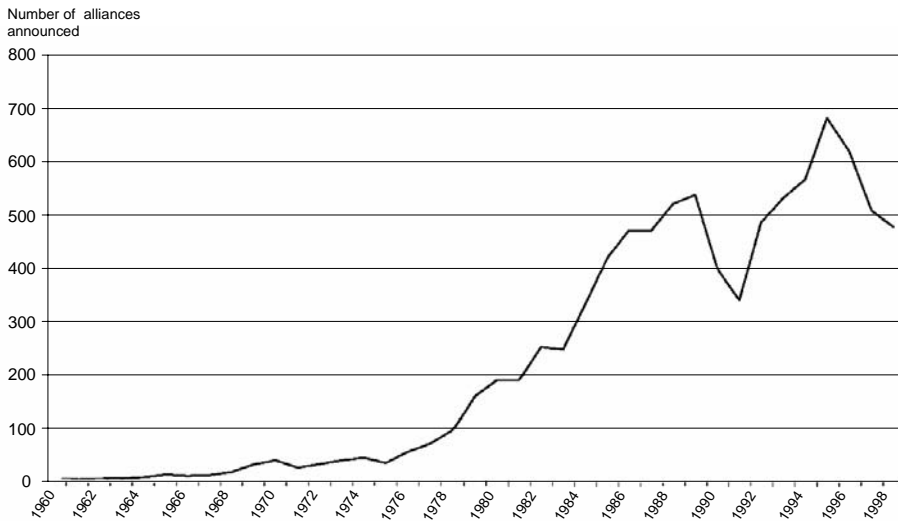


Figure 1-1 The growth of newly-established R&D partnerships (1960-1998) (Hagedoorn 2002). R&D is considered to be related to product development and innovation

Some well-known examples of innovation-based alliances include the cooperation between Daimler-Benz and Swatch for the Smart car, Microsoft and IBM for the DOS operating system, and Sony and Ericsson for mobile handsets. By combining complementary competencies, firms expect to create greater values than when trying to innovate alone. Several of these high-profile alliances involve an equity-based joint venture, although the great majority of innovation-based alliances are contractual (Hagedoorn 2002); alliances that are not always made public since this would not benefit the firms involved. The success of the alliances mentioned, as well as alliances in general varies greatly. Some could be described as success stories, e.g. Airbus, and some as nightmares, e.g. the Smart car.

Innovation-based alliances involve many challenges, with many alliances failing to match expectations. Nevertheless, they are growing in number due to the anticipated benefits associated with alliances. Among the challenges that have the potential to turn a promising alliance into a financial disaster are disputes concerning strategy or the distribution of the costs and benefits of the alliance. This could occur when an exploration reveals that initial assumptions concerning, for instance, the character of the market, the required competence, the quality of the partners' resources and the partners' intentions as regards the alliance, turn out to be wrong. The risk involved in giving up some of the firm's autonomy and exposing it to a possible draining-off of core competencies

might make most managers hesitant. Clear contracts are recommended by some as a solution to these challenges. A clear contract could prevent the uncertainty and unpredictability of innovation leading to a drift in the focus and strategic direction and ensure that the alliance does not evolve in the "wrong direction" vis-à-vis intentions. The opposite strategy, i.e. a loose contract and changes in both the focus and direction, could be more successful, however, since this flexibility makes it possible to adapt to the learning achieved during the exploration phase, thereby reducing the risk of unsuccessful innovation. The drawback of a trusting relationship guided by a loose contract is the risk of being deceived.

The difficulties of assessing the future of an innovation make it difficult to write contracts that are both clear and fixed, as well as find possible trusting relationships using loose contracts. The DOS alliance between IBM and Microsoft is an example of a situation where the future consequences of the innovation DOS, for the two partners, were difficult to assess in advance.

These contradictory requirements regarding alliances place great demands on their management. Unfortunately, there are no effective management tools for managers of innovation-based alliances. One explanation for this lack of tools might be the difficulties in developing recommendations that are caused by what the literature describes (see, e.g. Bidault and Cummings 1994) as a fundamental tension between the dynamics of innovation and the contractual nature of alliances.

## A fundamental tension between innovation and alliance

The requirement that the innovation process imposes on the context, e.g. the flexibility to adapt to learning, the acceptance of experimentation without goals that are too narrowly specified, and open communication between all involved, could be contrasted with the current alliance literature as well as the reality described above. This literature prescribes a well-defined situation where a clear contract can be agreed upon by the partners (Lorange and Roos 1992) and where suspicions about opportunistic behavior could lead to political struggles and reduced communication (Kale, Singh et al. 2000). The conflicting logic between the explorative nature of innovation and the contractual dimension of alliances is further stressed by Bidault and Cummings (1994) who even argue that there is a fundamental tension between the dynamics of innovation and the logic of alliances.

The existence of successful innovation-based alliances, e.g. Airbus, indicates that this tension is possible to manage. The managerial tools used to overcome this tension are, however, yet to be identified. Bidault and Cummings (1994) suggest, in their study of the tensions in innovation-based alliances, that the alliance structure, i.e. the way the alliance is decomposed as well as the arrangement and integration of these parts, is important when it comes to dealing with this tension. They investigated two parts of the structure; the division of responsi-

bilities between the partners regarding different tasks and the emphasis on the contractual nature of the agreement. Using the degree of tension as an inverted proxy for success, they found that structures which created rigidity and sluggishness increased the tension. The tension was reduced when the structures supported a) a champion of the innovation, b) united co-sponsorship, c) flexibility, d) information exchange, and e) ownership of the results. They recognize the need for further research regarding the development of additional structural factors. Sanchez and Mahoney (1996) stress the importance of the structure of the innovation in easing this tension by arguing that a high degree of modularity in the architecture of the innovation enables loosely-coupled organizations such as alliances. Their argument is that the clear module interfaces in modular product architecture provide embedded coordination of the development process. This embedded coordination significantly reduces the need for management to coordinate the development processes, thereby making possible the concurrent and autonomous development of modules by loosely-coupled organizations.

Considering Bidault and Cumming's (1994) argument that management structures are one of the few "action" variables that exist for managers, as well as Sanchez and Mahoney's (1996) argument that the structure of the innovation could reduce the need for interaction between the partners, it is considered reasonable to use a structural approach when trying to resolve the alliance-innovation tension. Using a structural approach involves identifying various aspects of alliance and innovation structures and trying to understand how these structures hinder or support the innovation process.

Alliances have been studied using a wide range of different perspectives focusing on, for example, resources (e.g. Tsang 2000), social capital (e.g. Kale, Singh et al. 2000), learning (e.g. Hamel 1991), and identity (e.g., Lerpold 2003), which all have their advantages. The structural approach is thus the choice of the author, without intending to call into question or reduce the explanatory value of other perspectives.

## A structural perspective on the alliance-innovation tension

Even using a wider perspective than a structural approach, there is limited knowledge of the practical management of innovation-based alliances and a need for more research (Gerwin and Barrowman 2002) (Koza and Lewin 1998; Spekman, Forbes et al. 1998; Barringer and Harrison 2000; Ireland, Hitt et al. 2002). The few existing empirical studies on innovation-based alliances (e.g., Bidault and Cummings 1994; Sivadas and Dwyer 2000) focus only partly on the alliance structure and not on the interplay between the alliance structure, the innovation structure, and the innovation process. The structures of alliances as well as innovations constitute some of the concrete tools that managers can use to guide the innovation process towards success. Unfortunately, the lack of

understanding of how these structures interact makes them difficult to use as management tools. The interplay between the structure of alliances and the structure of innovation during the process of creating innovations is thus an important area and one that needs empirically-based research. The theoretical approaches that discuss the structural aspects of innovation-based alliances are few (notable exceptions are Gerwin 2004; Gerwin and Ferris 2004) and have not been empirically tested yet. Gerwin and Ferris' (2004) recommendation of using two levels of analysis was chosen to be the basis for the model of the analysis in this thesis (see Structure of analysis p. 50).

## Positioning of the study

There are different types of innovation-based alliances. The most common distinction is made between innovation-based alliances where a separate legal entity is created for the innovation activities owned by the two partners and innovation-based alliances that are created via direct collaboration between the two partners. This thesis focuses on the latter type of alliance. The reason for focusing on contractual alliances is that the alliance-innovation tension is primarily an issue for this type of alliance.

The thesis' focus on innovations with a medium level of newness is a consequence of Robert and Berry's (1985) study of the strategies for entering new businesses, a study which suggests that alliances are most suitable for innovations with a medium level of newness. According to their model, incremental innovations are preferably carried out within the firm and radical innovations through venture capital investments in new companies.

The interdisciplinary character of the issue, touching both innovation management and alliance management, requires positioning in relation to these research fields. The innovation lies at the heart of this thesis and the intended contribution is primarily aimed at the innovation management literature and, secondarily, at the alliance literature. Five references are central to this thesis. Two of these are from the alliance management literature (Doz 1996; Koza and Lewin 1998) and three from the innovation management literature (Bidault and Cummings 1994; Sanchez and Mahoney 1996; Sivadas and Dwyer 2000). Koza and Lewin's (1998) contribution is their mapping of the dichotomy of exploration and exploitation to the purpose of alliances, as well as identifying the differences in management requirements that these two alliance purposes entail. Their article is the main inspiration for formulating the problem featured in this thesis. The article by Bidault and Cummings (1994) confirms the problematic nature of managing innovation in alliances and, most importantly, also identifies the fact that structures could be a useful management tool when dealing with many of the challenges of innovation-based alliances. The need to include both alliance and innovation structures is a consequence of Sanchez (1996) who links the

coordination need of an organization, e.g. an alliance, with the modularity, i.e. the internal structure of the innovation. Doz's article (1996) is important as regards showing that alliances evolve over time and that a study of the prerequisites of alliances is not sufficient in order to understand what makes them successful. Sivadas and Dwyer (2000) paint a static picture of innovation-based alliances which has played a supportive role in formulating the structural perspective on the dynamics of the innovation-based alliance.

## PROBLEM DEFINITION AND PURPOSE OF THE RESEARCH

The problem in focus in this thesis is *"how to mange an innovation-based alliance given the alliance-innovation tension"*. The problem is approached by looking at the structures of both the alliance and the innovation and their impact on the innovation process. The underlying hypothesis is that the structure will have an impact on the nature and the success of the innovation process. The purpose is thus:

*"Describe how and discuss why the structures of both the alliance and the innovation affect the innovation process in an alliance context".*
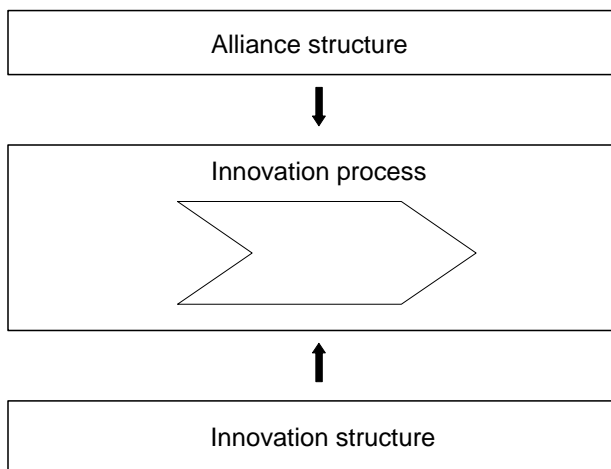
Figure 1-2   A conceptual model of the purpose of this thesis
The black arrows illustrate how the alliance and innovation structures affect the innovation process

The nature of the alliance and the innovation delimits the empirical basis for this study. The alliances included are formal cooperative ventures (Lorange and Roos 1992), a form of alliance that has gained ground compared with equity-based joint ventures over the last decade for innovation-based alliances (Hagedoorn 2002). The innovations in focus are of a medium level of newness which Garcia and Calantone (2002) label as "really new innovations", implying that either the technology or the market is new to the industry in contrast to radical innovations or incremental innovations. The innovation domain is technology-based products involving complex operation systems, which includes financial and telecommunication services.

## ROAD MAP OF THE THESIS

Following a description of the problem and the purpose, the time has now come to present a road map of this thesis. This thesis consists of five papers plus an extended summary that links the papers and adds an additional level of analysis over and above the individual papers. The extended summary (from now on referred to as "the thesis") was written after the papers, which could cause some confusion regarding the nomenclature. The intention behind the nomenclature used in the individual papers was to match the target journals. This nomenclature has evolved over time, thus the nomenclature used in the thesis could deviate from what has been used in the papers. Consequently, there is a short note addressed to the reader before each paper which describes how to map the nomenclature used in the paper to the nomenclature used in the thesis.

This thesis is composed of five parts (see Figure 1-3). The *first part* describes the problem, the purpose of the thesis, and develops tools for studying the problem. The frame of reference describes the central concepts, discusses the structural dimensions of alliances and innovations with the potential to affect the innovation process, elaborates the innovation and alliance processes, and ends with a discussion concerning different outcomes. Taking into account the discussion in the frame of reference, the purpose becomes transformed into a research question. The *second part* describes the methodology used when answering the research question. The *third part* presents the data in the form of short summaries of the included papers and descriptions of a number of issues important in the different cases. An analysis is made of the papers and the individual issues, resulting in a number of propositions for the cross-case analysis. The analytic model used separates into two levels of analysis and two phases of the innovation process, thereby creating a research matrix with four quadrants were each quadrant is analyzed as a case (see Structure of analysis, p. 50). The descriptions of the issues in the case-by-case analysis build on data directly from the studies as well as, whenever possible, data presented in the papers. The *fourth part* is the cross-case analysis where the results from both the case-by-case analysis and the papers are discussed across all quadrants in the research matrix. The *fifth and final part* of the thesis makes a synthesis and describes the contributions and implications.

Although the thesis might give a sense of using a deductive approach, the research process has been inductive, involving the interactive use of theory and empirical studies in order to develop theory. The frame of reference and the research matrix were thus not finalized until the results of the first study had been analyzed (see The research process – studies and papers, p. 52).

While the prime audience for this thesis is the academic community in innovation management, the first and last parts could well be worth reading for practicing managers in innovation-based alliances.

| Part I | Part II | Part III | Part IV | Part V |
|--------|---------|----------|---------|--------|
| Chapters 1&2 | Chapter 3 | Chapters 4&5 | Chapter 6 | Chapters 7&8 |

| Problem → Purpose → Frame of reference → Research question | Research methodology | Data and within case analysis — Case-by-case analysis ← Papers | Cross-case analysis | Synthesis and Conclusions → Contribution and Implications |
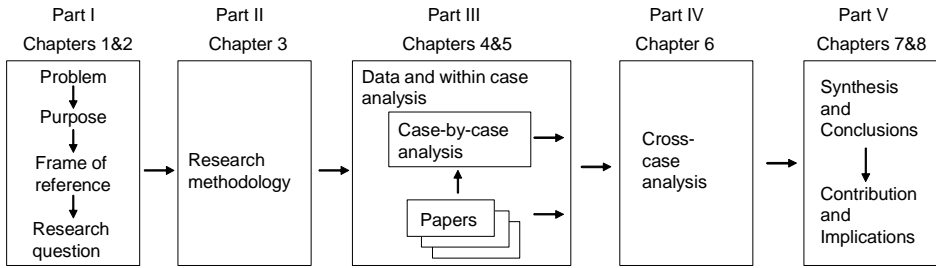
Figure 1-3  Road map of the thesis

# CENTRAL CONCEPTS

This section describes the two central concepts of this thesis; innovation and alliance.

## Innovation & Innovation process

The focus of this subsection is discussing and defining the "innovation" and the "innovation process". Many central works on innovation focus on taxonomies instead of definitions (e.g., Abernathy and Clark 1985; Henderson and Clark 1990) and these are included in order to make the positioning of the definition of innovation in this thesis more precise.

### Definition of innovation

In order to develop a platform for the definition of innovation, some classical definitions are presented. These classical definitions emphasize either the content aspect of innovation or the process aspect of the innovation. Based on these definitions, the terms "innovation" and "innovation process" are defined as they will be used in this thesis.

The first content-oriented definition highlights the novelty aspect of innovation. *"When an enterprise produces a good or service or uses a method or input that is new to it, it makes a technical change. The first enterprise to make a given technical change is an innovator. Its action is innovation"* (Marquis 1988). Later in the same article, Marquis adds that imitations in new settings also have an innovative value. The innovativeness of a product thus depends on both the product as such and the field of application.

The second content-oriented definition focuses on the scope of the innovation. "*An innovation in the economic sense is accomplished only with the first commercial transaction involving the new product, process, system or device although the word is used to describe the whole process*" (Freeman 1982). Freeman separates between "invention" and "innovation" and considering his comparison between invention and innovation it becomes clear that "new" in this definition of innovation could be described as non-trivial change or improvement, which is novel to the institution developing it. Freeman's definition of innovation is thus similar to Marquis' definition of a technical change since it does not require the innovation to be novel outside the institution that developed it. Freeman does not include any requirements that the innovation should be new to the industry, as Marquis does. The scope of the innovation could include product, process, system or device. By means of this definition, Freeman chooses to allow, for example, a change in an organization to be included in the term innovation.

Roberts (1988) uses a process-oriented definition of innovation highlighting the phases of the innovation process *"Innovation is composed of two parts: (1) the generation of an idea or invention, and (2) the conversion of that invention into business or other useful application".* This definition divides the innovation process into an invention part and a commercialization part. The invention part covers the creation of ideas and getting them to work while the commercialization part covers the commercial development and application and continues to broad-based utilization, dissemination and diffusion of the technology-based outcomes.

The second process-oriented definition comes from the OECD (1991) and focuses on the tasks involved as well as the interactive nature of the innovation process. *"Innovation is an iterative process initiated by the perception of a new market and/or new service opportunity for a technology-based invention which leads to development, production, and marketing tasks striving for the commercial success of the invention".* In conformity with Roberts' definition, this definition stresses both the technological development and the market introduction. Compared with Roberts' definition, the process starts at a later stage when the technology-based invention has come into existence. It continues further than Roberts' definition and includes the iterative nature of the process which also includes, besides the initial introduction onto the market, subsequent introductions of improved versions.

Based on these descriptions, an innovation is both a process and the result of that process. In this thesis, the term "innovation process" connects with the process and "innovation" with the result of the process.

An innovation process is *"an iterative process spanning from idea generation to the first market introduction of the innovation, then continuing with subsequent introductions of improved versions of the innovation."* The discussion on the innovation process has been concentrated to the section describing the frame of reference.

An innovation is defined as *"a new product or process aimed for commercial success."* The definition of innovation is not limited to a certain level of innovativeness. Instead, the taxonomies of innovation include the degree of innovativeness. The central novelty-oriented taxonomies are discussed next, including how novelty relates to market, technology, venture format, and complexity. The section ends with a discussion on the scope of innovation.

### Novelty and market/technology

A milestone in discussing novelty in relation to market/technology is Abernathy and Clark's work (1985), wherein these researchers create a taxonomy of innovation using four types. These types differ as regards the extent to which existing linkages to the markets and technologies were incrementally or radically changed. They propose four types of innovations labeled architectural, niche creations, and regular and revolutionary innovations (see Figure 1-4). These four types form what they call a transilience map, which illustrates the different con-

texts of the innovation process and the different management challenges connected to the different types of innovation. For architectural innovations, management needs to support the synthesis of new insights regarding user needs with information about technological possibilities. The central issues of niche creation are timing and the ability to quickly ramp up delivery capacity. Regular innovation is supported by methodical planning while revolutionary innovations are often a result of a technology push, something that requires management to be able to invest in long-term goals.

**Niche creation** Disrupt existing/create new linkages

**Architectural**

Markets/Customer Linkage

Technology/Production

Conserve/entrench existing competence

Disrupt/obsolete existing competence

Conserve/ entrench existing linkages

**Regular**

**Revolutionary**

Figure 1-4 Abernathy and Clark 's (1985) taxonomy of innovations based on the novelty of market and technology
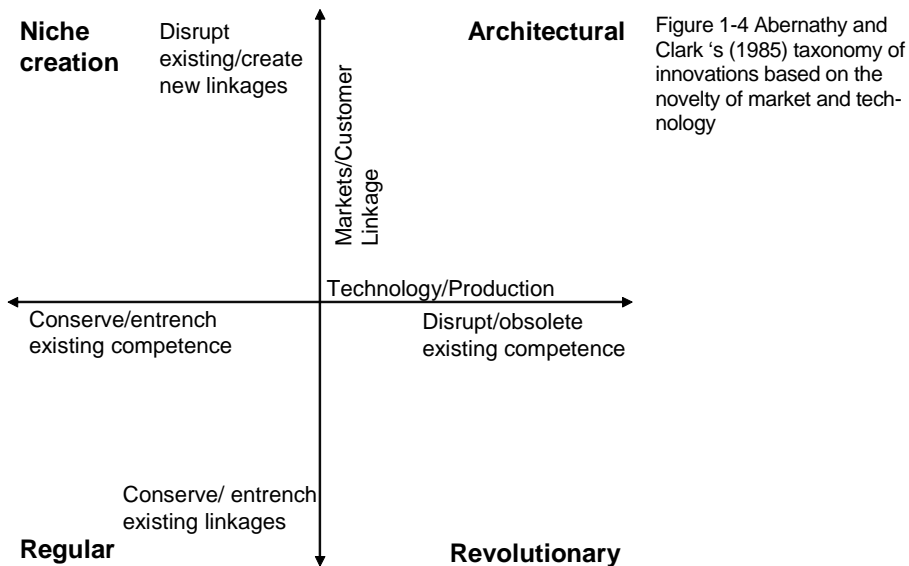
Abernathy and Clark's taxonomy has been used and refined over the years. Garcia and Calantone (2002) could today represent the present status of market and technology based taxonomies of the novelty of innovations.

They argue that innovativeness is beneficially described using three levels of newness of the market and of the technology. Essentially, it could be argued that they add a macro/micro aspect to Abernathy and Clark's taxonomy. The macro level describes whether the market or the technology is new to the industry and the micro level if the market or the technology is new to the firm. The lowest level of newness of either the market or the technology dimension is when the knowledge exists within the firm, the mid-level is when the knowledge is new to the firm but exists within the industry, and the highest level of newness is when the knowledge is new to the industry. Using these three levels of newness, Garcia and Calantone (2002) define three types of innovations, "radical

innovation", "really new innovation" and "incremental innovation". "Radical innovation" requires the macro level of both the market and the technology to be new. A "really new innovation" requires the macro level of either the market or the technology to be new. "Incremental innovation" presupposes that neither the market nor the technology is new on the macro level but that either the market or the technology is new on the micro level. The definition of innovation used in this thesis includes all three types of innovations. The focus in this thesis will be on "really new innovations" (Garcia and Calantone 2002). The different types of innovations are related to the differences in newness of the market factors and technology in Figure 1-5. The illustration is purposefully similar to Figure 1-6 in order to show the similarities.

| **Market Factors** | | | | |
|---|---|---|---|---|
| New market to the industry | Really new innovations | Really New Innovations | Radical innovations | Figure 1-5 Operation-alization of the newness factor of innovation (Garcia and Calantone 2002). (The graphical representation of the taxonomy has been done by the author) |
| New market know-how to the firm | Incremental innovations | Incremental innovations | Really New Innovations | |
| Within existing know-how | No innovation | Incremental innovations | Really New Innovations | |
| | Within existing know-how | New technology know-how to the firm | New technology to the industry | |

**Technology Factors**

### Novelty and venture format

The innovation process exists within a venture that could supply the process with the resources needed. Roberts and Berry (1985) found out that the strategies concerning the choice of venturing format for entering the new business connected to the innovation had to take the novelty of both the market and the technology into account. In their matrix describing the different entry strategies (Figure 1-6), they define three levels of novelty for the market and technology knowledge, respectively. The lowest level is called the "base" level and describes a situation when the knowledge needed already exists within the firm. The next level is "new familiar" which concerns knowledge that is new to the firm but lies within a well-known area. The highest level of novelty is when the knowledge needed is unfamiliar to the firm. If familiarity could be described in terms of whether the knowledge is new to the industry or not, a mapping could be done to Garcia and Calantone's taxonomy (2002). What Robert and Berry (1985) found

was that for innovations where either the market or technology knowledge was unfamiliar to the firm, i.e. "really new innovations" using Garcia and Calantone's nomenclature, alliances could beneficially be used to develop innovations.

The matrix could advantageously be used to position innovation-based alliances in relation to different types of innovations and different types of alliances. While "really new innovations" suit alliances well in general, the matrix recommends equity-based joint ventures when the market is unfamiliar but the technology well-known and contractual alliances when the market is well known but the technology unfamiliar. For radical innovation, i.e. when both the technology and market are unfamiliar, a venture capital approach is suggested. This could of course be done in collaboration with a partner but the alliance will then be a financial one more than an innovation-based one. Alliances are not recommended for incremental innovations.

| **Market Factors** | | | |
|---|---|---|---|
| New<br>Unfamiliar | **Joint Venture** | Venture Capital<br>or<br>Venture Nurturing<br>or<br>Educational<br>Acquisitions | Venture Capital<br>or<br>Venture Nurturing<br>or<br>Educational<br>acquisitions |
| New<br>Familiar | Internal Market<br>Developments<br>or<br>Acquisitions (or<br>Joint Ventures) | Internal Ventures<br>or<br>Acquisitions<br>or<br>Licensing | Venture Capital<br>or<br>Venture Nurturing<br>or<br>Educational<br>acquisitions |
| Base | Internal<br>Base<br>Developments<br>(or Acquisitions) | Internal Product<br>Developments<br>or<br>Acquisitions<br>or<br>Licensing | **"New- Style"<br>joint Ventures** |
| | Base | New<br>Familiar | New<br>Unfamiliar |

**Technologies or services
embodied in the product**

Figure 1-6  Entry strategies for new businesses (Roberts and Berry 1985). The squares where alliances are recommended contain bold text

### Novelty and complexity

Henderson and Clark (1990) combine the novelty of a product with its complexity. While they accept the difference between radical and incremental innovation, they introduce modular innovation and architectural innovation as two intermediate levels between radical and incremental innovation (see Figure 1-7). The complexity dimension of the innovation concerns whether or not the innovation's architecture, i.e. the linkages between the modules, has been changed. An architectural innovation has a higher level of complexity since it requires new linkages between the modules, while a modular innovation has a lower level of complexity since it does not require any new linkages between the

modules. Henderson and Clark argue that new architecture becomes a challenge, especially for established firms since the new architecture's need for changed linkages between workgroups could be more difficult to implement in an established firm than would be the case when creating these linkages in a new venture.

**Core concepts of components**

Reinforced          Overturned

|  | Reinforced | Overturned |
|---|---|---|
| **Unchanged** | Incremental Innovation | Modular Innovation |
| **Changed** | Architectural Innovation | Radical Innovation |

**Architecture: Linkage between core concepts and components**

Figure 1-7 Henderson and Clark's (1990) taxonomy for architectural innovation

The definition of innovation used in this thesis includes all levels of complexity. Complexity is, however, important when defining the empirical basis of the thesis, since this is defined as being limited to technology-based products involving complex operation systems. Tidd (2001), by means of a literature review, has identified the fact that complexity and uncertainty are two contingencies having a significant influence on the organization and management of innovation. He stresses that complexity does not imply uncertainty, or vice versa. By using uncertainty and complexity as axes, he develops four types of environments for innovation management (see Figure 1-8). He exemplifies the different environments using typical products, central competencies and organizational structures (see Table 1-1).

Uncertainty

low                    high

**Complexity**

| | Complexity (low) | Complexity (high) |
|---|---|---|
| Uncertainty (high) | Innovative | Complex |
| Uncertainty (low) | Differential | Networked |

Figure 1-8 Tidd's (2001) taxonomy for the context of innovation management
Using this taxonomy, the innovation domain of this thesis could be characterized as complex.
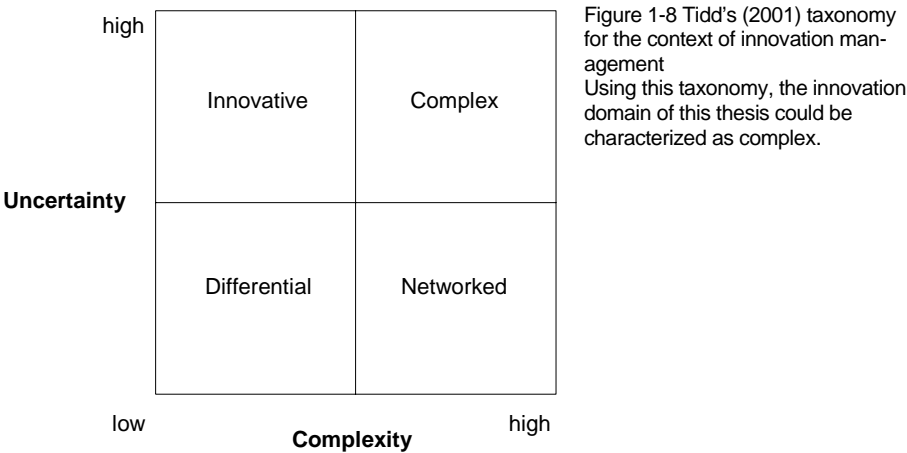
| Type of Environment | Differentiated | Innovative | Networked | Complex |
|---|---|---|---|---|
| **Example of products** | Fast moving consumer products | Pharmaceuticals | Construction | Software applications to complex systems such as telecom, transportation and logistics |
| **Central competencies** | Marketing competencies | Scientific or technological competencies | Project management competencies | A range of competencies including flexibility, adaptation and learning |
| **Typical organizational structures** | Product or market multi-divisional structures | Functional structures | Professional structures | Mediating institutions, e.g., consultants, system and system integrators |

Table 1-1 Characteristics of the four different contexts of innovation management suggested by Tidd (2001)

This taxonomy is important for positioning the innovation domain that this thesis focuses on. The limitation to technology-based products involving complex operation systems positions the innovation domain as having a high level of complexity. The novelty of the innovation, which was limited to "really new" innovations, could position the uncertainty of the innovation domain as medium to high. Using the taxonomy for different contexts of innovation management (see Figure 1-8), this thesis' innovation domain will be defined as

having a complex context as a consequence of its high complexity and its medium to high uncertainty.

### Innovation scope

The scope of the innovation is the type of innovation expected which the definition specifies as "…product or process…" This definition distinguishes between the innovation as a *product* and the innovation as a *process* of producing products (not to be confused with the innovation process). The distinction between product innovation and process innovation has been shown to have an empirical relevance in the diffusion of innovations (Utterback and Abernathy 1975). The focus on technology-based products involving complex operation systems where the offerings are often a mix of goods and services makes the distinction less useful since product and process are often impossible to separate from each other regarding services (Johne and Storey 1998). The distinction between the product and the process will thus not be used in this thesis even though it is important to understand that the innovations described include both a product and a process dimension.

## Alliances

Alliances are defined in several ways by academics and even more so by practitioners. Within academia, definitions can be grouped around the different theoretical frameworks that are used. Following Kale et al (2000), these theoretical frameworks can be classified into three groups. These groups are a) a strategic perspective including market power and resource-based theories, b) an operational perspective involving transaction cost and resource dependency theories, and finally c) theories concerning innovation and learning. Since the focus of this thesis is alliances for innovation, the definition used will be based on an innovation and learning perspective (e.g., Doz, Hamel et al. 1989). Most of the central references in an innovation and learning perspective (e.g., Hamel 1991; Bidault and Cummings 1994; Doz 1996; Inkpen and Dinur 1998; Khanna 1998) have not made a definition of alliances, thus a definition of alliances will be made for use in this thesis. This definition of alliances reads as follows *"any voluntarily initiated cooperative agreement between two or more independent firms that share compatible goals involving the exchange, sharing or co-development, of products, technologies or services."* This definition should be understood to include processes. What is considered an alliance or not rests with the judgment of the researcher. The people involved in the alliances studied refer to them as alliances, partnerships and joint projects.

The definition could be seen as a modification of Gulati and Singh's definition (1998); "any voluntarily initiated cooperative agreement between firms that

involves exchange, sharing, or co-development, and it can include contributions by partners of capital, technology, or firm-specific assets." The definition purposefully lacks any references to longevity since there is no reason for an innovation or learning alliance to exist once the innovation or learning purpose has been accomplished. This could be contrasted with the strategic and operational perspective where longevity is often included in alliance definitions (c.f. Parkhe 1991). The definition states that alliances exist between firms, i.e. cooperation within firms is excluded from this definition. This is an important prerequisite since it introduces the delicate question of how to apportion the costs and benefits of the cooperation (Gulati and Singh 1998), in comparison with an intradepartmental innovation process. The partners have voluntarily initiated the alliance and they are thus not obliged under law, for instance, to collaborate. The partners' goals in forming the alliance should be compatible or complementary, thus excluding traditional market transactions. A contractual relationship between two partners not carrying out activities is not an alliance since an alliance requires collaboration, which is manifested through activities such as exchange, sharing, or co-development.

The definition does not include "strategic" in contrast with other definitions (c.f. Mohr and Spekman 1994) in order to adapt to the nature of innovation-based alliances. Including strategic in the definition would narrow the focus to corporate alliances or at least alliances with a significant impact on the strategies of the corporation, thus possibly excluding many innovation-based alliances. Innovation-based alliances could be small and initially of minor strategic importance compared with other types of alliances such as production alliances. If the alliances result in important innovations, they could be considered *ex post* to be strategic alliances.

There are many similar words besides *alliance* used to describe different inter-organizational relationships, e.g. partnership, although there is no common taxonomy that distinguishes them. The existing taxonomies often fall into two types; descriptions of the motives for entering into the alliance and structural descriptions of the alliance.

Koza and Lewin (1998) have devised a simple yet widely-used categorization of the motives for entering into an alliance by dividing into exploration and exploitation motives using March's concept of exploration and exploitation (1991; 1995). Exploration alliances have the purpose of exploring new opportunities and involve innovation and building new capabilities. Exploitation alliances try to leverage on existing capabilities and focus on enhancing the productivity of the employed assets. Exploration and exploitation alliances exhibit important differences regarding the alliance process and the alliance management, thus making it important to study them separately (Koza and Lewin 1998). This thesis will focus on exploration alliances as a natural consequence of the purpose of understanding innovation-driven alliances.

One structural dimension of an alliance which is frequently used for characterizing alliances is its legal arrangement. Lorange and Roos (1992) describe the legal arrangement as a continuum of different levels of integration between the partners, spanning from transactions on a free market at one end to total internalization (hierarchy) at the other (Figure 1-9). In this thesis, the focus will be on formal cooperative ventures although the concept of alliances will include all forms, excluding mergers and acquisitions, recognizing that an alliance may change its format over time and that a formal cooperative venture on a high organizational level could include a number of equity-based joint ventures on a lower level.

Alliances

| Hierarchy | Mergers and acquisitions | Joint ownership | Joint (equity based) venture | **Formal cooperative venture** | Informal cooperative venture | Market |

Large ← Degree of integration → None
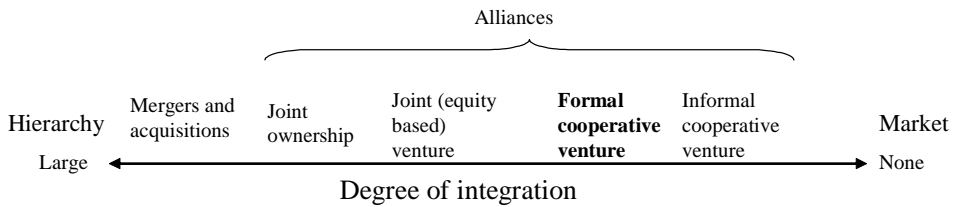
Figure 1-9 Different forms of alliances positioned along a continuum between hierarchy and market (Lorange and Roos 1992).

# FRAME OF REFERENCE

The purpose of this frame of reference is to create a "magnifying glass" for studying how the innovation process unfolds in the presence of different structures. Using the literature to identify important structural dimensions of alliances and innovations, with a potential for significantly affecting the innovation process, enables a focused approach to the inductive studies. Instead of a comprehensive list of dimensions, the idea is to be selective and identify four central dimensions that relate to the external and internal structures of the alliance, as well as the innovation. The dimensions form a catalogue from which the different studies can use some or all of the dimensions. The studies use the identified dimensions more as perspectives than as variables. The purpose of both the studies and the thesis is to "Describe how and discuss why the structures of both the alliance and the innovation affect the innovation process in an alliance context". The patterns identified between the structures and the innovation process are to be viewed as hypotheses until they are tested using a more deductive approach, something which lies outside the scope of the thesis, however.

The frame of reference spans across two theoretical traditions concerning innovation management and alliance management. Within the alliance literature, three alliance rationales are common: strategic by means of obtaining a market position or greater effectiveness, operational by means of transaction cost considerations, or for learning and innovation reasons (Kale, Singh et al. 2000). This thesis focuses on the latest type of alliance, highlighting the importance of innovation management theory in understanding the innovation dimension and of organizational theory in understanding the alliance dimension. These two fields of theory have established different nomenclatures concerning the arrangement of the different parts of something (e.g. alliance, innovation). Organizational theory uses the term structure while innovation theory often refers to it as design. This thesis uses the term structure for both innovation and alliances, in order to have a generic term capable of embracing various arrangements of parts, independently of theoretical discipline. Favoring the term structure over the design reduces the risk of any association with aesthetics.

The frame of reference starts with a discussion on the content of innovation-based alliances, i.e. the innovation and the alliance. It continues with the process of innovation-based alliances and the outcome of the process. This section ends with a summary describing the selected dimensions and the outcomes.

## Structure of an innovation

The structure of an innovation concerns how the different parts of the innovation relate to each other, i.e. how they are "put together". The structure of the innovation is, for analytical purposes, divided into an internal structure, i.e. a structure that is only observable by looking into the innovation like a designer would do, an external structure, i.e. a structure that relates to what is observable from the "outside" of the innovation by somebody using or operating the innovation.

The internal structure of an innovation is something that is hidden from all except the designers of the innovation. What these designers see is a number of parts that relate to each other in different ways in order to achieve the intention of the innovation. These parts could form recognizable clusters, with loose couplings between the clusters, or they could be non-clustered and look more like a homogenous web of tightly-coupled parts. The first situation is a modular structure while the latter is an integral structure (Ulrich 1995; Baldwin and Clark 2000). A modular structure builds on abstractions, hiding complexity and defining interfaces that separate the modules. The *modularity* of the innovation describes the degree of decomposition of the innovation into modules with a low interdependency. An innovation with a high degree of modularity, a *modular structure,* is characterized by modules having a low degree of interdependency between the modules through well-specified interfaces, having an explicit functionality with distinctive constraints, and a standard for testing compliance with the design rules (Baldwin and Clark 1997; Langlois 2002). With a modular structure, it is possible to make changes inside one module without affecting the others as long this does not involve changes to interfaces, functionality, constraints, or test standards. In an innovation having a low degree of modularity, an *integral structure*, the interdependencies between modules are great, which reduces the decomposability, and it is not possible to change one part of the innovation without affecting the other parts of it (Sanchez and Mahoney 1996). Associated with modularity is the possibility of reconfiguring modules and thus creating new so called architectural innovations (Henderson and Clark 1990).

Understanding the interdependencies in both the innovations' internal structures and the tasks associated with these structures is crucial with regard to the possibilities of creating a modular structure. These interdependencies, on a conceptual level using Thompson's (1967) nomenclature, could be described as sequential (serial), pooled (parallel), or reciprocal (coupled). A reduction in the number of reciprocal interdependencies enhances the modularity.

Design rules could make the ability to create modular structures explicit by providing guidelines regarding how to decompose innovations of a certain type. These design rules are a consequence of the accumulated experience of

structuring innovations in similar situations. If either the technology or the market is new, there will be fewer design rules than if the technology and market had been mature and thus well known. The newness of the technology and the market will therefore be important factors, influencing the degree of modularization as well as many other factors in the innovation process. A high degree of novelty calls for exploration in order to create the knowledge required to understand the interdependencies, while a low degree of novelty makes the exploitation of existing knowledge possible. The degree of exploration needed is one central dimension for categorizing alliances and there are different recommendations regarding management for alliances involving minimal exploration compared to alliances involving extensive exploration (Koza and Lewin 1998).

The ability to bring about both the modularization and the detailed design of the innovation relates to the concept of architectural and component knowledge. Component knowledge only relates to a part of the firm's operation, rather than to the whole. You can see an example of component knowledge in the knowledge connected to IT systems for a particular function as it only corresponds to a part of the overall knowledge structures of the firm. Architectural knowledge relates to the whole, e.g. processes for dividing the whole into components and for integrating the different components into a whole (Henderson and Clark 1990; Matusik and Hill 1998). Rather than being the sum of all the component knowledge, it is the knowledge needed to integrate the component knowledge into a whole. Categorization into architectural knowledge or component knowledge is dependent on the level of analysis. Within each area of component knowledge, there is architectural knowledge concerning how to integrate the sub-component of knowledge. The ability to modularize an innovation and to set up design rules constitutes an example of architectural knowledge.

The external structure of the innovation is what somebody who has to produce or use the innovation can recognize from "outside" the innovation, i.e. without dismantling it. Development of the innovation as a product is only one part of the innovation process. The other part concerns the process development needed to produce and deliver the product. For those responsible for producing the innovation, the variety of the innovation has profound consequences for the structure of the processes of producing and delivering the product. Undifferentiated mass market services such as basic telephony could exemplify a low level of variety while a solution integrated into the customer's operation system has a very high level of variety, i.e. the same solution is only sold once.

Hayes and Wheelwright (1979) have developed a normative model for choosing the type of process to be used for the operations based on the variety and volume of the innovation (Figure 1-10).

Manufacturing operations process types — Volume → Variety — Service operations process types

Project · Jobbing · Batch · Mass · Continuous

None · More process flexibility than is needed · Less process flexibility than is needed · None

Professional service · Service shop · Mass service

The "natural" line of fit of process to volume/variety characteristics
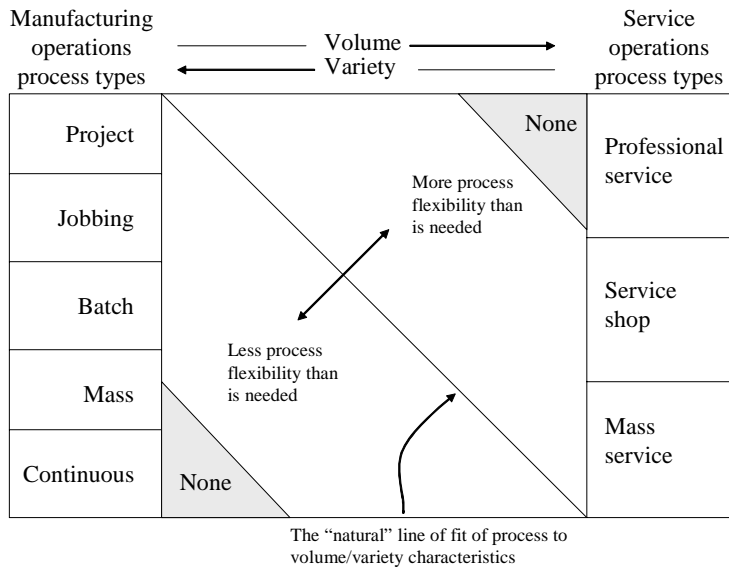
Figure 1-10  The product-process matrix, Hayes and Wheelwright (1979) adapted by Slack et al.(1998).

Their product-process matrix suggests that a low-variety innovation is produced using a process type for mass services while an innovation of high-variety is produced by professional services. A "natural" line of fit between process type and variety represents the position of the lowest cost of the operation. Being beside this natural line will decrease competitiveness. Being "above" the line, by having a low-volume process for a high-volume product, will result in a process that is more flexible than the actual volume-variety position demands. The cost will be high since the opportunity to take advantage of standardization is not used. Being "below" the line, i.e. having a high-volume process for a low-volume product, will result in a process that is too standardized and thus too inflexible for the actual volume-variety position. This inflexibility will incur high cost since a highly-standardized process does not support changes in activities as efficiently as a flexible low-volume process. A modular structure may support modularization of the processes. Instead of having one type of process for the entire innovation, a number of different process types could be used, each type being adapted to the differences in variety of the individual modules.

The deliberation on the internal and external structures of the innovation has led to the selection of two dimensions for describing the structure of innovations in an alliance context. The internal dimension is the modularity of the innovation (modular-integral) which influences the possibilities of decomposing the innovation task, something which is important in an alliance as regards reducing coordination costs (Sanchez and Mahoney 1996). The external

dimension is the degree of variety of the innovation. This dimension links the innovation with the processes of producing and delivering it.

## Structure of alliances

The structure of alliances is a special case of organizational structure. The discussion on the purpose of organizational structures has a long tradition and Chandler has defined organizational structures (1962, p. 14) as the design of the organization through which the enterprise is administrated. Several scholars have since described and defined the purpose of organizational structures. In this thesis, the purpose of the organizational structure is seen, in line with Child (1972) and Mintzberg (1979), as supporting the allocation of work activities during the innovation process and as a mechanism for the control and integration of these activities.

Gulati and Singh (1998) suggest that the design of these structures, for an alliance, will be guided by concerns regarding coordination costs and appropriation. Coordination costs are associated with the interdependency of tasks across organizational boundaries and the complexity of the activities to be completed, jointly or individually. A modularization of the tasks accompanied by a concentration of them to different workgroups at the partners could decrease the need for coordination between the partners. This concentration of tasks to the different partners will give them different roles within the alliance. Giving the partners different roles is a way of allocating the work activities, with the interface between the partners becoming a mechanism for the control and integration of the work activities, i.e. an organizational structure.

The roles of the partners will be described in relation to the external actors, i.e. as an external structure in line with the division into external and internal structures for the innovation, while the interface describes the internal mechanisms for coordination and communication between the different workgroups at the partners.

The roles that both partners have toward each other in relation to the market constitute an important and often-used structural dimension of characterizing alliances (Dussauge and Garrette 1999). The roles of the partners could indicate the possibility of a competitive situation between the partners which impacts upon the sustainability of the alliance (Das and Teng 2000). A vertical alliance is, in relation to the value chain, an alliance where one partner is the supplier to the other, which in its turn delivers to the market. In a horizontal alliance, both partners deliver to the market, but not necessarily to the same markets since they may be active in different industries. There are seldom any fixed or sustainable boundaries between markets or industries. A noncompetitive situation today could turn out to be a competitive one tomorrow. The different combina-

tions of roles of the partners are called *business roles*. The business roles can be *vertical* or *horizontal* (see Figure 1-11).

## Vertical alliance                          Horizontal alliance
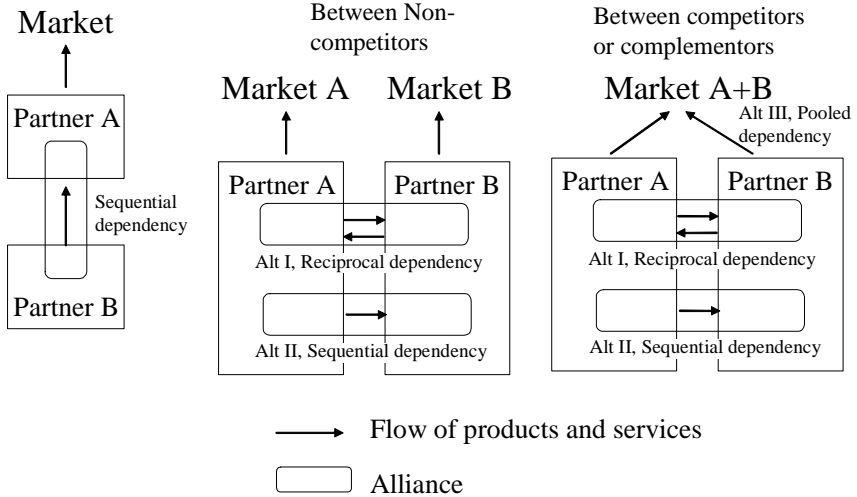


Figure 1-11  The relative positions of the alliance partners to the market.
The market concerns the product-market, i.e. the market for a special product. Thompson's (1967) descriptions of three types of interdependencies have been added to illustrate the differences in interaction between the partners.

A horizontal alliance between competitors will entail more suspicion regarding opportunistic behavior than vertical alliances due to the intrinsic feature of ambiguity in the relationship, which simultaneously combines rivalry and cooperation (Dussauge and Garrette 1999). This suspicion will reduce the openness of the communication as well as the flexibility, two important success factors for innovation processes (Brown and Eisenhardt 1995), instead creating safeguards through formal contracts. The three types of alliances discussed, i.e. vertical, horizontal with a non-competitor, and horizontal with a competitor (Figure 1-11) could in many situations be mapped to Thompson's (1967) descriptions of three types of interdependencies. A vertical alliance could, using this nomenclature, be regarded as generally having a sequential dependency. A horizontal alliance between two non-competitors delivering to separate markets could be reciprocal (Alt I) or sequential (Alt II). If they address the complementary needs of customers on the same market (e.g. CDs and CD players), the dependency could be described as pooled (Alt III) in addition to the reciprocal or sequential dependency. An alliance between competitors could be both a reciprocal and a sequential relationship although a reciprocal dependency might instead be created in an equity-joint venture rather than directly between the two firms.

The strategic reasons for creating an alliance could be coupled with the structure of the alliance. Doz and Hamel (1998), in their writings about technological alliances, discuss three value creation logics for alliances. These logics are co-option, co-specialization, and internalized learning. Co-option is cooperation with a competitor, which probably results in a horizontal alliance. In co-specialization, the partners concentrate on different parts of the whole. This is often arranged as a vertical alliance. The last value creating logic, internalized learning, requires intensive interaction between the partners in order to make knowledge transfer happen. Trust is required for this intensive interaction and the most likely type of alliance is a horizontal alliance where the partners are non-competitors.

The *interface* between the partners is an important part of the coordination mechanism, i.e. the joint information and decision-making process (Galbraith and Kazanjian 1986). It consists of the sum of all linkages between the different workgroups involved. As described earlier, the success of the innovation process depends on open communication, which is directly linked to the interface. Henderson and Clark (1990) suggest that each linkage could be described as a combination of communication channels, information filters, and a repertoire of strategies for resolving problems. A *thick interface* is characterized by frequent and intensive communication between actors on different organizational levels, few information filters and a broad repertoire of problem-solving strategies. People working in the two organizations may be friends privately and there are informal meetings for joint problem-solving. A *thin* interface, analogously, involves few actors and communication is infrequent and non-intense. A thick interface is often connected to learning and learning is a prerequisite for innovation (Brown and Duguid 1991).

This section has resulted in the selection of two dimensions for describing the structure of contractual alliances. The *business roles* describe, from an industry perspective, the alliance as being either a vertical one or a horizontal one. This dimension affects the level of tension in the alliance due to different levels of ambiguity in the relationship. The internal dimension is the *interface* between the partners, which could be either thick or thin. The thickness of the interface limits the maximum potential coordination. For tasks with little need for coordination, a thin interface might be enough but for tasks where intensive coordination is vital, a thick interface will be required. The consequences of a thick or thin interface will thus be different depending on the characteristics of the joint task, which could vary along the innovation process.

## The process

Pettigrew (1987) describes the "process" as "the actions, reactions, and inter-actions from the various partners as they seek to move the firm [or alliance, innovation] from its present state to its future state." The alliance process and the innovation process are two analytical perspectives on the process which unfolds in innovation-based alliances.

There have been many attempts to capture the essence of the process of innovation. Brown and Eisenhardt (1995) have categorized the product development literature in three research streams: product development as a) a rational plan, b) a communication web, and c) a disciplined problem solving. The "rational plan" focuses on the rational planning and management of the development of new products within organizations. The research stream "communication web" complements the rational plan by including both the political and information processing aspects of product development. The "disciplined problem solving" stream focuses on how to overcome problems encountered during the process.

The "rational plan" research stream describes the innovation process as a number of sequential stages, and Marquis (1988) has suggested that the process be divided into six stages (see Figure 1-14). The first stage is the *recognition* of both technical feasibility and an existing or potential market demand. The next stage is *idea formulation* where the requirements regarding the recognized demand and the technical feasibility are merged into a design concept. The design concept is the formulation of a problem considered to be worth investment. The *problem-solving* stage searches for a solution to the problem in readily available information. If the information needed for a solution is not readily available, a *solution* stage is necessary where a solution either is created by invention or by adaptation. During this phase, the architecture of the innovation starts to become clear and critical concepts in modules are tested. Even if a solution to the problem exists, there is still uncertainty when entering the *development* stage with regard to market demand and the challenges of putting operations in place. The final stage in this model is when the innovation is *utilized* and *diffused* into the marketplace. Cooper (2002b; 2002a) concurs with the descriptions of the innovation process as consisting of a number of stages, but continues a step further by prescribing stage-gate models as the best models for innovation processes. Roberts (1988) summarizes the innovation process into two main components: invention and exploitation. When mapping the stages of the process described by Marquis (1988) to the two phases of invention and exploitation (Roberts 1988), invention will match the stages of recognition, idea formulation, problem-solving and solution while exploitation will focus on development as well as the utilization and diffusion (see Figure 1-14).

Roberts' (1988) model of the innovation process will be used as the process model in this thesis. The two phases that Roberts called invention and exploitation are changed to better fit the terminology used in the alliance literature. The term invention is changed to exploration, building on March's (1991) concept of organizational learning, which captures approximately the same thing in both the innovation literature and the alliance literature. Exploitation as an alliance term covers many more activities than those connected with the term exploitation during the innovation process. To avoid any unintended mapping to these two meanings, the term commercialization will be used for the second phase of the innovation process.

The stepwise process is challenged by Clark and Wheelwright (1993) who argue that the exploration phase, at least, is not linear but could contain recursive loops. The problem-solving stream supports this view when arguing that the steps could be overlapping (Imai, Ikujiro et al. 1985). Most of the ideas will be terminated before all steps have been taken, for various reasons. The exploration phase of the process is thus described as a funnel wherein the number of ideas is gradually reduced (Roberts 1988; Clark and Wheelwright 1993). The gradual reduction of ideas in the funnel could also result in the termination of the innovation-based alliance since the reason for its existence disappears.

The transition between the exploration and commercialization phases is complicated even when the innovation occurs within the same organization (Galbraith 1982). This is due to the different requirements these two phases place on the context. Flexibility is important during the exploration phase while stability is important during the commercialization phase in order to implement the innovation in all business processes. A dependency on two strategic and organizational contexts makes the transition even more complicated in an alliance.

The literature describes the alliance process in both a sequential way and in a process-oriented way. The sequential way of describing alliances is associated with the traditional research stream where emphasis is placed on the importance of the initial conditions for the outcome of the alliance (Lorange and Roos 1992). Spekman et al (1998), in their review of alliance studies, summarize different models into a lifecycle model with seven stages. These stages are a) search for partner, b) partner identification, c) valuation and initiation, d) coordination and interfacing, e) expansion and growth, f) adjustment, and g) reevaluation (see Figure 1-14). The more recent process-oriented research stream describes the evolution of alliances as a continual process of repeated negotiation-commitment–execution (Ring and Van de Ven 1994) (Figure 1-12). This model has been further developed, albeit with the same basic design by Doz (1996) adding the learning aspect (Figure 1-13). A further development of these models has been done by Ariño and de la Torre (1998), adding the termination of the alliance and the influence of external changes to the model.

However, their model becomes more complicated and less intuitive thus Doz's (1996) model is the preferred one in this thesis. It is recognized that, although not explicit in Doz's model, changes in the external context are considered to affect reevaluation and termination is seen as a possible result of reevaluation.
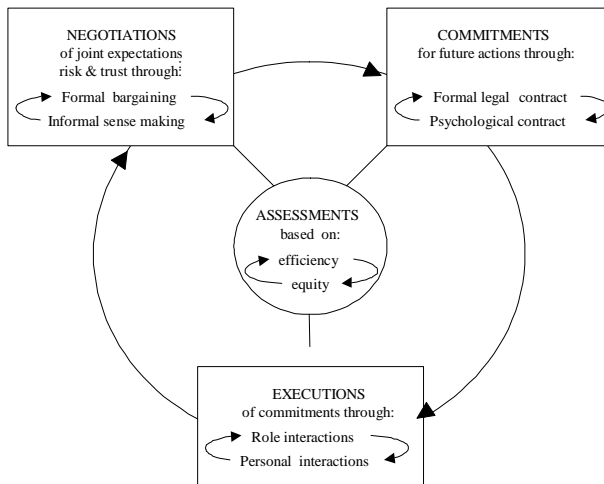


Figure 1-12  Process model by Ring & Van de Ven (1994)
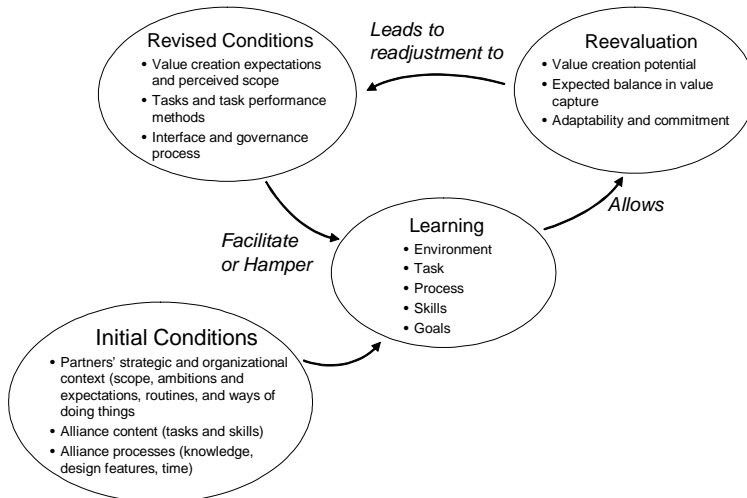


Figure 1-13  Process model by Doz (1996; 1998).

The alliance process could make one or several loops of learning-reevaluation and revised conditions during the innovation process. The ease of making a loop in the alliance process depends on, among other things, the trust that

exists in the relationship, which correlates to the thickness of the interface. The transition between exploration and commercialization in the innovation dimension could trigger a new loop in the alliance dimension in order to create a structure better suited to the requirements of the new phase.

The different process models for alliances and innovations are illustrated in Figure 1-14. The mapping between the alliance lifecycle and the innovation process presented below is not without criticism. Spekman et al (1998) could be seen as an example of a position arguing that uncertainty has to be reduced to a reasonably low level before it is possible to start up an alliance. Exploration includes a high level of uncertainty and a logical conclusion of Spekman et al's argument is that the exploration phase has to be completed before an alliance can start up. Millson et al (1996) express a similar position in one of the rare examples of process models for innovation-based alliances. This thesis builds on the hypothesis that exploration is a potential activity for alliances and not something that has to be finished before the alliance starts up.
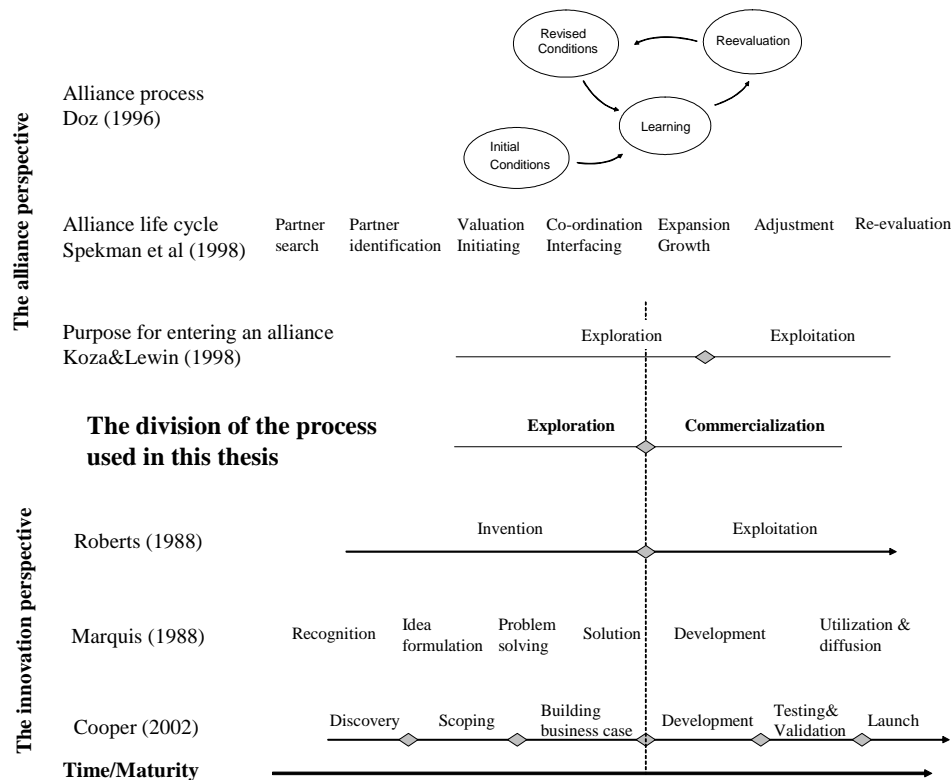


Figure 1-14  Mapping between the alliance process and the innovation process
Alliance lifecycle by Spekman et al (1998), Alliance process by Doz (1996; 1998), Innovation process by Roberts (1988) , Marquis (1988) and Cooper (2002a)

The innovation process, with the two phases of exploration and commercialization, is chosen as the basic model for the process on the basis of the different nature of these two phases, which will also affect the structure of the innovation and the alliance. Early on during the exploration phase, the level of uncertainty is high and it is more or less impossible to know whether the innovation will pass through the funnel and enter the commercialization phase. The structures are flexible with no long-term commitments to investments. The commercialization phase requires more stability to reduce the risks involved with the major investments made during this phase.

## Outcomes

At the end of the day, performance is what really counts. Unfortunately, performance is not a variable with a single criterion; neither is there any consensus regarding which criteria are important when measuring performance. Actually, one could say that performance is what is important to the person doing the evaluation. Performance is often described as the outcome in relation to the input. In this thesis, the focus will be on the perceived outcome of the innovation process in the innovation-based alliance.

To test a causal relationship between an independent variable and the outcome, without the possibility of conducting experiments, the sample will have to be large and the number of potential confounding factors low (Cooper and Schindler 1998). The research issue in this thesis and the associated research design do not support these types of conditions and, instead of testing the causal relationships, the outcome will be used to help determine whether the suggested relationships between structural dimensions and the innovation process are positive or negative.

For the innovation process, a commercially successful innovation is the prime goal of the process. A successful innovation, however, depends on several other factors besides the innovation process, e.g. the market, competitors, operations, etc., creating too many intermediate variables between the innovation process and the successful innovation to make it a useful causality. The secondary goal is that the innovation project should meet the project goals in terms of time, cost and quality (Wheelwright and Clark 1992a). The causality link between a successful innovation process and the ability to meet project goals is more direct, although a successful innovation is not guaranteed by meeting the innovation project's targets since these targets may be wrong. A challenge faced during the innovation process is the fact that, due to uncertainty, planning primarily covers the next step in the process. Measuring the project is thus reasonable for the commercialization phase while the exploration phase consists of many small steps (Marquis 1988) with a project plan for each step. A signifi-

cant achievement during the exploration phase occurs when the innovation is accepted for entry into the commercialization phase (Galbraith 1982). The anticipated success of the innovation is required for the evaluation preceding entry into the commercialization phase, thus making the transition *per se* an approximation of both a perceived promising innovation and innovation process. The outcome of the innovation process at the operational level for the exploration phase will therefore be the ability to bring about transition to the commercialization phase. For the commercialization phase, the outcome will be the perceived ability of the innovation project to meet its targets. There are several challenges facing measurement of the transition since there could be several parallel evaluations, e.g. besides a joint evaluation, each partner might be conducting an internal evaluation whereby the future of the innovation constitutes one parameter but where continuation also depends on the evaluation of the alliance.

For an alliance, additional outcomes exist besides successful innovations such as new knowledge gained or increased competitiveness through focusing on core competencies, made possible by the alliance. However, since the innovation process is in focus, the outcome on any aggregated level will be the perceived ability of the alliance to meet the outcome criteria of the innovation process.

Thus, the outcomes used in this thesis are - for the exploration phase; the ability of the innovation project to make the transition from exploration to commercialization, and for the commercialization phase; the perceived ability of the innovation project to meet its targets.

## SUMMARY

The intention of this frame of reference was to discuss structural dimensions with the potential to have a major impact on the innovation process. From the literature, four important structural dimensions have been identified which seem to fulfill this requirement and represent both an external and an internal perspective on innovation and alliances. The literature tells us that different positions within these structural dimensions will affect the innovation process in various ways.

The structural dimensions associated with innovations and alliances which have been discussed are the following:

*The modularity of innovation* describes the degree of decomposability of the innovation into modules with a low interdependency on each other. The scale stretches from integral to modular. A high modularity in the innovation, i.e. a modular structure, enables the division of the task and activities into independent task packages and workgroups. Modularity also affects the possibilities of greater variety in the innovation. Modularity is a result of the deep understanding of the architecture used for the innovation and is therefore something that emerges with time.

*The variety of the innovation* is the number of different variations of the innovation delivered to the market. This dimension affects the choice of operations process type. The operations process type will determine whether the innovation process will lean towards product design or process design.

*The business role* describes the relative position of the partners to the market. In a vertical alliance, one of the partners acts as a supplier to the other, which in turn is a supplier to the market. In a horizontal alliance, both partners are suppliers to the market. Horizontal alliances could be further subdivided depending on whether the partners are competitors or not and depending on the nature of the interdependency.

*The interface* describes the interaction between the partners in terms of communication channels, information filters, and existing strategies for resolving problems. A thick interface has multiple communication channels on different organizational levels, few information filters, and a wide repertoire of problem-solving strategies. A thin interface has less of all this. The interface could be a limiting factor for the innovation process, especially as regards the more radical innovations that require flexibility and open communication, which only a thick interface could provide.

The outcome of the innovation process is, during the exploration phase, the ability of the innovation project to make the transition to the commercialization

phase while during the commercialization phase, it is the perceived ability of the innovation project to meet its project targets.

The review of the literature illustrates the vast amount of literature concerning alliances and innovation, but also the lack of literature concerning the combination of alliances and innovation, despite the problematic alliance-innovation tension. This lack of clarity and understanding regarding innovation-based alliances makes it an interesting and important research area.

# CHAPTER TWO

# RESEARCH QUESTION

As described earlier, the purpose of this thesis is to "Describe how and discuss why the structures of both the alliance and the innovation affect the innovation process in an alliance context". The discussion in the previous chapter has shown that there is a rich body of literature concerning alliances and innovations, but a lack of literature combining these two areas, despite the problematic alliance-innovation tension. On the basis of the frame of reference, the purpose of the thesis has been developed into the following research question.

*"How and why do the different positions within the structural dimensions associated with innovations and alliances affect the innovation process in an alliance context?"*

The structural dimensions associated with the innovation are the modularity of the innovation and the variety of the innovation. The dimensions associated with the alliance are the business roles and the interfaces between the partners. The outcomes used in this thesis are, during the exploration phase, the ability of the innovation project to make the transition from the exploration phase to the commercialization phase and, during the commercialization phase, the perceived ability of the innovation project to meet its project targets.

A tentative model of the relationships between the structural dimensions and the innovation process is shown in Figure 2-1. The innovation and the alliance structures are expected to influence the innovation process directly as well as indirectly. The choice of structural dimensions to be studied will vary from study to study enabling more focused studies.
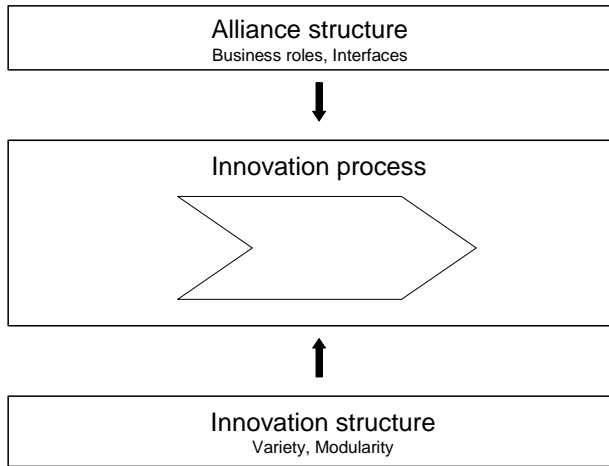
Figure 2-1 Research model
The research question is "How and why do the different positions within the structural dimensions associated with innovations and alliances affect the innovation process in an alliance context?"

The context of this research could, using Pettigrew's nomenclature (1987), be divided up into the "inner context" and the "outer context." The inner context is described and discussed in the research methodology section. The outer context refers to the social, economic, political, and competitive environments where the studied alliances operate. The social and political situation in society was stable during the period when the studied alliances were in existence. The general economic situation was characterized by a booming economy (1995-1999) and a recession (2000-2004), both of which were quite dramatic for the telecom and IT sectors, which is the empirical basis for this thesis. At the beginning of the earliest alliance studied, the Internet was virtually unknown outside groups of scientists and data communication specialists, while at the end of this period, it was regarded as one of the major methods of communication. The outer context varied between the different alliances since it was not possible to find alliances that existed during exactly the same period. The consequences of the external context with regard to the possibilities of generalizing the results will be discussed in the final chapter.

# THE RESEARCH QUESTION IN RELATION TO OTHER STUDIES

What justifies another study of alliances when the literature is already full of studies concerning alliances? The answer is that even though there are many studies, the number of studies focusing on innovation-based alliances is limited. One fairly established way of distinguishing between alliances is based upon whether their purpose is to explore or exploit something. Innovation alliances are, using this terminology, essential exploration alliances, and exploration alliances are in general less researched than the more common exploitation alliances (Koza and Lewin 1998). These two types of alliances entail different types of management challenges (Koza and Lewin 1998), still many broad studies make no distinction between them with the result that their findings are largely based on exploitation alliances since these form the majority of all alliances.

The innovation process is both difficult to predict and dynamic in nature. However, alliance research has to a large extent employed a static view which focuses on the prerequisites of alliances and to a lesser extent on the dynamics of the process over time in alliances (Spekman, Forbes et al. 1998). The process of innovation-based alliances is thus an underdeveloped research area.

One could relate this study to other studies by using the two dimensions the purpose of the alliances studied and the degree of process-orientation of the contribution. Using these dimensions, a number of important empirical studies are related in Figure 2-2 to the purpose of the thesis. Examples of different activities along the exploration-exploitation axes could start with basic research, innovation, shared investment in operations within well-known areas and could end with the coordination of existing operations. The axis describing the degree of process-orientation of the contribution could similarly be divided into four groups of studies starting with a) a static process with no process-oriented parameters included, b) a static process but with process oriented parameters included, c) a dynamic process where the result connects with at least two phases, and finally d) a dynamic process with several phases.

## Focus of the empirically based alliance research
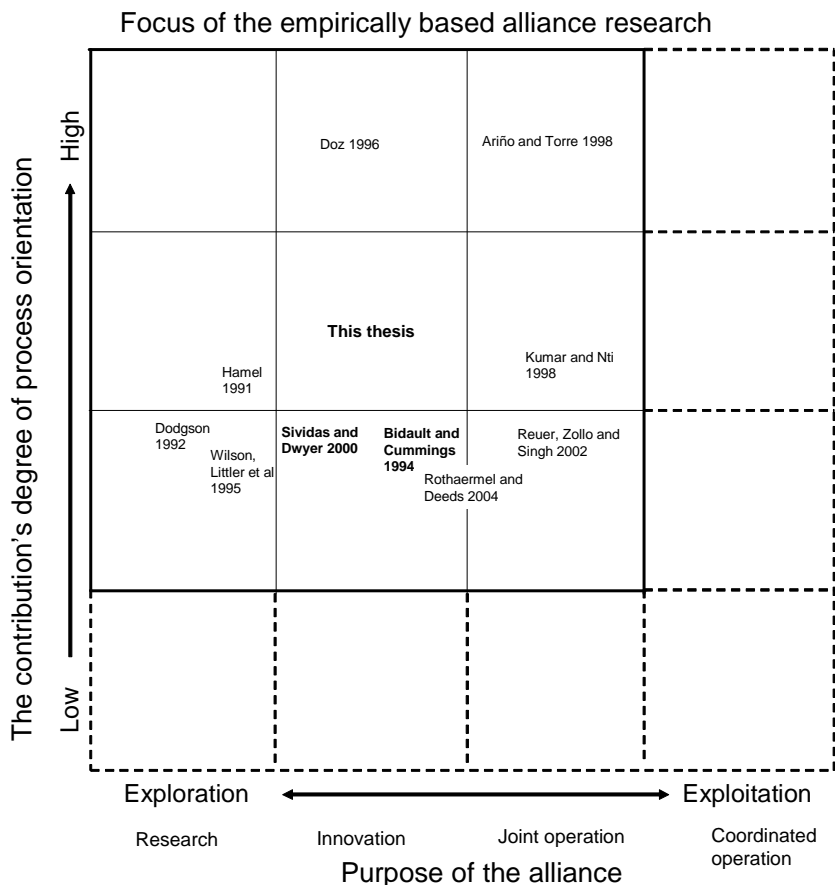


Figure 2-2  Positioning of the research purpose of this thesis in relation to the purpose of alliances (Koza and Lewin 1998) and the degree of process-orientation of the contribution.
The publications plotted are primarily those which are close to this thesis. The dotted quadrants are included to illustrate the full matrix although no references are described in these quadrants since they are considered distant to the purpose of the thesis. The bold publications are considered closest to the purpose of this thesis. Studies which do not focus on a certain type of alliances are positioned as joint operations in the table.

An overview of the contributions closest to the purpose of this thesis, i.e. those studying the dynamics of innovation-based alliances, will first be discussed in the table followed by some additional papers considered important to the positioning of this thesis (Table 2-1). The two papers having a similar position to the purpose of this thesis will be discussed more thoroughly after the table.

| Article | Research Issue | Mapping to the framework /Theoretical framework | Conclusions |
|---------|----------------|------------------------------------------------|-------------|
| **Bidault and Cummings 1994** | Management of innovation process in the context of alliance | The effect of alliance structures on the innovation process. | "Innovation-driven partnerships can be ´managed´ through various 'structures'." The division of responsibility and the degree of formality were in focus |
| **Sivadas and Dwyer 2000** | Testing hypotheses derived from integrating the new product and alliance literature. | Newness of innovation, horizontal/vertical alliance, interface (coordination, dependency) + additional factors | A thick interface, mutual dependency, and complementary competencies contribute to NPD success. |
| **Doz 1996** | How does learning, along several dimensions in strategic alliances, mediate the initial firm conditions and alliance outcomes? | The alliance process, horizontal interface, modularization (i.e. task interdependency) | "The initial conditions in each of the alliance partner firms were either facilitated or hampered by the partner's learning about the alliance environment. Alliances can fail because: first, initial conditions may block or delay learning, thus breeding frustration, second, initial conditions may allow cognitive learning but may make alliance partners more aware of the difficulties of behavioral learning, and third, successful learning may be followed by negative re-evaluation"[1] |

Table 2-1 Comparison of different papers close to the purpose of this thesis

Two contributions are considered to hold a similar position to the planned contribution of this thesis. The first is an article by Bidault and Cummings (1994) who study how various management structures affect the innovation process in innovation-based alliances. The second is by Sivadas and Dwyer (2000) who study how different organizational factors affect the innovation process, both in internal and alliance contexts.

Bidault and Cummings (1994) study the innovation process in five inter-industry technological alliances. The purpose is to identify key managerial issues connected to the effectiveness of the innovation process in alliances. They describe the logic of alliances as being opposite to the dynamics of innovation. They found that the outcome is affected by the nature of the innovation project (principally the newness of innovation), the conditions under which the alliance is formed (e.g. the partners' experiences, their expectations, and the history of the relationship) and the management of the innovation project. The authors argue that innovation-based alliances can "be managed through various structures." They discuss the impact of management structures which reduce or generate tension on the innovation process. The management structure of their model consists of two dimensions. The first dimension is the division of responsibility

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[1] Summary made by Ireland, R Duane, Michael A Hitt, et al. (2002), "Alliance management as a source of competitive advantage." *Journal of Management*, Vol. 28, No. 3, pp 413-446.

between the partners that could result in a continuum from a shared leadership, to a dominant partner leading the alliance, to rather autonomous partners. The second dimension is the degree of formality, which could range from informal agreement to a tightly-specified agreement. The first dimension shows similarities with the combination of the thickness of the interface and the modularity, e.g. a thin interface and modular innovation could be regarded as rather autonomous partners. The second dimension, the degree of formality, can be seen as different positions along the degree of integration (see Figure 1-9). This thesis differs in relation to Bidault and Cummings' article in the sense that the degree of formality attempts to be reasonably constant. Their conclusion is that management structures designed to reduce tensions mitigate the inherent tension in innovation–based alliances. They relate a positive outcome to a low degree of tension, an assumption that may be correct for the alliance relationship but somewhat problematic from the perspective of the innovation process since a tension-free context is not necessarily a very creative one.

Bidault and Cummings consider the nature of the innovation as given and regard only the management dimension as something that can be renegotiated and changed. In this thesis, both the structures of the innovation and the alliance are regarded as something that could be managed and changed, thereby affecting the innovation process. The interplay between the structure of the innovation and the structure of the alliance during the innovation process may reveal other mechanisms than those identified in Bidault and Cummings' study.

Sivadas and Dwyer (2000) focus on how different organizational factors influence innovation in internal and alliance contexts. They develop hypotheses related to seven groups; groups which they argue map the factors for new product success. These groups of factors are: 1) trust, communication, coordination, 2) governance and administrative mechanisms, 3) partner type, 4) dependence, 5) type of innovation, 6) institutional support, and 7) complementarity of partner competencies. The hypotheses have been tested in the semiconductor industry for innovation in internal and alliance contexts, as well as in the health care sector for innovation in alliances. The outcome variable is the success of the innovation process. Based on 95 responses from the semiconductor industry and on 52 responses from the health care sector, Sivadas and Dwyer found that their concept "cooperative competency" (a combination of trust, communication and coordination) contributed significantly to the success of the innovation process in both the semiconductor industry and in the health sector. They found that the cooperative competency could by enhanced by clan-type mechanisms of control, i.e. shared visions and values to guide behavior. They also found that mutual dependency enhances the cooperative competency as well as institutional support (operationalized as clarity of agreement and the lack of resistance from key players in both organizations).

The authors end the article by discussing whether it will be enough to guarantee a successful innovation process if both partners have a high cooperative competence. Their answer is no; what they predict is that two partners which both have a low cooperative competency will have problems forming an innovation-based alliance. They conclude that a successful innovation process depends on many other variables that are of a dynamic nature, and they suggest that additional studies using a dynamic perspective are necessary. This thesis could be seen as a response to their request for studies using a dynamic perspective. In addition, this thesis also includes the structure of the innovation.

# CHAPTER THREE

# RESEARCH METHODOLOGY

This chapter discusses the strategy of the research project and its consequences for the results and conclusions. The chapter is divided into sections that describe a) the research strategy, b) the operationalization of the research question and the choice of studies, c) data collection and analysis in the studies, d) analysis in the thesis, and finally e) a discussion of the consequences of the chosen methods and the credibility of the analysis.

## RESEARCH STRATEGY

The purpose of the research strategy is to outline the general design of a research project that could support the investigation of the research question. Central to this strategy are the motives for choosing an inductive case-based research strategy, the selection of the type of case-based method to be used, and the selection of the empirical basis. The author's background as a manager in the IT industry and as a researcher at a research center focusing on managerial issues in close collaboration with the industry is described as the final part of this section.

### Reason for choosing an inductive case-based research strategy

The research strategy has to adapt to the nature and background of the research purpose and the form of the research question. Two observations are important in the choice of research strategy. The first is the rather explorative nature of the research purpose and the research questions being formulated as "how" and "why" questions aimed at theory building. The second observation is that an understanding of how alliance and innovation structures affect the innovation process requires a contextual approach to the study of the innovation process, similar to the approach suggested by Pettigrew (1987) for studying change processes.

The phenomenon that the research purpose addresses is not well described thus an inductive strategy is natural, instead of a deductive strategy requiring an initially better understanding of the phenomena.

Yin (2003) argues that the research purpose, which he divides into exploratory, descriptive and explanatory purposes, could be obtained using many different research strategies, e.g. experiments, surveys, histories and case studies. What is important in the choice of research strategy, he argues, is a) the form of the research question (e.g. who, what, where, how, why), b) whether it is possible to control behavioural events, and c) whether it focuses on contemporary events. He concludes that a case-based strategy has distinct advantages over the other research strategies when "a 'how' or 'why' question is being asked about a contemporary set of events, over which the investigator has little or no control".

Meredith (1998) lists three strengths of qualitative case-based research. The first strength is that the phenomenon could be studied in its natural setting and an understanding could be gained through observing the actual practice. The second strength is that the case method allows the questions why, what and how, to be answered with a relatively full understanding of the nature and complexity of the phenomenon. The third strength is that the case method allows early exploratory investigations where the variables are still unknown and the phenomenon not understood.

The exploratory purpose and the "how" and "why" questions of the study, together with the need for a contextual approach, constitute the justification for choosing an inductive case-based strategy for the study. A deductive method would be less supportive as regards understanding the mechanisms since deductive models by nature (and purpose) are more rigid.


## Finding an appropriate case-based research method

Having made the choice between an inductive and deductive research strategy, and having concluded that it had better be a case-based research method to address the research purpose, the next step is to decide on the case-based research method.

Voss et al (2002) provide a guide to this choice (see Table 3-1). Using their terminology, the research issue would be classed as theory-building more than exploration due to its focus on patterns and linkages between the variables and on the motives for these relationships. Their recommendation is thus one or more of the following approaches; a) few focused case studies, b) in-depth case studies, c) multi-site case studies, and d) best in class case studies.

| Purpose | Research question | Research structure |
|---|---|---|
| **Exploration**<br>Uncover areas for research and theory development | Is there something interesting enough to justify research? | In-depth case studies<br>Unfocused, longitudinal field study |
| **Theory building**<br>Identify/describe key variables<br>Identify linkages between variables<br>Identify "why" these relationships exist | What are the key variables?<br>What are the patterns or linkages between the variables?<br>Why should these relationships exist? | Few focused case studies<br>In-depth field studies<br>Multi-site case studies<br>Best-in-class case studies |
| **Theory testing**<br>Test the theories developed in the previous stages<br>Predict future outcomes | Are the theories we have generated able to survive the test of empirical data?<br>Did we get the behaviour that was predicted by theory or did we observe another unanticipated behavior? | Experiment<br>Quasi-experiment<br>Multiple case studies<br>Large-scale sample of population |
| **Theory extension/refinement**<br>To better structure the theories in light of the observed results | How generalisable is the theory?<br>Where does the theory apply? | Experiment<br>Quasi-experiment<br>Case studies<br>Large-scale sample of population |

Table 3-1  Matching research purpose with research strategy, (Voss, Tsikriktsis et al. 2002)
The purpose of this thesis is regarded as theory building, according to this nomenclature.

There is a tradeoff between the number of cases and the depth of observation for a given amount of resources. A single case enables a deep understanding of the mechanisms involved, but has limitations in the generalizability of the conclusion and a risk of misjudging a single event. Multiple cases are less deep but the external validity is better and the risk of misjudgment is reduced. Connected with the number of cases is the choice between retrospective and real-time studies. The advantage of retrospective studies is the possibility of having more controlled case selection, while the drawbacks include difficulties determining cause and effect and participants who may not recall important events. Longitudinal real-time studies could overcome the problems associated with retrospective studies but at the cost of a long time span and a great demand for research resources. Given the limitations of a thesis, concerning time and resources, a tradeoff has to be made between the number of cases and the

depth of the studies. One or two longitudinal case studies may not be enough, since their continuation into commercialization cannot be taken for granted, given the uncertainty of innovation. As an analogy, the positions within some of the structural dimensions are not possible to predict in advance, thus increasing the requirements regarding the number of longitudinal cases. Given the limited resources available, retrospective studies have thus been favored in order to secure cases that will cover the whole process, as well as the different positions within the structural dimensions.

## Empirical basis

The empirical basis for this study is defined by the nature of the alliance and the innovation. The alliances included are all formal cooperative ventures (Lorange and Roos 1992), a legal form of an alliance that has gained ground in relation to equity-based joint ventures during the last decade in innovation-based alliances (Hagedoorn 2002). The partners are characterized as large corporations with thousands of employees, several lines of business and international operations. The purpose of the alliances is to create innovations by combining comple-mentary knowledge. The innovations in focus are what Garcia and Calantone (2002) label "really new innovations", implying that either the technology or the market is new to the industry. The innovation domain is technology-based products involving complex operation systems, a domain which, given the chosen level of novelty, could be descried as complex using Tidd's taxonomy (2001). The selection of cases has been guided by theoretical sampling, i.e. finding cases of theoretical value in relation to the thesis' frame of reference (Eisenhardt 1989). Thus, the selection of cases has been done in such way that all quadrants of the analysis model and all structural dimensions have been covered (see Structure of analysis, p. 50, The research process – studies and papers, p. 52), although this does not imply that every combination is included. The inductive research strategy and its trade off between the number of cases and the depth of observation have favored the studying of a limited number of combinations. The generalization of the findings to the other combinations is left to the synthesis. Based on this theoretical sampling, cases have been selected wherever it was possible to obtain good access.

The choice of empirical basis will naturally affect the results. The choice of focusing on formal cooperative ventures, excluding equity-based joint ventures, is important since equity-based joint ventures have a different context to the innovation process, e.g. the operational level is then conducted at a single firm - the joint venture. The results of this thesis are not, thus, directly applicable to equity-based joint ventures without further analysis. The choice of large corporations, with the purpose of creating innovations by combining comple-

mentary knowledge, excludes alliances that are primarily based on co-option logic (Doz and Hamel 1998).

The literature suggests that uncertainty and complexity have a significant impact on the organization and management of innovation (Tidd 2001). The uncertainty could be linked to the novelty of the innovation. The degree of novelty of the innovations in the alliances studied is limited by the choice of studying innovation-based alliances. Building on Roberts and Berry's (1985) studies of strategies for entering new businesses, alliances are a suitable vehicle for "really new innovations", while more radical innovations are preferably achieved through investment in new ventures, and more incremental innovations are achieved in-house (see also Figure 1-5 and Figure 1-6).

The focus on technology-based products involving complex operation systems means that the complexity could be regarded as rather high for the innovations studied, which creates new challenges for management (Hobday, Rush et al. 2000). As this limitation applies to the innovation, the industries could vary although it is more common to see this type of innovation in some industries rather than in others, e.g. telecom and IT.


## The author's background

Before returning to the academic world, the author had been working in the IT industry for fifteen years in various managerial positions. He has both a Master's in engineering physics, including computer science, and an MBA. The work area has always been consulting and system integration, but the focus has varied between product development, integration into the customer's operation and business development including divestitures and being a Board Member of some startup companies. Alliances have been a popular strategic move to talk about in these contexts, but the author has never been an alliance manager as such. The author's background provides the advantage of having an understanding of the context and content of the innovation, as well as of the alliances. This understanding has also supported the use of technically advanced concepts during the studies, e.g. modularity. The downside of this familiarity with the area is the risk of not having enough distance to the subject. This issue will be discussed further in the subsection "difficulties during data collection and analysis."

The research environment where this research has been conducted has an inter-disciplinary tradition focusing on issues of practical relevance that are illuminated using different knowledge areas suitable for the issue in focus. Central areas are business creation, innovation, knowledge management and operations management, areas which all support the chosen issue. This thesis uses a qualitative method, which is in line with the methodological tradition in the research group. The research environment has played a crucial role in providing a context

for reflection and discussing difficulties and results. Methodological issues as well as issues connected with the subject have been possible to discuss with the author's colleagues who used similar methods and frames of reference. The focus of one's colleagues is largely innovation and, for many of them, alliance issues.

## OPERATIONALIZATION OF THE RESEARCH QUESTION AND THE CHOICE OF STUDIES

In order to answer the research question, it needs to be operationalized into properties or events that the researcher can observe. The research question is wide thus it is difficult to cover each aspect between the research question and the conclusions. Instead of claiming that every aspect between the research question and the conclusions is covered by the empirical material, the operationalization of the research question will correspond to a number of studies that has focused on important subparts of the overarching research question. In addition, the structural dimensions discussed in the frame of reference will be related to a number of issues identified as being relevant to the innovation process in the different quadrants of the research matrix (what constitutes an issue is elaborated on in the description of the case-by-case analysis p. 64). These issues are identified from the papers as well as from the studies on which the papers are based (see section Description of the analysis in the thesis p. 63). The research question will thus partly be answered by the individual papers, and partly by the analysis in the thesis (see Figure 3-1).
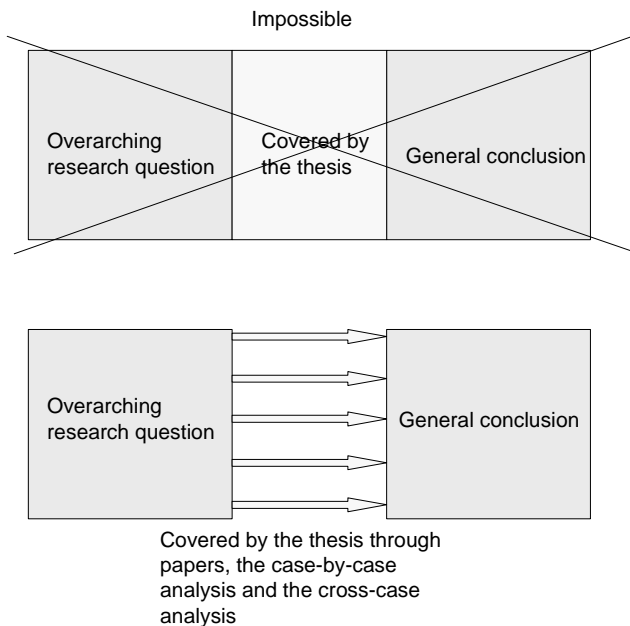


Figure 3-1  A graphical illustration of the relationship between the research question and the general conclusions
The broad research question makes it practically impossible to cover every aspect between the research question and the general conclusions. The operationalization of the research question thus only covers part of these aspects.

## Structure of analysis

A study of the innovation processes in an alliance context using a structural perspective is here considered to benefit from using the tools developed by Pettigrew for analyzing change processes (1987; 1990). He stresses the importance of content, context, and process and their interconnection over time, as well as the necessity of studying these on different levels of analysis. In this thesis, the time dimension will be represented by two innovation phases. The *exploration phase* is characterized by creativity, experimentation, uncertainty, and learning while the *commercialization phase* tends to focus on such things as efficiency in development, quality, and preparation for production and future maintenance. Two levels of analysis have been chosen for the study of innovation-based alliances. This choice to separate into two levels is supported by Gerwin and Ferris (2004) who conclude, through a theoretical discussion about innovation-based alliances, that "our contribution is to distinguish between the alliance level and a project level lying underneath with its own set of concerns." To avoid the difficulty of single innovation alliances whereby innovation project and alliance may overlap, the two levels will be called the tactical level and the operational level. These two levels correspond to the alliance and not to what is considered an operational or tactical level within each partner.

The *tactical level* is where the programs, policies, and goals are decided for the innovation projects. The focus is on creating a supportive context for the innovation process. The tactical level could be associated with the alliance level in a multi-innovation alliance. The tactical level has to handle the alliance-innovation tension by enabling flexibility in the innovations despite the contractual nature of the alliance, reduce communication and coordination barriers that hinder the innovation process and protect the alliance from being terminated due the failure of a single innovation. It is worth elucidating that the use of the term "tactical level" does not entail that the alliance cannot be considered a strategic alliance by either of the partners.

The *operational level* is where the innovation tasks are accomplished by means of different activities and is associated with the innovation project level in the alliance. The distinction between the two levels could be blurred in small single innovation alliances. The management issues in focus on the operational level are traditional management issues such as how to overcome the time, cost, and quality constraints. The alliance context adds issues concerning the division of the innovation task into different workgroups at the two partners, the coordination of the activities across firm boundaries and the integration of the results of the different innovation tasks. The alliance context not only requires that the innovation be successful, but also that it be successful for both partners in order to receive support to continue as a joint innovation process.

## *The research matrix*

A two-by-two matrix wherein the internal context, content, and process can be studied is created by combining the two innovation phases and the two levels of analysis. Although it is always possible to argue in favor of a more finely granulated matrix containing more phases of the innovation process and more levels of analysis, a two-by-two matrix is here considered a reasonable compromise between precision and relevance.

**Innovation phase in focus**



Figure 3-2 The research matrix This two-by-two matrix will be used in the analysis of the activities of the innovation process in an alliance context.
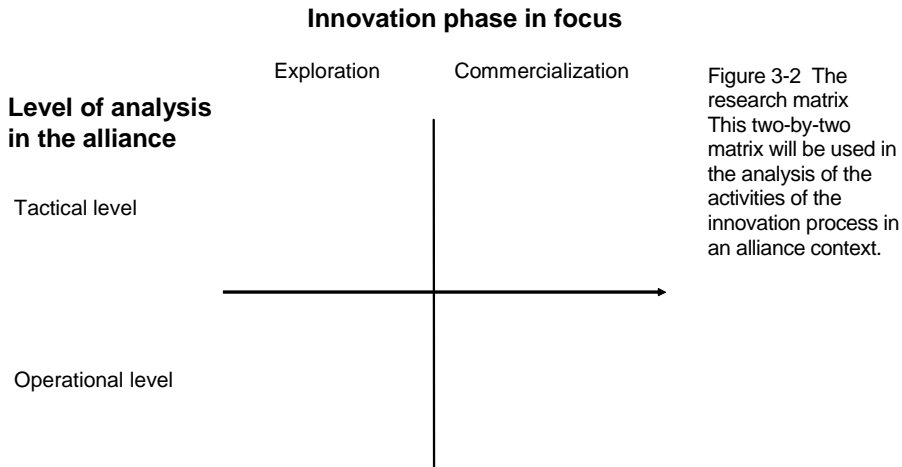
The nature of the exploration and commercialization phases will differ between the operational and tactical levels. On the operational level, the exploration phase is connected with the individual innovation. In this phase, the planned functionality vis-à-vis the customer is specified, fundamental principles are tested, and plans for commercialization are developed. Once this is completed, the innovation project is ready to make the transition to the commercialization phase. Using, for example, Cooper's stage gate model (2002a), the transition could be seen as gate number three which is between the stage where the business case is made and the development stage (see frame of reference). The commercialization phase could, in the case of solutions, be regarded as starting when a contract with a customer is entered into as regards delivering a solution.

For the tactical level, the distinction between the exploration phase and the commercialization phase could be seen as an average of the innovation activities on the operational level in the alliance. The tactical level is considered to be in the exploration phase if the majority of the innovation activities in the different innovation projects are undergoing an exploration phase but in the commercialization phase if the majority of innovation activities take place during this phase. An illustration of both the research model and the structure of the analysis is provided in Figure 3-3.
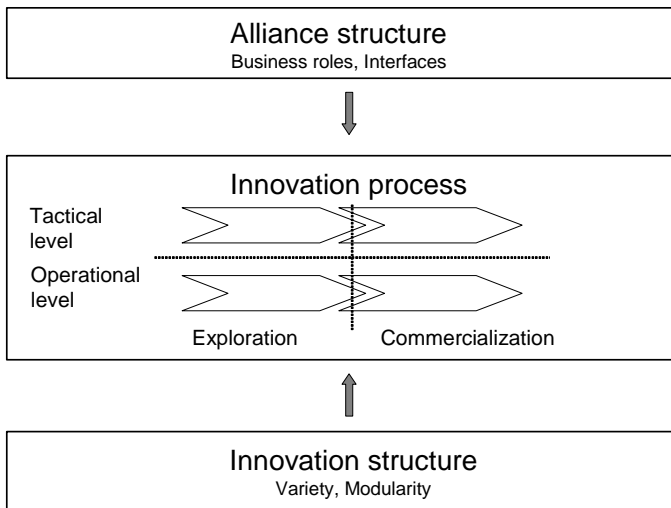
Figure 3-3  The research model and the structure of the analysis

## The research process – studies and papers

Given the small amount of research that has been done regarding innovation-based alliances, the purpose of this thesis has been to build theory (see Table 3-1). An inductive research strategy has thus been applied involving the parallel use of empirical data and literature and with the view that the development of theory is an evolutionary process (Eisenhardt and Bourgeois 1988), an approach also called abduction (see, e.g. Alvesson and Sköldberg, 1994). Because of this iterative process, the studies have been successively designed to enable incorporation of what has been learned from the previous studies.

The first study that is included in this thesis focuses on the exploration phase of the innovation process, on both the tactical and operational levels. The research model and the framework for analysis had not been finalized when this study commenced but became one of the results of the study. The first step in this study was an in-depth study of a learning alliance, which was expected to identify important structural dimensions. This enabled an understanding of the area and the important mechanisms involved.

The next step in this study concerned five innovation projects conducted in an alliance context, two of these belonging to the alliance investigated in the first part of the study. The additional three innovation-based alliances were selected in such a way that one partner, the telecom operator, would be the same in all the alliances. The expectation was that this part of the study would answer some of the hows and whys in the research question, at least with regard to the exploration phase. The study resulted in two papers; one paper primarily focusing on the structural aspects of the alliance and the tactical level (Paper I), and the other focusing on the structural dimensions of both the alliance and the

innovation on the operational level (Paper II). The study also contributed by completing the research model, the framework for analysis, i.e. the research matrix, and the final choice of the structural dimensions.

After Study A had been completed, there was a need to design a study that could focus on the commercialization phase, as well as the variety, in order to cover all research quadrants and all structural dimensions. The second study (B) was thus designed with the intention of studying the commercialization phase on the operational level for innovations with great variety. Solutions integrated with the customers' operation systems were considered a distinctive example of great variety since each solution had something unique for the individual customer. A retrospective study was conducted of two solution alliances between one system integrator and two of its product suppliers for periods of nine and fourteen years. This study resulted in one paper focusing on the alliance interface over time for these two solution alliances (Paper III).

The third study (C) was conducted to address the remaining quadrant in the research matrix, the commercialization phase and the tactical level. The choice made was to focus on the alliances created by outsourcing innovation activities. These alliances focused on the commercialization phase and, since they were designed from scratch to support the commercialization phase, they were expected to lack the lingering structures of the exploration phase. The study resulted in two papers, one paper focusing on the alliance interface and knowledge types (Paper IV) and the other focusing on alliance interfaces and the architecture of innovation (Paper V). The positioning of the studies in the research matrix is illustrated in Figure 3-4 and the relation between the studies and the papers in Figure 3-5.

**Positioning of the studies**
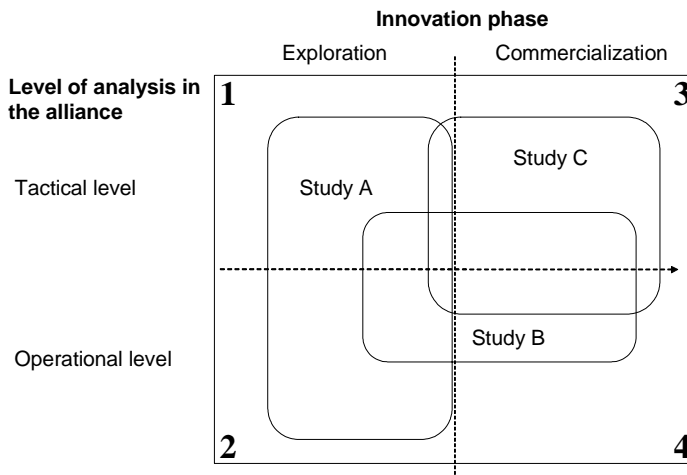


Figure 3-4 Positioning of the studies in relation to the research matrix

| Study A<br>Exploration<br>alliances | | Study B<br>Solution<br>alliances | Study C<br>Outsourcing<br>alliances | |
|---|---|---|---|---|
| **Paper I**<br>Overcoming the<br>Innovation-alliance<br>paradox | **Paper II**<br>Patterns of<br>alignment in<br>alliance structure<br>and innovation | **Paper III**<br>Managing the<br>relationship<br>between system<br>integrator and<br>product supplier | **Paper IV**<br>Outsourcing<br>service innovation | **Paper V**<br>Outsourcing<br>R&D for flexibility |

Figure 3-5  Mapping between studies and papers
The three studies of innovation-based alliances are called the exploration alliances, the solution
alliances, and the outsourcing alliances to capture some of the character of the alliances studied.

## DESCRIPTION OF THE STUDIES

The data collection and analysis in the three studies will be described in the next three subsections. To facilitate a comparison between the different studies, an overview of the data collection in the different studies is provided in Table 3-2.

|  | Study A "Exploration alliances" | Study B "Solution alliances" | Study C "Outsourcing alliances" |
|---|---|---|---|
| **Period of data collection** | August 2001-Feb 2004 | October 2003 - April 2004 | September 2002 - May 2004 |
| **Purpose of study** | Identifying the important structural dimensions of innovation and alliances and studying how these affected the innovation process | Studying how the structural dimensions affected the innovation process during the commercialization phase on the operational level for innovations with great variety | Studying how the structural dimensions affected the innovation process during the commercialization phase on the tactical level |
| **Research design** | In-depth single case study + multi-case study, both retrospective | Retrospective study of pair of alliances | Multi-case study, partly retrospective partly real-time |
| **Empirical basis/setting** | One learning alliance between a telecom operator and a bank between 1995 and 2001 + The innovation process during the exploration phase for five innovation projects in an alliance context | Two alliances between one solution provider and two product suppliers in the information and communication technology (ICT) sector | Three alliances created by outsourcing of product and process development in the ICT sector |
| **Level of analysis** | Tactical and operational levels | Tactical and operational levels | Tactical level |
| **Data sources** | 23 interviews + written material | 16 interviews + written material | 26 interviews + written material |
| **Data collection method** | Semi-structured interviews | Interviews containing one semi-structured part and one structured part | Semi-structured interviews |
| **Validation of description and analysis** | Feedback to key informants | Feedback to key informant | Presentation and discussion of earlier version of Paper V with one of the CEOs |

Table 3-2 Description of the methodology used in the different studies

Data collection was mainly achieved through interviews and by studying different documents. The interviews were central while the documents were mainly used for triangulation. The main part of the documents had been studied before the interviews for about one third of the interviews. Getting into contact with the interviewees was mostly done via a key informant who supplied the

researcher with a list of people considered central to the alliance in focus. These were contacted by phone in order to set up an appointment, using their secretaries as intermediaries.

The author's background in the information and communication technology sector (ICT) enabled him to understand the technology and innovations very well. The preparations before the interviews could thus be focused on learning more about the alliance, the partner's organization and, if possible, learning something about the interviewee's background, more than on the innovation *per se*. To enable semi-structured interviews, an interview protocol was developed in advance. An example of this type of protocol is provided in Figure 3-6.

Being well prepared made it easier to be more precise and to press the interviewees slightly more than would otherwise have been possible. During most of the interviews, the empty rhetoric disappeared after a few precise questions, showing that the author knew the subject and the case reasonably well prior to the interview. Thereafter, people were surprisingly open and frank.

| A – Introduction – Create Atmosphere - | B – Background information |
|---|---|
| Me, Purpose of study, Anonymity, Tape recorder | The interviewee, Company/Business, Organization |

**General information about the alliance**

| The nature of the alliance & innovation | What were the motives? |
|---|---|
| Could you describe the alliance? | What were the motives for the alliance (e.g. develop a product, a new market, learning…) |
| Could you describe the innovation? | What do you think your partner is good at? |
| Describe the relationship in organizational terms, both formal and informal. | What are you good at according to your partner? |
| Could you describe your role? | What results/benefits does each partner want from the alliance? |
| What is regulated in the relationship? | How do you know your partner's motives? |
| What guarantees were there that the relationship would meet expectations? | |
| Describe the innovation (purpose, architecture, interfaces) | |

**Organization and implementation**

| Implementation history | |
|---|---|
| Tell the story of how the relationship was formed and how it developed. | Which similarities did you recognize between the partners? Differences? |
| Prior to decision to cooperate | Which factors hindered cooperation (geographical, language, working methods..)? |
| Describe the process of reaching the decision to cooperate (inc. actors). | How was the relationship managed? |
| What were the motives of the different actors? (e.g. develop a product, a new market, learning…) | What level of dependence does your firm have on your partners' knowledge/capabilities? |
| What is the content? (Product innovation, process innovation, support, delivery, production…) | What kind of support did you get in your role? |
| | Which differences in working methods were there between the alliance and your organization? |
| What type of analysis was done? | What type of information was exchanged? |
| Forming and managing the alliance | Which types of resources went into the collaboration? |
| How was the partner chosen? | |

What previous relationship did you have with the partner? (e.g. customer).

Which critical incidents occurred? (Provide a piece of paper that will serve as a timeline) FOLLOW UP!

For each critical incident:
- Why was it critical?
- Who was involved? Whom did you meet?
- How did it start?
- How did it stop?
- Was it expected or desired?
- When was the incident?

Which types of issues were in focus?

Which kinds of risks and opportunities were anticipated?

How were the people involved in the alliance connected with the rest of their organization?

What was the outcome/result of the cooperation?

What kind of internal consequences did the result entail?

How was the cooperation evaluated by your organization? Within the cooperation/alliance?

Which expectations were not met?

Were there any renegotiations?

Were there any behavioral changes due to learning?

### Final questions

Personal experiences

Additional materials

Is it possible to return for some supplementary questions?

Do you have a suggestion for other interviewees?

Figure 3-6  Example protocol for the initial interviews in study A
(Translation, original was in Swedish) Later on, questions that were more specific were added in order to verify information provided during previous interviews. The interview guide was also gradually improved

A structured part was added to the semi-structured interviews in study B. In this part of the interview, the interviewees had to answer a survey containing Likert-style questions that had been adapted from the one developed by Spekman et al (2000, pp. 74-75) describing the partnership in terms of commitment, equity, information flow, coordination, long-term focus, joint decision-making, and cultural compatibility. This survey was used to improve the quality of data collection during the interviews and to facilitate comparison between the cases, thus not for any statistical purposes.

## Description of study A, Exploration alliances

This study was initiated with the purpose of identifying the relevant structural dimensions of product innovation in an alliance context and of studying these during the exploration phase of the innovation process. The study was designed in two steps. The first step was an in-depth case study of one learning alliance between a bank and a telecom operator and the second step was a multi-case study of five innovation projects during the exploration phase in an alliance context.

The alliance in focus for the first step of this study existed between 1995 and 2001. The choice of which alliance to study was based on its relative success and exploratory purpose. In order to obtain a detailed picture of the alliance, both written material and interview data were collected. The written material consisted of protocols from the steering committee, as well as presentations and reports. Regarding the written material, a detailed case description was pro-

duced. This case description then guided the process of choosing eight interviewees, four from each organization, who together represented the steering committee throughout the period. Four project managers and concept developers were also interviewed in order to triangulate the information obtained from the tactical level. The interviews were semi-structured and covered the process, the structural design, and the outcome of the overall alliance, as well as the innovation projects carried out within the alliance framework. The interviews ranged between 40 and 120 minutes in duration, and were recorded and transcribed. Some informants were interviewed several times. The interviews were conducted between September 2001 and March 2002.

The analysis of the interview data was supported by the software tool N-Vivo, which systematized the structuring of the interview data (Richards and Richards 1991). The documents produced by the alliance were considered too numerous (more than 700) to be analyzed using N-Vivo. Instead, the conclusions drawn from the study of the interview protocols were checked against these documents. The final case description and the central findings of the study have been validated by a key informant from each partner.

The second step of this study concerned five innovation projects conducted in an alliance context, two of them being in the alliance studied in the first part of the study. The additional three innovation-based alliances were selected in such a way that one partner, the telecom operator, would be the same in all the alliances. Besides having one partner in common, the additional innovation projects were selected in order to create variety with regard to consumer and industrial innovations. The empirical basis for the five cases is presented in Table 3-3. The innovation is the unit of analysis used in each of the cases.

|  | Cellphone position | Internet bank | E-billing | Fleet management | Unified messaging |
|---|---|---|---|---|---|
| Innovation | Service to locate cellphones | Financial transactions from home using the Internet | Substitution of the sending of bills with mail sent by electronic means | Information-wise integrating of trucks with their command centers | Integrating telephony, voice messaging and e-mail into a single communication hub |
| Partners | Telecom corporation<br><br>Telecom operator | Bank<br><br>Telecom operator | Bank<br><br>Telecom operator | Haulage contractors' association<br>Telecom operator | IT corporation<br><br>Telecom operator |
| Period | 2000-2002 | 1995-1997 | 1996-1999 | 2002-2003 | 2002-2003 |
| Information sources | 3 Interviews | 5 Interviews<br>Various internal material<br>Public material | 7 Interviews<br>Various internal material | 3 Interviews<br>Various internal material | 5 Interviews<br>Various internal material |

Table 3-3  Overview of the data sources in the second part of the study of explorative alliances (Paper II)

The general market situation differs from case to case. Two of the cases started just before the boom in the software industry at the end of the 1990s. The other three cases started some year later when large parts of the IT and telecom industries were practically in recession.

To get a detailed picture of the alliances and the innovation process, both written material and interview data were collected. Between three and seven interviews were conducted for each case. The people interviewed came from both partners and were either part of the steering committees of the different alliances or project managers. The interviews were semi-structured and covered the process, the structural design, the outcome of the innovation process, and important issues and incidents occurring during the early phases of the innovation process. Twenty-one face-to-face interviews and two telephone interviews were conducted. The face-to-face interviews ranged between 40 minutes and two and a half hours and were recorded and transcribed. The telephone interviews ranged between 40 minutes and one hour and detailed notes were taken which were written up after the interviews. The interviews were conducted between November 2001 and February 2004. The written material consists of internal material, e.g. presentations and protocols, and public material, e.g. press releases. The final case descriptions have been validated by the key informants of the different cases.

The analysis involved a number of matrices to structure the data. The first matrix sorted the cases in one dimension and the innovation process in the other dimension. The identified incidents and issues were plotted in this matrix. A second matrix was created with the cases in one dimension and incidents of similar type in the other dimension. The descriptions of the incidents were put in the intersections. A third matrix compared different structural dimensions of both the alliances and the innovations with incidents and events including the transition to commercialization. Using these matrices, the patterns described in Paper II were identified.

## Description of study B, Solution alliances

This study was designed to investigate how the structural dimensions affected the innovation process during the commercialization phase on the operational level, with a special focus on innovations of high variety. This focus was chosen to address one missing part of the research model, a model that had been completed as a result of Study A. Solutions were considered to fulfill the requirements regarding high variety and the general design was to compare two solution alliances over time. Similarities between the selected alliances with regard to partner characteristics, business environment, and technology, were considered

as important in order to facilitate the study of the effect of management. The empirical basis thus became two alliances between one solution provider and two of its product suppliers in the information and communication technology industry, targeting the business market. The product suppliers were similar as regards product focus and geographical origin, and the periods of the alliances overlapped to a high degree (see Table 3-4).

|  | Fusion | Sunny | Moon |
|---|---|---|---|
| Business | System integrator | Software products for voice response systems and voicemail | Software products for call center systems |
| Year firm established | 1984 | 1983 | 1990 |
| Year when alliance with Fusion was initiated | -- | 1990 | 1995 |
| Geographical origin | Northern Europe | US | US |
| Turnover M€ in 2000 | 40 | 100 | 120 |

Table 3-4  A comparison between the system integrator and two of its product suppliers in the study of solution alliances

To obtain a detailed picture of the alliances, written material as well as interview data was collected. Before returning to the academic world, the author had been a manager employed by the system integrator in a third solution area, which had no contact with the two being studied. This linkage with the system integrator enabled a very good level of access to the company archive, as well as few problems arranging interviews with people involved in the alliance, both inside and outside the firm. Most people interviewed had only been working with one of the alliances, although the Vice President level, for obvious reasons, had insight into both. Ten formal semi-structured interviews were held, covering collaboration, important issues, and the incidents occurring during the alliance. Eight of these interviews were with people employed by Fusion. The interviews ranged between one and three hours in duration and were all recorded. The interviews were conducted between October 2003 and April 2004. The written material consisted of reports discussing the market, suppliers, and strategic choices. A key informant, with knowledge of both alliances, has validated the final case descriptions and the central findings.

A case description was written for each of the alliances. Important issues and patterns were identified and compared with similar types of situations in the other cases in order to identify similarities and differences regarding how the different issues had been handled.

## Description of study C, Outsourcing alliances

This study was designed to understand the innovation process during the commercialization phase on the tactical level in an alliance context, which was the last research quadrant in the research matrix to be covered. The empirical basis was three outsourcing alliances, i.e. alliances created by divestiture and the forming of an alliance with the divested unit. The choice of studying outsourcing alliances was made in order to have alliances that had been designed from scratch to meet the requirements of the commercialization phase thus avoiding lingering structures from the exploration phase.

Data collection was divided between the two researchers involved in such a way that the author interviewed managers of the two alliances connected with the telecom operator while the other researcher interviewed managers of the alliance connected with the telecom product supplier. The interviews were mainly conducted with managers at the senior management level, from both the outsourcing firm and the divested unit. In addition, some staff specialists were interviewed. In total, 26 semi-structured interviews were held, covering the divesting and alliance process, the logic behind the outsourcing, the nature of the outsourced firms, the coordination, the nature and knowledge of R&D resources, and important issues and events occurring during the process. These interviews lasted between 45 minutes and two hours and were recorded. The interviews were conducted between October 2002 and May 2004. The written material consisted of presentation material for potential investors, standard procedures for the service innovation process, access to the outsourcing firm's corporate intranet, and public domain sources such as articles, etc. Each of the authors enjoyed, predating this study, an extensive network within and knowledge of one of the two outsourcing firms. This enabled extensive, deep, and broad access to information and informants.

The analysis focused on a) the strategic reason for the outsourcing, b) the process of outsourcing, c) the arrangement of the collaboration, and d) the problems and benefits of the collaboration vis-à-vis the innovation process. The different outsourcing strategies and the interface thickness were related to a number of dimensions such as architecture of the innovation, variety, type of knowledge involved, relation to operation, etc., in order to find patterns that could increase the understanding.

In order to guarantee a critical review of the tentative findings, both authors reviewed and critically discussed the findings of the interviews performed by the other. Later, both authors critically reviewed the results and interpretations together with an independent researcher. An earlier version of this paper was discussed with the CEO of ITInt about nine months prior to the repurchasing of ITInt being announced.

## Difficulties in data collection and analysis

The process of collecting data was, in some aspects, easier than expected while in other aspects, it was more difficult. Gaining access to senior management was expected to be difficult, especially those outside the telecom operator. This proved to be unproblematic once contact had been established with an alliance manager who could act as a key informant. Even interviews with managers from other companies were rather straightforward. It was expected that the author's background as formally employed by the telecom operator, although doing his Ph.D., could be an obstacle. To avoid being accused of industrial espionage, the author decided to be open about this fact. Senior managers did not have any problems at all, probably because they had been informed by the key informant beforehand. The interviewees freely shared their experiences and opinions. Only for one short moment did an interviewee ask for recording to be halted temporarily while he explained how stupidly his superiors had been acting in the alliance. Access to the written material was more difficult to gain, being granted mostly when the author was somewhat familiar with the people in possession of the documents. This familiarity was the key to the very good level of access enjoyed in the learning alliance in Study A and in the solution alliances in Study B. In comparison with several other Ph.D. students, the author realizes that he had experienced few problems gaining access to data. One explanation for this could be the author's lengthy experience of the industry and his extensive networks of contacts.

The analysis in the individual papers was generally based on a within-case analysis followed by a cross-case analysis. Some exciting hypotheses emerging during the cross-case analysis were difficult to substantiate since they had been based on the dimensions outside the framework and had thus not been revealed in all cases. Sometimes, the lack of data was identified before the interview series had been done, enabling additional questions to be included in the final interviews. In other cases, the hypothesis had to be abandoned due to the lack of data.

The author's industrial background also affected the analysis. The advantage of this background was a rich understanding of the environment of the industry. An understanding of the interviewees' frame of reference and their sometimes rather technical jargon helped to establish favorable interview situations. The risk was that the researcher might lose his detachment from the studied phenomenon and that the thesis might take on the character of an autobiography. This risk was dealt with by writing papers jointly with other researchers who did not have any connections with the author's organization but who had a similar background, thereby enabling a critical dialog regarding the data, analysis and conclusions.

# DESCRIPTION OF THE ANALYSIS IN THE THESIS

## Introduction

The question posed in this thesis is "How and why do the different positions within the structural dimensions associated with innovations and alliances affect the innovation process in an alliance context?". The research strategy has been to look at this question from two levels of analysis and from two phases of the innovation process. The research process resulted in three studies and five papers. These studies and papers contribute to answering the research question as well as serving as an empirical basis for the analysis in the thesis. The analysis in the thesis consists of two sections where the first section is a case-by-case analysis, using each quadrant in the research matrix as a case. The second section is a cross-case analysis of the propositions from the case-by-case analysis together with the propositions from the individual papers. The case-by-case analysis is mainly based on the empirical data presented in the papers, although data from the studies are sometimes presented and used for the analysis in order to cover otherwise white spots. The relationships between the empirical data from the studies, the analysis in the individual papers, the case-by-case analysis, the cross-case analysis and the synthesis are illustrated in Figure 3-7.
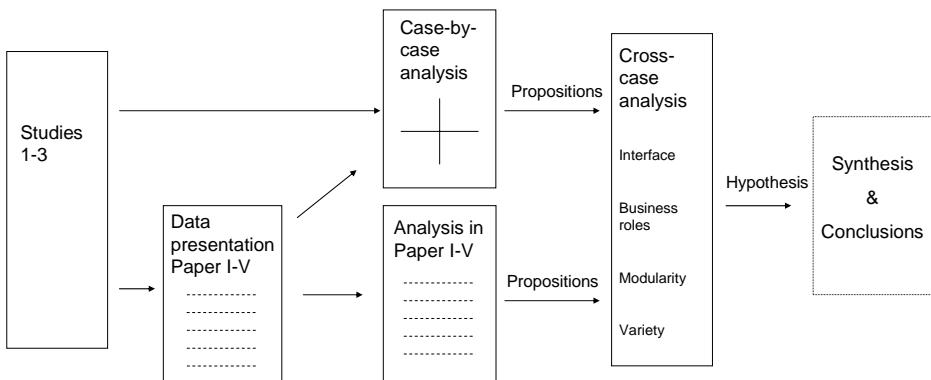


Figure 3-7  Illustration of the relationship between the empirical data and the analysis in the papers, the case-by-case analysis and the cross-case analysis

The case-by-case analysis describes a number of issues of importance based on the observations of incidents and issues in the different studies. The analysis of each issue ends with one or more propositions concerning the relationship between the structural dimensions and the issue. The different propositions are categorized into four groups in the cross-case analysis. Within each group of propositions, the propositions are compared across the research quadrants and in relation to the other structural dimensions. The findings of the cross-case

analysis become the basis for the synthesis where the different findings are synthesized into different models.

## Case-by-case analysis

The case-by-case analysis applies the perspective of an envisaged actor who has a central position for the actual case, e.g. the alliance manager or the project manager of the innovation project. The analysis identifies issues, i.e. events and trends, that the envisaged actor regards as having a (potentially) significant impact on the innovation process related to the alliance context (Dutton, Fahey et al. 1983; Åhlström 1997). Since managers are likely to be more aware of issues related to threats than opportunities (Jackson and Dutton 1988), the identified issues will mostly concern problems and obstacles relating to the innovation process. It should be recognized that the described set of issues is not exhaustive and does not necessarily consist of the most important issues, rather it is the authors' judgment regarding what issues were considered important to the alliance management and the innovation project management.

The issues have been identified through studying the transcribed interviews and case descriptions, and through the issues identified in the different articles. Even though the case-by-case analysis has used the rich empirical material from the studies, which has only to a limited extent been described in the papers, the aim when describing the issues has been to relate to the data described in the papers. The descriptions in the papers are primarily aimed at answering the questions in the papers, and the issues described in this case-by-case analysis are thus sometimes highlighted in the headings and sometimes only described in a few sentences. The empirical data is less strong for the fourth quadrant, i.e. the operational level in the commercialization phase (see Figure 5-1), with the result that fewer issues have been identified when compared with the other quadrants. Each issue is analyzed in relation to the structural dimensions, and propositions are suggested. These propositions can be seen as the result of the case-by-case analysis and they become the input for the cross-case analysis.

## The cross-case analysis

The purpose of the cross-case analysis is to compare the propositions identified in the different research quadrants, across all the other quadrants, in order to enhance the generalizability and deepen the understanding and explanation of the identified patterns (Miles and Huberman 1994). The cross-case analysis involves a number of steps in order to move the analysis from propositions to conclusions regarding how the different structural dimensions affect the innovation process. The cross-case analysis is divided into four subsections, each

focusing on a specific structural dimension. Within each subsection, the analysis contains three steps.

The *first step* discusses the propositions in the group across all quadrants in the research matrix in order to find contrasting situations that could enhance the understanding of the mechanisms linking the structural dimension and the innovation process. The *second step* compares the propositions in relation to the other structural dimensions. The *third step* summarizes the discussion and analysis of the group of propositions into one or several hypotheses. These hypotheses then become the input for the synthesis.

# CONSEQUENCES OF THE CHOSEN METHODOLOGY

## Positioning of the scientific approach of the thesis

Before discussing the consequences of the methods used, a brief reflection is presented on the position of the thesis regarding epistemology, i.e. the nature, origin, and scope of knowledge, and of ontology, i.e. the assumptions of the nature of reality.

Different perspectives on these two dimensions have led to a number of scientific approaches to the study of social phenomena. The different positions could be positioned along a continuum between the two end-poles of a subjectivist approach and an objectivist approach (Morgan and Smircich 1980). An overview of the ontology and epistemology of the different scientific approaches along this continuum, based on Morgan and Smircich (1980), is provided in Table 3-5.

| | Subjectivist Approaches to Social Science | | | | | Objectivist Approaches to Social Science |
|---|---|---|---|---|---|---|
| Core Ontological Assumptions | reality as a projection of human imagination | reality as a social construction | reality as a realm of symbolic discourse | reality as a contextual field of information | reality as a concrete process | reality as a concrete structure |
| Assumptions About Human Nature | man as pure spirit, consciousness, being | man as a social constructor; the symbol creator | man as an actor; the symbol user | man as an information processor | man as an adaptor | man as a responder |
| Basic Epistemological Stance | to obtain phenomenological insight, revelation | to understand how social reality is created | to understand patterns of symbolic discourse | to map contexts | to study systems, process, change | to construct a positivistic science |
| Some Favored Metaphors | transcendental | language game, accomplishment, text | theater, culture | cybernetic | organism | machine |
| Research Methods | exploration of pure subjectivity | hermeneutics | symbolic analysis | contextual analysis of Gestalten | historical analysis | lab experiments, surveys |

Table 3-5  Network of basic assumptions characterizing the subjective-objective debate within social science (Morgan and Smircich 1980).

Using this nomenclature, the positioning of the research strategies could be regarded as a mix of contextual and historical analysis.

Having positioned the ontological assumptions and epistemological stance of the thesis, the requirements for judging the quality of the research design could be described. The dividing line is often drawn between the two columns at the far right of Table 3-5, with the right-hand one considered to be quantitative and all the columns to the left to be qualitative, even though nothing stops the qualitative methods from using statistical methods (Daft 1983). Daft (1983) summarizes the differences between the two approaches by concluding that "qualitative research is concerned with the meaning rather than the measurement of organizational phenomena." A qualitative approach requires that the research process be transparent so that the reader may be able to judge the different steps from problem to conclusion (Eisenhardt 1989). By clearly separating the different steps of the analysis in this thesis, into a case-by-case analysis, a cross-case analysis and a synthesis, it is the author's intention that the readers should be able to make their own judgment regarding the different steps.

The positioning of the research strategy, as a mix of contextual and historical analysis, makes a critical historical analysis of the data sources important, as will be discussed in the next section.

## Discussion of the collection of data

In order to make a critical analysis of the data sources in a study, Torstendahl (1966) recommends a study of the authenticity, tendency, and dependency of the data sources.

*The authenticity* is affected by the closeness in time and space between the data source and the phenomenon that it describes. A written document made in direct conjunction with a phenomenon is likely to be a more authentic description than one that is made many years later. The written material in this thesis is normally close in time to the phenomenon that it describes. The draft version of the protocols in Study A, for example, was made only a few days after the meetings (as could be checked with the date when the file was saved on the computer), although the final versions seem to have been saved within about two weeks. The other written data sources have been in the form of paper, thus lacking the "time-stamp" that the computer files had. Except for some internal evaluations (which for obvious reasons were done at the end of a project), there is no reason to believe that the written material would not be close in time to the described phenomenon. The authors of all documents are well known within the alliances, thus ensuring that they are likely to be knowledgeable about the described phenomenon. The interviews, from the authenticity perspective, were more problematic. Since most interviews were retrospective (some exceptions in study C where there were real-time interviews, i.e. describing a phenomenon

that was unfolding in parallel with the interview), there was a distance in time between the phenomenon and the interview. This risk of reduced authenticity was dealt with by being well prepared before the interviews in order to be able to question what was said based on the previously received information and by using triangulation in the analysis. An important factor was whether or not the interviewees were telling the truth. Assessment of the veracity was supported by the author's familiarity with the context.

The *tendency* of the data sources concerns the extent to which they have been affected by the interviewee's own opinions. A tendency observed in several interviews was that the interviewees wanted to be perceived as doing a good job. To find the sensitive issues that were easily "forgotten" by the interviewees, interviews with free-speaking individuals were important early on during the interview process. Being well prepared before interviewing supported a critical attitude towards what could be perceived as different types of tendencies.

The *dependency* of the data sources describes the extent to which these are interdependent in some way. To reduce this risk, the people interviewed were selected in order to enhance the likelihood of independent descriptions. By interviewing both partners, the hierarchical dependency between interviewees from the same firm was overcome. By interviewing people on different organizational levels, the interviewees were expected to be dependent on different ways of reasoning and different types of espoused theories. An example of the importance of the organizational level was the learning alliance described in Study A. In answer to the question regarding which partner had gained most out of the alliance, both partners had a shared opinion on the tactical level and the opposite opinion, but still shared, on the operational level.

One method of improving the quality of the data material is to let the interviewees study and correct the transcriptions of the interviews. This method has not been used since the interviews were recorded. The quality was instead improved by letting the key informants read and comment on both the case descriptions and the analysis that the interviews had resulted in, thereby verifying correct understanding of the interviews.

## Discussion of the analysis

The quality criteria which will be employed to judge the quality of this research project follow Yin's (2003) recommendation to use reliability, construct validity, internal validity and reliability as quality criteria. In addition, the managerial nature of the research question makes the "pragmatic validity" (Worren, Moore et al. 2002), which fundamentally translates to managerial relevance, important to include.

| Test | Case Study tactics | Phase of research during which tactics occur |
|---|---|---|
| Construct validity | Use multiple sources of evidence | Data collection |
| | Establish chain of evidence | Data collection |
| | Having key informants review draft case study reports | Composition |
| Internal validity | Do pattern-matching | Data analysis |
| | Do explanation-building | Data analysis |
| | Address rival explanations | Data analysis |
| | Use logic models | Data analysis |
| External validity | Use theory in single-case studies | Research design |
| | Use replication logic in multiple-case studies | Research design |
| Reliability | Use case-study protocols | Data collection |
| | Develop case-study database | Data collection |

Table 3-6 Case study tactics for improving the quality of research design (Yin 2003)

### *Reliability*

Reliability concerns the extent to which a study can be repeated by another researcher and obtain the same results (Yin 2003). Within qualitative research, it is important that the reader be able to make his or her own assessment of the different steps leading to the results. Clear separation is important between the data and the theories used to explain this data.

Data collection primarily consists of recorded interviews and written documents. Field notes, wherein the challenge of mixing data with interpretation is greater, have only been used as a secondary data source. It is thus possible to repeat the analysis based on the data collected. Although interview protocols exist, the data collection in itself might be difficult to repeat. A new interviewer's understanding of the context and content prior to the interviews could differ from the author's and the fact that more time have elapsed since the alliances was in operation could increase the risk that the interviewees have forgotten pertinent details. The division into case-by-case analysis, cross-case analysis, and synthesis used in this thesis enables the reader to assess each step of the analysis and to repeat it.

## Construct validity

The construct validity refers to the degree to which the researcher's "measurement tools" measure what they claim to be measuring. Although the constructs vary between the studies, the strategy for improving their validity is similar in the different studies. The retrospective character of the data collection caused some difficulties, as discussed in the previous section, and the strategies for dealing with these difficulties include triangulation. Triangulation, using two or more independent data sources for the same phenomenon, is one important move used in the research project to improve the construct validity (Jick 1979). The triangulation used includes using interview data from both partners and from different organizational levels, as well as different written material from different sources. The validity could also be improved by a dialog with those who have been involved in the study concerning the results (Yin 2003). This has been achieved by sending the case descriptions to the key informants in the different alliances. In addition, the people interviewed have attended workshops where the studies were discussed.

## Internal Validity

Internal validity concerns the identification of causal relationships describing how a certain condition leads to another condition. Central to establishing a causal relationship is observing that the conditions are separated in time. In the different studies, case descriptions and the plotting of events along time lines have been a common tool for increasing the internal validity. The internal validity has also been increased by means of the cross-case analysis, which enables the researcher to look at the evidence through "multiple lenses" (Eisenhardt 1989). By working with another researcher in Studies A and C, confidence in the internal validity has increased through the convergence of the two researchers' observations (Eisenhardt 1989; Voss, Tsikriktsis et al. 2002).

## External validity

External validity, or generalizability, concerns the establishment of a domain to which a study's findings can be generalized. This was described in the "empirical basis" section as large corporations creating formal cooperative ventures with the purpose of creating "really new innovations" in an innovation domain characterized by technology-based products involving complex operation systems. In quantitative research, generalizability builds upon a large number of similar evidence while generalizability in qualitative research builds upon a structure of different types of evidence which all converge at the same point. The statistical generalizability is low for the research project since all studies jointly involve nine different innovation-based alliances. The aim of the research project could not, according to Jick's model (described in Drejer, Blackmon et al.

2000), achieve realism, precision and generalizability at the same time. By focusing on precision and realism in the research project, generalizability is enhanced by means of a critical discussion of the result in relation to the literature. The generalizability is further supported by the use of cross-case analysis (Miles and Huberman 1994). Discussions of the results held with research colleagues, focusing on alliances and innovation in the automobile industry and the ICT sector, have supported the view that the external validity is likely to be acceptable throughout the entire domain.

### Pragmatic validity

To obtain the full value of the findings of this thesis, it will not be enough for them to be valid and transferable to other contexts. In addition, they need "pragmatic validity" (Worren, Moore et al. 2002), i.e. the results need to be intellectually accessible to managers and guide the managers' future action. Worren et al. (2002) argue that to achieve pragmatic validity, the representational mode of the findings will not only have to rely on the propositional mode that is common within academia, but also on the narrative and visual representational mode preferred by practitioners.

The pragmatic validity has been enhanced by the rich use of visual illustrations in this thesis and the narratives of the cases in the articles and the issues in the thesis. The design of the research process, with its individual papers and this thesis, has also enhanced the level of pragmatic validity since the author has had the opportunity to present and discuss the results of the individual papers before the thesis was completed (primarily Papers I and II, as these were finished first) not only at academic conferences, but also at seminars held at companies in the telecom and automobile industries. The reaction has been positive and has supported the belief that they have a high degree of pragmatic validity.

# CHAPTER FOUR

# SUMMARY OF THE PAPERS

The purpose of this chapter is to provide an overview of the papers included in the thesis and describe the propositions of the cross-case analysis which the conclusions in these articles might be seen as. The empirical setting was described in more detail in the description of the studies in the chapter "Research methodology" (a mapping between the studies and the papers is provided in Figure 3-5). The articles are mapped to the research matrix in Figure 4-1. All articles are included in the appendix.

## Positioning of the articles
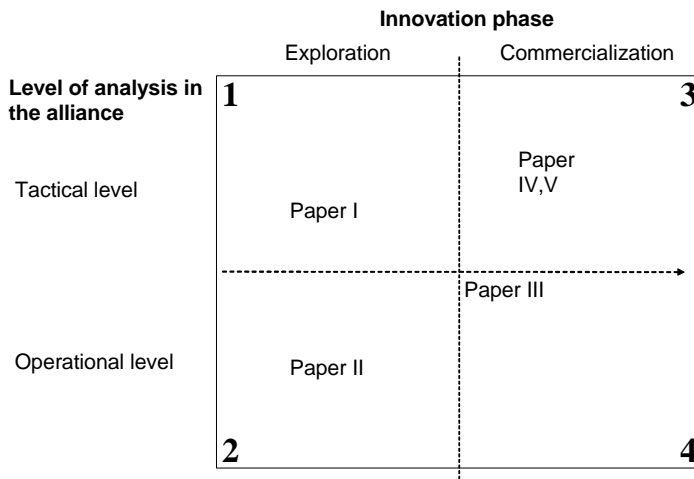


Figure 4-1  A graphical mapping of the papers to the research matrix

# PAPER I: OVERCOMING THE INNOVATION–ALLIANCE PARADOX: A CASE STUDY OF AN EXPLORATIVE ALLIANCE

|  | Exploration | Commercialization |
|---|---|---|
| Tactical | **X** | |
| Operational | **(X)** | |

***Abstract:*** Alliances are an increasingly common way of organizing the uncertain exploration phase of radical innovation. It may, however, be argued that there is inherent tension between the logic of alliances and the logic of innovation. Whereas innovation is generally argued to require flexibility, political protection, and extensive communication, the commonly mentioned key characteristics of alliances are detailed contractual regulation, political struggles, and limited information exchange. On the basis of an in-depth case study of a largely successful alliance for innovation between a European bank and a European telecom operator, this paper argues that the tensions between innovation logic and alliance logic may be overcome by creating a multilevel governance structure for the alliance containing a learning agenda on both the operational and tactical levels. The different levels of the structure are described and their contribution to the success of the alliance discussed. A three-level structure, consisting of an operational level on which explorative projects were carried out, a tactical level providing legitimacy and support to the alliance, and an intermediate level supporting the tactical and operational levels, as well as linking these, was of central importance to the alliance's success since it allowed flexibility and protection against premature termination and managed to overcome the communication barriers that are common in alliances. It highlights the importance of a managerial platform that holds together the different collaborative activities occurring between alliance partners and suggests the use of educational visits as a way of creating this platform. Explorative alliances, it is thus argued, will benefit from the creation of a learning agenda, not only on the operational level but also on the tactical level, giving the alliance a *raison d'être* beyond single successful or failed alliance projects.

***Comments:*** This paper provides a rich empirical description of an alliance during the exploration phase. The results of this paper are interwoven with the issues described in the case-by-case analysis.

# PAPER II: PATTERNS OF ALIGNMENT OF ALLIANCE STRUCTURE AND INNOVATION

Linnarsson, H. (2005). Technology Analysis and Strategic Management, Forthcoming

| | Exploration | Commercialization |
|---|---|---|
| Tactical | | |
| Operational | X | |

**Abstract:** Alliances have become an increasingly common strategy for product development despite the intrinsic tension between alliance logic and innovation logic. This paper investigates the interplay between the alliance structure and the innovation during the early, explorative phases of the innovation process and in the transition from exploration to commercialization. The study is based on five service innovation alliances in the telecom industry. The analysis identifies three patterns through which alliance structure and innovation are brought into alignment: 1) Learning about the innovation may trigger changes in the alliance structure; 2) Learning about the innovation may suggest changes in the alliance structure, which are not, however, possible to implement, thus triggering changes in the innovation; 3) Discussions about the alliance structure may demand changes in the innovation. The alliance process and the innovation process thus need to be viewed as one interwoven process; issues related to the alliance structure being explored in parallel with the exploration of the technical and market aspects of the innovation. Modularizing the innovation supports the convergent exploration of these dimensions.

**Comments:** The conclusions of this paper could be regarded as propositions for the cross-case analysis. The first conclusion suggests that the structures of the alliance and the innovation are interdependent. The second conclusion concerns the reversed dependency, i.e. that the design of the innovation could be dependent on the alliance structure. The third conclusion is that modularization is supportive of finding agreeable forms of commercialization.

## PAPER III: MANAGING THE RELATIONSHIP BETWEEN SYSTEM INTEGRATOR AND PRODUCT SUPPLIER

Linnarsson, H. (2005). Under review in Journal of Change Management

| | Exploration | Commercialization |
|---|---|---|
| Tactical | | |
| Operational | (X) | X |

***Abstract:*** This article asks how a system integrator should manage its collaboration with product suppliers on the basis that different solutions can vary between a minor and a major need for adaptation of the platforms and products to be integrated; two degrees of adaptation requiring different styles of management of the collaboration with the product supplier. The dynamics of such collaboration have been studied in two solution alliances between one system integrator and two of its products suppliers for periods of nine and fourteen years. In this paper, the closeness of the collaboration has been related to the exploration need, creating a model containing four generic types of solution alliances. These generic types of solution alliances are labelled; the innovation alliance, hedged alliance, precarious alliance and reselling alliance. The different types of alliances are discussed and different moves are identified for dealing with an unfavourable balance between the exploration need and the closeness of the collaboration.

***Comments:*** This paper contributes conclusions regarding the development of the interface over time in an alliance, as well as empirical descriptions of the process in innovations with a high level of variety. A proposition for the cross-case analysis in the thesis is that the actual thickness of the interface could deviate substantially from what would be supportive of the innovation process due to an asymmetric dependency and personal relationships.

# PAPER IV: OUTSOURCING SERVICE INNOVATION

Linnarsson, H. (2005). To be revised and submitted for a second review in Creativity and Innovation Management

| | Exploration | Commercialization |
|---|---|---|
| Tactical | | X |
| Operational | | |

***Abstract:*** Outsourcing innovation has become an increasingly common strategy for enhancing effectiveness and flexibility in many industries (Higginbotham 1997). Outsourcing innovation activities, in the form of divesting R&D units with the purpose of buying back their R&D services, is a challenging endeavor due to the strategic role played by R&D. Purchasing R&D services requires close collaboration with the supplier, i.e., an alliance, since this involves uncertainty and the transfer of tacit and complex knowledge (Inkpen 2000).

The coordination needed between the partners of an R&D alliance is influenced by many factors, among these the character of the task, e.g. modularity (Sanchez and Mahoney 1996; Gerwin 2004), the knowledge of the partners, e.g. familiarity with technology/markets (Roberts and Berry 1985), and the objectives of the collaboration, e.g. exploration or exploitation (Koza and Lewin 1998). A common assumption in all these models, albeit often implicit, is that the alliance is created between two independent firms and that these firms are moving from an arm's length relationship to a situation somewhere between market and hierarchy (Williamsson 1991; Lorange and Roos 1992). This assumption is not valid as regards alliances created by firms and their outsourced R&D units. This type of alliance starts with two firms having a joint history where the evolution of the collaboration is from hierarchy toward a more distant relationship. This difference in origin could result in an initially more extensive network between the people in the two firms entering into an alliance created by outsourcing vis-à-vis an alliance initiated by two independent firms. In consequence, coordination could be expected to face different challenges in alliances based on both types of origin.

Against this background, the purpose of this paper is to explore the organizing of the alliance created when outsourcing R&D for services. Some important aspects concern the type of knowledge outsourced and the relationship between R&D and the operation.

As an empirical basis, two outsourcing alliances are used which were created when divesting R&D for telecom service innovation. These have the outsourcing firm in common but differ in their main tasks, with one focusing on specification and the detailed design of service innovations and the other focusing on testing service innovations.

It is argued that discussions regarding alliance coordination need to distinguish between a strategic/tactical level and an operational level since the need for coordination may differ greatly between these levels. While the coordination needed on the operational level is connected to the nature of the task (Gerwin 2004), it is suggested here that the coordination needed on the strategic/tactical level is influenced by the type of knowledge being used by the outsourced firm, and the interaction between the partners prior to initiating the alliance, e.g. whether it is an outsourcing alliance or an alliance initiated by two independent firms.

**Comment:** This article illustrates the commercialization phase on the tactical level. It suggests two propositions for the cross-case analysis in the thesis. The first is "The thickness of the interface on the tactical level relates to the type of knowledge involved and the strategic direction of the alliance" and the second is "The coordination need on the tactical level could differ from that on the operational level"

## PAPER V: OUTSOURCING R&D FOR FLEXIBILITY-EXPERIENCES FROM THE TELECOM INDUSTRY

Kling, R. and H. Linnarsson (2003). The 10th International Product Development Management Conference, Brussels

| | Exploration | Commercialization |
|---|---|---|
| Tactical | | X |
| Operational | | |

*Abstract:* Outsourcing is an important method of restructuring research and development (R&D). Based on a study of three cases in the telecommunications industry, a tentative framework is proposed for understanding the process of creating innovation-based alliances by outsourcing R&D, through divesting internal R&D operations and creating alliances with the outsourced unit. Impacts on flexibility from the process, structure, and interface are identified. Understanding these impacts is critical to successful management of R&D outsourcing. How do firms retain and develop flexibility while moving from hierarchy towards a more mixed-mode relationship, with a greater degree of market influence?

*Comments:* This article contributes by illustrating the importance of the interplay between modularity and the organizational structure on an aggregated level. A proposition is "The alignment of the organizational structure to the product structure is supportive of a strategic flexibility".

# CHAPTER FIVE

# CASE-BY-CASE ANALYSIS

The question posed in this thesis is "How and why do the different positions within the structural dimensions associated with innovations and alliances affect the innovation process in an alliance context?" The case-by-case analysis examines this question for each of the four research quadrants in the research matrix. The case-by-case analysis describes a number of issues of importance to an envisaged actor with a central position in the different research quadrant based on the observation of incidents and issues in the different studies. The outcome of the analysis of the individual issues is presented as propositions related to the structural dimensions.

The four research quadrants will be discussed, beginning with the two quadrants connected with the exploration phase then continuing with the two quadrants connected with the commercialization phase. There is no perfect mapping between the papers and the quadrants, i.e. each paper does not map exactly to one quadrant, as Figure 5-1 illustrates. The analysis of each quadrant is thus based on one or more papers.

The different quadrants of the research matrix have been given a number that corresponds to the order in which they are analyzed (see Figure 5-1). The first part of the exploration phase involving pure research has not been covered by any of the papers. Neither is there any paper covering the late innovation phases involving maintenance and incremental enhancements on the operational level.

The description of each issue is divided into three parts. The first part describes why the issue is important to the innovation process and why it is problematic in an alliance context. The second part describes the observations of how the issue affected the innovation process, how it was handled and what consequences could be seen. The final part presents the outcome of the analysis in the form of propositions.

Although the analysis could be read independently of the papers, it is highly recommended to read at least the empirical descriptions of the papers in order

to obtain the empirical background. Without this background, some empirical references in the case-by-case analysis may be difficult to understand.

## Positioning of the articles

**Innovation phase**

| Exploration | Commercialization |
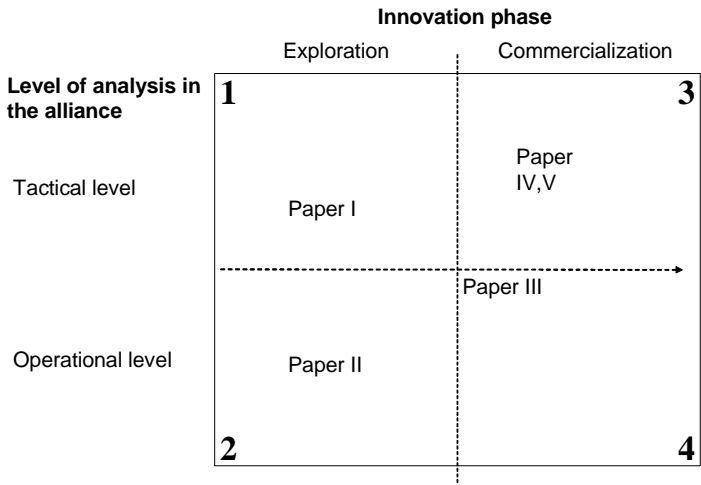


Figure 5-1  A graphical mapping of the papers to the research matrix
(This figure is identical with Figure 4-1)

# QUADRANT ONE: TACTICAL LEVEL AND THE EXPLORATION PHASE

| | Exploration | Commercialization |
|---|---|---|
| Tactical | X | |
| Operational | | |

This quadrant focuses on the tactical level of the alliance during the exploration phase. In contrast to the quadrants focusing on the commercialization phase, management had to deal with creativity, great uncertainty, and the need for knowledge creation. In relation to the quadrants focusing on the operational level, management focused on the organizational context of the innovation process. The discussion is primarily based on Paper I, with some support from Papers II, III and IV.

The analysis identifies six issues. These are a) Securing joint strategic involvement in idea generation, b) Enabling flexible management of the project portfolio, c) Protecting uncertain ideas, d) Enabling open communication, e) Creating preconditions for commercialization, and f) Defending the alliance against competing internal initiatives.

## Securing joint strategic involvement in idea generation

Securing strategic involvement in idea generation is an important issue in order to get funding to the innovation during the exploration phase. Traditional methods of evaluation could kill the more radical innovations prematurely since these methods are more focused on incremental innovation where the uncertainty is less. To use evaluation criteria other than those traditionally used for product development requires the approval of senior management, which is easier to get if senior management has been involved in idea generation.

Securing joint strategic involvement in idea generation could be problematic since senior management has many other important activities; activities that are easily prioritized since the effect is seen closer in time than the effect of an innovation-based alliance.

### Observations

In the alliance illustrating the first quadrant, securing strategic involvement in idea generation was supported by a number of workshops where senior management from the two partners could together reflect on mockups of possible innovations. The securing of strategic involvement also rested on a joint learning agenda for senior management, which included educational visits to different parts of the world.

A number of factors were important for enabling this strategic involvement, some of these being designed and some of them being prerequisites for the

alliance. The prerequisites could be described as a similar historical background for the two partners, which supported a common perspective on the two corporations' roles and challenges, i.e. a cultural similarity between the two partners. A learning agenda in the alliance, not only designed for the operational level but also for the tactical level, seems to have been crucial for securing this involvement. This learning agenda included annual educational visits to different places throughout the world where the tactical level, i.e. the senior management of the two corporations, could together study issues related to the innovation area of the cooperation. These educational visits were highly appreciated by top management as personal development, being important for maintaining top management's attention to the alliance:

> "The most interesting part [of the alliance] was the learning tours we did together, and the work related to them" (VP Eurobank) (Paper I p. 11)

The explorative projects, together with the educational visits, helped the tactical level to build a shared understanding, which facilitated decisions concerning the direction of single projects and the alliance as a whole.

> "We realized that he [the responsible senior executive] would never accept this alternative [the Internet alternative], but the alliance management had just been to the US and seen the very latest regarding the Internet. He had returned some days before the meeting, so when we showed him the web technology he realized from experience that this was right" Project Manager home bank   (Paper I in an earlier version found in  Linnarsson and Werr 2002)

Central to the creation of these factors supporting top management' involvement in idea generation was the intermediate level that created the different arenas for idea generation and learning.

### *Propositions for the cross-case analysis*

The creation of personal incentives for the managers on the strategic level, in the form of a learning agenda, secured their involvement in idea generation.

*Proposition 1.1*    ***A learning agenda on the tactical level supports the securing of joint strategic involvement in idea generation.***

Joint strategic involvement in idea generation could be expressed as a thick interface. Without the joint strategic involvement during idea generation, the interface could be regarded as thin since this phase focuses on exploration and learning.

## Enabling flexible management of the project portfolio

Flexible management of the project portfolio is important to be able to adapt to the learning gained during the exploration of the innovations. Having this flexibility in the management of the project portfolio in an alliance is difficult since there are two partners that need to agree on which projects to start and

which to stop. This could be contrasted with the single point of command that could exist within a firm. Alliances are recommended to have clear contracts regulating what to do, how each partner should contribute, and how the benefits should be distributed. This recommendation could hamper flexible management of the project portfolio in an alliance since the renegotiations of the alliance conditions that the changes might imply, could delay the innovation process.

## *Observations*

In the Eurobank-Eurotel alliance described in Paper I, flexibility consisted of the easy starting and stopping of the projects. This flexibility supported the dual purposes of creating innovations and generating some new knowledge of the innovation area. Increased knowledge, which was the result of the exploration, sometimes made it unnecessary to continue with certain projects, thus making the easy termination of the projects important. The flexible termination of projects was also supportive of the easy starting of projects since it reduced the risk of a long-term commitment regarding ideas that are difficult to assess. More ideas could be explored, and if not considered to have any future, the exploration could be stopped immediately.

Flexible management of the project portfolio was enabled by a loose contract between the partners, stating that each partner would bear his own costs for the exploration unless otherwise agreed. This loose contract was possible due to a trustful relationship between the partners on the highest management level. This trustful relationship was, in the present alliance, linked to a feeling of affinity between the companies which was based on a common history and similar market positions within the respective industry. The trustful relationship was further supported by the recurring educational visits of top management. During these visits, a common understanding and trustful personal relationships formed. The flexibility of the management of the project portfolio was supported by the focus on creating relatively limited projects involving two to three representatives from each partner organization in order to explore a new product or service idea. The organization of the exploration into projects on the operational level enabled the tactical level to have considerable flexibility in starting and stopping different exploration projects. This flexibility was also enhanced by the limited exchange of money. There was a general understanding that the activities should be allocated in such a way that the cost and benefits of the activity would remain with the same partner. This strategy was enabled by modularizing the exploration of the innovation. The exploration of the innovation concept and the architecture of the innovations were done jointly. The modules needed for the architecture were rather quickly identified and the exploration of the individual modules was led by the partner that was believed to benefit most from it later on. The exploration of the overall concept and the architecture continued in parallel with the exploration of the modules. Each

partner's benefits of being active in the architectural exploration were considered to be linked to the amount of resources put in.

### Propositions for the cross-case analysis

Flexible management was supported by the easy starting and stopping of projects. This easy starting and stopping required that the individual innovations could be detached from the tactical level in the alliance. This portfolio approach presupposes a multi-innovation alliance. In a single-innovation alliance, the alliance's existence will be tied to the innovation's existence.

*Proposition 1.2*    *An easily detachable operational level is supportive of the management of the innovation project portfolio by enabling the easy starting and stopping of the projects*

Factors that enable an easily detachable operational level include limited timespans for projects, relatively small investments, and a balance in the distribution of investments in relation to the knowledge gains that exist independently of whether or not the innovation continues. Modularity links with the last argument by enabling partners to focus their investments on such areas where they have a long-term knowledge interest.

*Proposition 1.3*    *Modularity supports flexible management of the project portfolio*

## Protecting uncertain ideas

The protection of uncertain ideas is important during the explorative phase of the innovation process since the innovation could face premature termination if called into question. Innovations that are more radical are vulnerable to being questioned since they are less understood than more incremental innovations and a greater threat to existing products or routines. The protection of uncertain ideas is, perhaps, even more difficult in an alliance than a single firm since an alliance relies on two strategic and organizational contexts. The innovation could be killed by arguments concerning a lack of potential as well as by arguments concerning the distribution of costs and benefits between the partners.

### Observations

Among the methods used to protect the uncertain ideas in the Eurobank-Eurotel alliance (Paper I) were the location of the early exploration outside the ordinary product development organization as well as the financing of this exploration as business development instead of product development. The intermediate level that existed between the tactical and operational levels partly fulfilled the central roles of being product champion and sponsors of the explorative projects. With its elaborate organizational networks and direct access to top management, the intermediate level of the alliance structure was essential for generating resources for the projects and protecting them from critical assessment during early

phases. By making this role a joint one involving managers from both partner organizations, the problem of the champion's and sponsor's limited understanding of, and network within, the other organization was overcome. The consistent attention of top management, fueled by the recurrent educational visits organized by the intermediate level, also provided the alliance projects with great legitimacy. The educational visits, together with other learning activities, provided the benefits that top management needed to continually prioritize this activity. It also gave top management a deep enough understanding of the field of innovation that they were exploring to make them comfortable with the investments and to stabilize the decision making process at the top management level. This enabled a more predictable sponsoring of the different projects.

### *Propositions for the cross-case analysis*

A thick interface between the partners enabled joint responsibility for the champion and sponsor roles that were important for protecting the uncertain ideas.

**Proposition 1.4**   *A thick interface on the tactical level is supportive of the innovation process by enabling joint responsibility for the champion and sponsor roles*

Many of the tactics used to protect the innovations are only available to senior management, e.g. financing exploration as business development.

**Proposition 1.5**   *Increased seniority of the management involved in the cooperation supports the protection of uncertain ideas.*

## Enabling open communication

Open communication, being a widely recognized success factor for radical innovation, is often described in the alliance and partnering literature as a challenge since it involves the risk of losing strategic knowledge and capabilities to the partner. Since the alliances studied in this thesis are contractual, the issue of open communication becomes more problematic than if the alliances had involved a separate equity-based entity with resources from both partners, which in this sense would be more similar to a single firm. Innovation is crucial for the firm's future possibilities and ideas for innovations could be more difficult to protect than, for instance, knowledge relating to operations.

### *Observations*

Open communication was essential for the explorative projects in order to be able to create new knowledge and new ideas for innovations. The tactical level had an important role to play in enabling this open communication since people on the operational level seemed to reflect the openness that they perceived to exist on the tactical level.  In the Eurobank-Eurotel alliance (Paper I), communication was mainly described as very open on all levels — from the operational level, with its individual projects, to the tactical level, with its recurrent educa-

tional visits. This was however not the norm in all alliances with a very open communication, and the communication in some of the innovation projects described in Paper II was of a more cautious nature. The close collaboration on the tactical level resulted in a psychological contract that contained many of the factors enabling a good innovation climate, e.g. openness, clear motives and collaboration practice (see for instance Wathne, Roos et al. 1996). This psychological contract and the involvement of top management legitimized the collaboration on all levels. Furthermore, communication was facilitated by the similar background of the organizations in terms of markets and corporate culture. This made it easier to understand each other on all levels. There was a wide range of communication channels between the two organizations, starting at the very top of the organizations and continuing down to business development and the local level where the two corporations were engaged in joint exploration projects concerning innovations. The close interaction between people from the two organizations enabled open communication since it allowed people to know each other better. Senior management's example was described as especially important since lower management was reluctant to have a higher risk profile than senior management regarding risks of opportunistic behavior.

The perceived risk of opportunistic behavior reduced the openness of one of the innovation projects studied (E-billing in Paper II). Uncertainty concerning what business role the partner would try to obtain during the commercialization phase reduced the level of openness between the partners.

### Propositions for the cross-case analysis

The openness of the communication on the tactical level seems to act as a role model for the operational level. A thick interface ensures a lot of communication and extensive communication will support the building of trust and more open communication.

*Proposition 1.6    A thick interface on the tactical level is supportive of open communication.*

The more senior management was involved in the cooperation, the more the collaboration was legitimized on all levels and senior management could serve as an example of the type of dialog that was expected.

*Proposition 1.7    The increased seniority of the management involved in the cooperation supports open communication*

Suspicions that the partner would behave opportunistically could reduce the openness of the communication. These suspicions could be created by a perceived risk that the partner would evolve into a competitor. This risk can be reduced if the partners, for some reason, have fixed business roles.

*Proposition 1.8    Fixed business roles support open communication.*

## Creating preconditions for commercialization

The innovation process places different requirements on the context during the exploration phase, compared with the commercialization phase. To make the innovation continue beyond exploration, it is important to find or create a context that supports the commercialization phase. The transition between these two contexts is not easy within a single firm. It is even more complicated in an exploration alliance since a commercialization context might not necessarily exist. The partners thus have to either transform the alliance into a commercialization alliance, at the same time creating a less suitable context for other innovations during the exploration phase, or negotiate a continuation of the innovation in another context. Both alternatives are likely to take time, thus delaying the innovation process.

### *Observations*

The difficulties of creating the preconditions for the commercialization phase varied between the alliances. The preconditions included; finding an organizational form for the commercialization, an agreement between the partners, and the internal approval of the necessary investments. In the Eurobank-Eurotel alliance, one difficulty was the purpose of the alliance focusing only on the exploration phase. The tactical level thus had to plan for the continuation of the innovations in another organizational context. This could be between the two partners, but outside the alliance agreement. In the other alliances studied, as well, the creating of preconditions for commercialization was an important issue, even though the alliance was intended to continue with the innovation into the commercialization phase. A problem with the creation of preconditions for the commercialization phase was that the requirements which the innovation placed on the context became known only at a late stage of the exploration phase, thus making it difficult to start creating the preconditions for commercialization in parallel with the exploration of the innovation. The fact that there were renegotiations of the alliance structure for all innovation projects which continued to the commercialization phase could serve as an example of the importance of creating supportive preconditions for commercialization. Even when the commercialization phase had been included in the original agreement (e.g. Mobile positioning in Paper II), renegotiation of the contract was carried out before continuing to the commercialization phase. In several of the cases, the renegotiations resulted in changes to the alliance structures, e.g. the partners' relationship to the market and the degree of shared revenues. Several alliances had a horizontal nature during the exploration phase whereby all the partners carried their own costs. A number of these horizontal alliances were changed upon transition to the commercialization phase into vertical alliances. A tight dialog on the tactical level which enabled different alternatives to be discussed

was important with regard to creating the right preconditions for the commercialization phase.

A different approach to this issue existed in the solution alliances (Paper III). In these alliances, the preconditions for commercialization were created by selling and delivering one or a few solutions to customers where the commercial conditions could differ between the different solutions. In the Moon alliance for example, the first solution was delivered as a horizontal relationship and the following solutions as a vertical relationship. In the solution alliances, it was easier to do a commercial introduction of the innovation on a small scale with one customer. The experiences gained resulted in additional exploration or wider commercialization. The change between exploration and commercialization was thus much more gradual than in the other alliances. In the other alliances, the creation of the preconditions had to be carried out before entering the commercialization phase in order to be able to make the substantial investments necessary during the commercialization phase to develop dedicated high-volume operations.

The solution alliances differed from the other alliances in the sense that the innovation, i.e. the solutions, had a greater variety than did the innovations in the other alliances described. The activities in both the exploration and commercialization phases were organized, in the solution alliances, as projects. This could be contrasted with the alliances with low variety innovations where the organization of the activities shifted from a project form during the exploration phase to a more permanent organization during the commercialization phase.

A low level of variety in the innovation thus seems to result in a distinct transition to commercialization, while a high level of variety in the innovation makes the transition from exploration to commercialization more gradual.

### *Propositions for the cross-case analysis*

Renegotiations of the alliance structures seem common in the studied alliances, before the innovation can enter the commercialization phase. A thick interface can enable the required dialog to find conditions that both partners can accept.

*Proposition 1.9*    *A thick interface on the tactical level is supportive of finding suitable preconditions for the commercialization phase.*

The way the preconditions were created seems to differ substantially between the innovations with a low and a high level of variety. In the former case, preconditions are created just before a distinct transition to the commercialization phase, while in the latter case, conditions are created in a situation that mixes exploration and commercialization.

*Proposition 1.10*   *The distinctiveness of the transition from the exploration phase to the commercialization phase is reduced by increased variety.*

## Defending the alliance against competing internal initiatives

The innovation developed in the alliance might not be the only innovation that the firm is involved in regarding the same innovation area. Parallel innovation activities within the same innovation area can be difficult to handle within the single firm, and it becomes even more challenging when some of these parallel activities are carried out in alliances with other firms. Suspicions about opportunistic behavior, i.e. leaking information to the parallel alliance, can arise in the case of parallel innovation activities.

The problem with suspicions about opportunistic behavior regarding the innovation process is that these suspicions decrease trust and thus increase the reliance on formal contracts which may hamper the flexibility to adapt to the learning gained during the exploration of the innovation.

### *Observations*

The alliances studied had to be defended against other internal initiatives in the form of other alliances and internal development. In order to defend the alliance, it was important to know about competing internal initiatives at an early stage as well as to be able to stop or redirect these initiatives in such way that the threat to the alliance would be removed.

In the alliance described in Paper I, one source of tension was Eurotel's cooperation with other banks to create Internet banks and other sophisticated solutions. The thick interface on the tactical level and the deep trust between the partners assured Eurobank that no knowledge would leak from them via Eurotel to the other banks. The alliance was eventually dissolved since Eurotel had formed a parallel alliance that Eurobank saw as competitive. The alliance manager of Eurotel was not familiar with the plans of the parallel alliance and thus could not stop it or prepare the alliance so that it would survive the foreseeable tension that the other alliance would create.

In the TeleProvider-ITDev alliance described in Paper IV, a controversy arose when TeleProvider started building internal capacity for some services that had been outsourced. In the end, the controversy turned out to be a misunderstanding of the role of some new functions. A thin interface made it difficult to check the real purpose of these functions thus instead it became an issue on the CEO level.

### Propositions for the cross-case analysis

Three propositions emerge from the issue of defending the alliance against competitive internal initiatives. To defend the alliance successfully, it is important to know about the other initiatives at an early stage and before they are able to harm the alliance and the innovation.

***Proposition 1.11***    ***The wider the network the alliance management has in the organizations, the better will be the ability to defend the alliance against competing internal initiatives.***

Just knowing that there is a threat to the alliance is not enough to be able to defend it. It would be even better if the alliance management could stop or redirect these other initiatives. The more seniority the management of the alliance has the better is the chance of influencing the decision-making process.

***Proposition 1.12***    ***The increased seniority of the management involved in the cooperation supports the defending of the alliance against competing internal initiatives.***

Not all internal initiatives might be as harmful as the partner believes at first glance. A thick interface enables a dialog whereby mistakes can be sorted out.

***Proposition 1.13***    ***A thick interface between the partners is supportive of defending the alliance against competing internal initiatives by creating a dialog whereby misunderstandings can be solved***

# QUADRANT TWO: OPERATIONAL LEVEL AND EXPLORATION PHASE

| | Exploration | Commercialization |
|---|---|---|
| Tactical | | |
| Operational | X | |

This quadrant focuses on the operational level of the alliance during the exploration phase. The challenges that were particularly salient for the management in this quadrant were related to creativity and learning in the individual innovation project, in contrast to the tactical level described in the previous chapter where the focus was on the context of the innovation process.

The aim of the innovation project is to develop an idea for an innovation into an innovation concept that would have such a good potential that the tactical level could decide to commercialize it. The project management of the innovation project was often a team consisting of one manager from each partner. This project management team had to handle issues of an operational and a tactical nature, the latter a delegation from the tactical level.

The empirical data is primarily based on Paper II, but also to some extent on Papers I and III. The issues concerned a) Anchoring the innovation project to the internal context, b) Handling two sets of standard procedures, c) Realizing the cooperation, d) Verifying the partners' business logic and priorities, e) Aligning the innovations and the alliance, and f) Handling changes in costs and benefits.

## Anchoring the innovation project to the internal context

An innovation project has to interact with many activities that are external to the project itself but internal to the partners. These activities could be everything from the sales organization to the HR department. If the project is well connected with this internal context, it is likely that the internal context will be better at supporting the innovation project. The connecting of the internal context to the innovation project is more difficult for an innovation that is explored in collaboration with another firm since it has to be connected with two internal contexts, and more resistance of the type "not invented here" can be expected vis-à-vis an in-house exploration.

### Observations

Anchoring the project in the internal context in the studied alliances included obtaining support concerning technology, advice concerning strategies in different areas, market analyses, and resources for the exploration. The internal financing of the resources needed for the alliance did not automatically guarantee that the alliance would obtain any resources. The task of anchoring the

innovation project became even more challenging when this had to be done at the same time as the organization was changing, thus requiring connecting with both the old organizational structure and the expected new organizational structure. Explorative alliances seemed to become orphans, to some extent, when reorganizations occurred. In several of the innovation projects described, the alliance manager had to spend considerable amounts of time on internal negotiations and persuasions. The alliance manager's capability of political entrepreneurship seems to have been important as regards rallying internal support.

Anchoring the innovation project in the internal context placed a heavy demand on the alliance manager when securing resources and support, while at the same time not losing the focus on the innovation project. The alliance management had a role in managing not only the exchange with the partner but also the internal activities that are affected by the joint collaboration; activities that could hinder the innovation process.

> "The problem was not new but had been known about for a while. If their manager had been better in touch with the market, there would have been some action." Alliance manager for the fleet management alliance, describing an internal problem getting another unit to fix a bug

The ability to connect the internal context with the innovation project varied between the different cases. For some of the alliances, it was described as difficult to connect the internal context with the innovation project group (e.g. fleet management and unified messaging in Paper II). People in other organizational units were reluctant to give their support to the innovation project until ordered to do so by their superiors. In the same corporation, other innovation projects conducted in alliances had less of a problem obtaining the necessary support and people were often persuaded to prepare for activities before the order had been given by their superiors (e.g. the Internet bank in Paper I).

One difference between the innovation projects that were well anchored to the internal context, and the innovation projects that lacked this anchoring, seems to be the extent to which the alliance management was well connected to a wide network of people within their own organizations. The ability of the alliance management to affect a wide network could also, in the cases studied, be related to seniority and entrepreneurial instinct.

### *Propositions for the cross-case analysis*

One proposition originates from the analysis. It is,

**Proposition 2.1**  *The wider the network the alliance management has in its own organization, the better will be the ability to anchor the innovation project in the internal context*

## Handling two sets of standard procedures

To enable an efficient innovation process within the firm, many larger firms have implemented elaborated standard procedures and processes related to innovation. Using these models enables a better quality of decisions and a more efficient use of resources. When the innovations are made in an alliance context, difficulties can arise when the two partners' standard procedures and processes are incompatible.

### *Observations*

In the studied alliances, there were models for partnering, product development, and project management. The identified incompatibilities existed between partnering models and product development models. In unified messaging (Paper II), the partnering model of one firm required a firmer commitment from the other firm than this firm's product development model would accept at the stage in question. The deadlock could be resolved by relaxing the requirements to adhere to the models. However, this alternative only seems to have been available after fairly senior managers had become involved. Mobile positioning (Paper II) was the alliance where the partners had the most similar models, i.e. both had adaptations of the same core model with the same number of stages. In this alliance, the issue of handling two sets of standard procedures did not exist.

The issue of two sets of standard procedures was less during the commercialization phase. Finding a jointly acceptable approach to the standard procedures thus seems to be an issue that is resolved during the exploration phase.

### *Propositions for the cross-case analysis*

The most obvious supportive factor is that the two partners have compatible procedures and processes. In most cases, the partners have not chosen each other using these criteria and the handling of two sets of standard procedures is therefore necessary. One way of solving this issue was senior management temporarily adjusting the standard procedures, something that is more difficult for lower management to do.

**Proposition 2.2**  **Increased seniority of the management involved in the cooperation supports the handling of two sets of standard procedures.**

## Realizing the cooperation

In order to realize an exploration project, finding the right people and making them cooperate is important. This is difficult under normal circumstances within a single firm and the alliance context brings additional challenges via, for instance, cultural differences.

*Observations*

In the alliances studied, the realization of the cooperation was focused on making the right people meet and jointly solve the innovation challenge. The co-location of people from the partners over a period, instead of setting up a number of meetings, was seen as attractive in several of the studied alliances as it was expected to boost the collaboration. However, even if co-location was supported from the tactical level (Paper I), it was not always easy to implement. The first decision was whether the co-location should be at one of the partners' offices or at a third place. The centrality of the location of the partners seems to have been important in making this choice. One challenge was the willingness of the employees to go to another office, which, as in the case of one of the alliances, could be 60-80 kilometers away, for perhaps six to twelve months. The alliance managers were not, in most of the alliances, the hierarchical managers of the bulk of the people involved. To "recruit" the right people inside the two organizations, the alliance managers had to rely on their ability to sell the cooperation as a hot technical area and use other interpersonal capabilities to get people where they wanted them to be since the required competence often came from various other departments. There were few additional benefits for the people involved in the collaboration, besides being in a more exciting project.

*Propositions for the cross-case analysis*

The realization of the cooperation requires that the alliance management be able to attract resources from different parts of the organizations. This is enabled by a wide network within the organization.

*Proposition 2.3    **The wider the network the alliance management has in the organizations, the easier will be the realization of the cooperation.***

## Verifying the partners' business logic and priorities

The innovation process will be enabled if the resources needed can be secured in advance. This is, however, difficult during the exploration phase since the nature of the resources needed may be unknown in advance. Instead, the innovation process has to trust that the organization nurturing the innovation will supply the resources needed. In the case of an alliance, this is more complicated since two strategic contexts are involved. The explorative nature makes it difficult to write firm contracts specifying the roles of the partners during the process. Instead, the partners have to rely on each other and that they will jointly provide the necessary resources. The benefit for the innovation process of having a more secure verification of the partners' business logic and priorities is that it might be able to reduce suspicions concerning the possibilities of opportunistic behavior, or increase them, in which case the alliance will have problems.

## *Observations*

Although the partners had a picture of each other before entering into the alliance, a continual issue in the alliances studied (Paper I) was the understanding of the partners' business logic and their priorities. The explorative nature made it difficult to know how the partner would react to new findings. The importance of a trustful relationship did not always enable the tough questioning of the partner's motives and priorities. The tactical level verified, through discussions, the partners' business logic and priorities, but negotiation tactics could sometimes make it difficult for the tactical level to know the other partner's priorities. The operational level, i.e. the project manager, was thus given the role of verifying the tactical level's perception of the other partner's business logic and priorities, through studying that partner's actions on the operational level.

In situations where the picture emerging on the operational level did not match the picture on the tactical level, a substantially slower innovation process could be expected until this had been checked out.

> "Over a long period of time, I had heard from the corporate management of Eurotel that financial services were outside their scope. I was therefore amazed when I learned, that financial services were included in the strategies of one of their business areas….One must be extremely explicit regarding what one's business is so that one understands the other and does not hide anything…. Whose is the customer? How would the business work? How does their business work today?" VP Eurobank, Study A

This issue was most important in innovation projects where the partners were perceived as having the potential for multiple business roles during the commercialization phase. It was thus an issue in E-billing and Unified messaging, a minor issue in the Internet bank but not an issue in Mobile position and Fleet Management (cases from Paper II).

## *Propositions for the cross-case analysis*

When the partner was able to take on many different roles, it became more important to verify what their business logic and priorities would be in the case in question. If the business roles are fixed for some reason, the difficulties of verifying the business logic and priorities will, of course, be fewer.

**Proposition 2.4** *Fixed business roles support the verification of the partners' business logic and priorities.*

The choice of business logic and priorities is a consequence of the learning gained during exploration. To understand what consequences this learning will have for the partner's business logic and priorities, a thick interface to the partner is supportive.

**Proposition 2.5** *A thick interface on both the tactical and operational levels is supportive of verifying the partners' business logic and priorities.*

A thick interface might be supportive by guiding the learning achieved by the partner in the direction of a favorable choice of business logic.

## Aligning the innovations and the alliance

In order to continue to the commercialization phase, both partners had to accept the design of the innovation, as well as the organizational format required to support the innovation. This issue is trickier in an alliance than within one firm since the organizational format of the commercialization will affect the distribution of costs and benefits between the partners, in contrast to commercialization within a single firm. The functionality and the internal design of the innovations could affect the size of the commercialization project as well whether it will need a more integrated form of collaboration, e.g. an equity-based joint venture, or whether a less integrated form of collaboration would do.

### *Observations*

The innovation and the alliance need to be aligned in order for the innovation process to continue to the commercialization phase. This means that, in addition to an acceptable innovation and an acceptable alliance, the design of the innovation must match the format of the alliance. To make this possible, it could be necessary to adjust both the alliance and the innovation before alignment is reached. This alignment took different paths in the alliances studied. In two cases, the innovation did not match the agreed alliance structure of the commercialization, but here the alliance structure was renegotiated to match the innovation (Internet bank and Mobile positioning in Paper II). The issue of deciding the alliance structure for the commercialization phase arose late in the exploration phase when the innovation concept was rather clear.

In E-billing (Paper II), the suggested innovation concept entailed an alliance structure that the partners could not accept. Instead of abandoning the innovation concept, the partners used the modularity of the innovation concept and reconfigured the innovation in such a way that it could be commercialized via an established method of having alliances between the two firms. The innovation process lost some months due to this reconfiguring of the innovation. The Internet bank and E-billing were similar in many ways, both being innovation projects in the same alliance. Both projects finished with an innovation concept for the exploration that required changes being made to the local alliance context. These changes to the local alliance structure were accepted in the Internet bank while in E-billing the suggested changes were not accepted. The two innovation projects differed in the sense that there was a tight relationship between the tactical level and the operational level in the Internet bank, while the same relationship was much looser in E-billing. This difference in the thickness of relationship might explain why E-billing developed a rather complete

concept without understanding that it would require an alliance format that the tactical level would not accept, as well as why the Internet bank did not have any difficulties in getting acceptance from the tactical level regarding a changed alliance format that the switch to the Internet would entail.

### *Propositions for the cross-case analysis*

To enable the alignment of the innovation and the alliance, including the mutual adjustments that might be necessary, a thick vertical interface is necessary between the operational level, focusing on the design of the innovation, and the tactical level, focusing on the format of the alliance.

**Proposition 2.6**    *The thicker the vertical interface, the better will be the support for aligning the innovation and the alliance*

The flexibility of the business roles in the Internet bank enabled the alignment of the alliance format with the innovation.

**Proposition 2.7**    *Flexible business roles are supportive of the alignment of the innovation and alliance*

In contrast to the alignment of the Internet bank, the innovation in E-billing was adapted in order to align with the alliance structure. This adaptation was enabled by the modularization of the innovation.

**Proposition 2.8**    *Modularity enhances the possibility of the partners to find a mutually acceptable solution for aligning the innovation and the alliance*

## Handling changes in costs and benefits

In an innovation project, the flexibility to adapt to learning gained during exploration is important in order to continue to the commercialization phase. One consequence of such flexibility is the need to handle situations of additional costs and reduced expectations regarding future revenues.

This issue becomes more difficult in an alliance where the distribution of costs and benefits between the partners has to be considered. The formal decision-making process is also more complex since two partners need to be involved. This need to balance cost and benefit is unique to the alliance format, compared with innovation within a single firm.

### *Observations*

In the alliances studied (Paper II), issues concerning costs and benefits did pop up continually during the exploration phase. The explorative nature of the phase made it difficult to estimate the resources needed from each partner. Increased learning due to exploration could change the value of each partner's benefits. For some of the alliances, the changing nature of the distribution of costs and benefits leads to renegotiations between the partners (e.g. Mobile positioning in Paper II), but in most situations, the changes were of a minor nature and led to

implicit micro-bargaining between the partners. This micro bargaining put demands on the employees involved in the cooperation to have commercial sense besides technical knowledge. This requirement may be one reason why internal consultants were involved in several of the alliances; consultants who were trained to combine technical knowledge with commercial awareness.

In fleet management, the responsibility of each module was clearly allocated to one of the partners. This way of dividing up the task supported the handling of changes in costs since the partner responsible for a certain module also became responsible for the changes in the costs associated with this module. There was substantial interference between the modules and the partner responsible for one module was burdened on several occasions with additional costs because the other partner's module did not behave in the planned way. However, these costs, associated with insufficient quality of the modularization, were regarded as less substantial compared with the changes in costs related to the exploration inside each module. In the alliance, the magnitude of the increased costs for each partner, caused by the other partner's insufficient quality of the modularization, was considered to be about equal for both partners and was thus no big issue. A similar approach to handling the changes in the costs and benefits resulting from the modularization and division of responsibility were used in the Internet bank and E-billing.

## Propositions for the cross-case analysis

Handling changes in costs and benefits in an alliance is much easier if the principles regarding how to share the consequences of the changes have been decided in advance. Modularization and the low degree of shared development of these modules both reduce the activities for which there is joint responsibility. The consequences of changed costs or benefits can be linked to individual modules, modules for which one of the partners may be responsible.

*Proposition 2.9    Modularity and a low degree of shared development support the handling of changes in costs and benefits.*

# QUADRANT THREE: TACTICAL LEVEL AND COMMERCIALIZATION PHASE

| | Exploration | Commercialization |
|---|---|---|
| **Tactical** | | X |
| **Operational** | | |

This quadrant focuses on the tactical level of the alliance and the commercialization phase. The challenges for management in this quadrant, compared with the exploration phase, relate to the focus on efficiency and quality instead of on creativity. The need for coordination increases as more activities such as marketing and sale become involved. The organizational context will thus be different, compared with the exploration phase, in order to support the innovation process.

The empirical data is based on Paper III describing solution alliances and Papers IV & V describing outsourcing alliances. The issues identified are a) Integrating the alliance with internal activities, b) Retaining the capability to handle exploration, c) Managing and adapting the interface, and d) Finding forums for issues of a strategic nature.

## Integrating the alliance with internal activities

The number of activities and functions involved in the innovation process increases when the innovation enters the commercialization phase. The dependency on two strategic and organizational contexts makes it difficult for a product champion to have authority over all the activities involved.

### *Observations*

The alliance manager and the innovation project managers directed the activities carried out in collaboration, here called alliance activities. These activities concerned, for instance, the specification of the innovation, module development and the integration of modules into the innovation. What these managers did not direct was a number of internal activities that were (or ought to have been) linked to the alliance activities or linked to the other partner's internal activities. This could concern the sales function, knowledge management, the support function, etc.

These linkages and the need to integrate them were in many cases identified after the lack of integration had created some sort of problem. An example of this lack of integration could be taken from the ITDev alliance in Paper IV. In this alliance, the internal planning of the service portfolio at TeleProvider was not integrated with the internal resource planning at the partner ITDev. The lack of integration made TeleProvider unaware that ITDev was having to close down a site due to financial difficulties, which reduced the resources available

for the development of some categories of services. As a consequence, TeleProvider had to change its plans regarding its service portfolio and delay the introduction of some services.

The focus in the studied alliances was on the clearly-identified alliance activities, with peripheral activities not being taken into consideration. The goal was not, however, to integrate these alliance activities but to find a structure that would reduce the need for collaboration and integration. One way of reducing the integration need was through modularization, with a low degree of shared development of the modules (Papers III, V).

The integration of internal activities differed substantially between TeleHard and Sunny on the one hand, and ITDev and Moon on the other (ITInt has been omitted since it changed the degree of integration dramatically). TeleHard had some integration of planning and knowledge management, for instance, while this was not the case for ITDev. The differences between these alliances were that ITDev and Moon had a thin interface on the tactical level while TeleHard and Sunny had a thick one. The strategic direction of the alliances, in the case of ITDev, TeleHard and Moon, was toward a market relationship while in the Sunny alliance, it was status quo regarding the degree of integration. ITDev and TeleHard were both created because of outsourcing, which explained the strategic direction. The Moon alliance was an "arranged marriage" staged by an important customer. All these forced alliances (the outsourcing alliances are considered to be forced) were thus in the direction of a market relationship.

### Propositions for the cross-case analysis

When integrating activities across firm boundaries, the possibilities of using hierarchical coordination, as in single firms, is reduced and coordination has to rely on other means such as a thick interface.

*Proposition 3.1*   *The thicker the horizontal interface, the more support there will be for the integration of the alliance with internal activities.*

The need to integrate different activities at the two partners in order to support the innovation process could be reduced. Modularization enables activities to be connected to individual modules, modules that could be linked to one of the partners. This linking between modules and activities reduces the need to integrate activities between the partners.

*Proposition 3.2*   *Modularization reduces the need to integrate an alliance with internal activities.*

In the alliances studied, the integration of activities does not to seem to be related to the need of the innovation process but to be guided by the strategic direction of the alliance.

*Proposition 3.3*   *The degree of integration of the alliance and internal activities will be more related to the strategic direction of the alliance than the need of the innovation process.*

## Retaining the capability to handle exploration

Retaining the capability to handle exploration is important in order to be able to make incremental improvements to the innovation and to correct faults in existing innovations. It is difficult to maintain this capability in the single firm over extended periods in a context that is focused on efficiency, which affects everything from management control to culture. The challenge is greater in an alliance since the individual innovations may outlast the alliance. The distribution of costs and benefits will change over time and the benefits of making the innovation in an alliance may be outweighed by the benefits of making it in-house.

### *Observations*

Unexpected development problems during the commercialization phase came to require *ad hoc* exploration (Paper III). A quick start-up of this exploration was described as essential in both solution alliances. This was solved in the Sunny alliance (Paper III) by a thick interface characterized by direct contact between engineers at the two partners so that the right people to conduct the exploration could easily get in touch with each other. In the Moon alliance, *ad hoc* exploration was more difficult to start up since this required management approval and the interface on the tactical level was thin. *Ad hoc* exploration was one important motive for changing from a thin interface to a thick interface in the ITInt alliance (Paper IV).

It seems that it was difficult to maintain a joint exploration capability over time. In the alliances studied, the architectural knowledge that was needed for joint exploration gradually became concentrated to the partner closest to the customer while the modular knowledge remained at the same place where it had been during the exploration phase. This trend was accompanied by a trend of increasing modularity in the innovations by means of enhancing the quality of the interfaces of the modules. Two examples of this process are when Tele-Provider absorbed ITInt (Paper IV) and when system integrator Fusion built up architectural knowledge in-house in order to reduce its dependency on the component suppliers' architectural knowledge (Paper III).

### *Propositions for the cross-case analysis*

To maintain a joint exploration capability, there must be a network of contacts on different levels at the partners which jointly cover all parts that could be necessary to explore.

*Proposition 3.4*    *The thicker the interface on the tactical as well as operational levels, the more support there will be for retaining the capability to handle joint exploration.*

In the end, it might not be attractive for one or both partners to share a capability for joint exploration since this could hinder a focus on certain competencies, or that the costs of sharing the exploration capability become too great. Concentrating the exploration to one of the partners entails that the knowledge needed for this exploration will be concentrated to this partner. Modularization enables a distinction between architectural knowledge and modular knowledge whereby the partner closest to the customer having the ultimate responsibility for the innovation focuses on the architectural knowledge. The modular knowledge could be spread between the partners depending on which partner a particular module belongs to.

**Proposition 3.5**  *Modularization will support the gradual accumulation of architectural knowledge in the partner closest to the customer and will thereby reduce the need for joint exploration.*

With a high degree of modularity, exploration will either concern the architecture of the innovation or a particular module. When the architectural knowledge is accumulated in one partner, joint exploration is no longer necessary since modular exploration can be conducted independently by the partners.

## Managing and adapting the interface

A well-managed interface which is continually adapted to changing requirements is important in order to secure an efficient innovation process. A well-managed interface supports good coordination of activities and resources.

### *Observations*

Management of the interface was a continuous activity of ensuring that the right people were cooperating and, when necessary, that changes in the staff involved in the collaboration were smooth. Managers involved in the Eurobank-Eurotel alliance changed positions several times during the alliance. The central alliance secretariat experienced the replacement of the two full-time senior managers working with coordination across all innovation projects, as well as the replacement of several members of the steering committee. The thick interface, with several parallel contacts, made it possible to introduce new managers with little loss of momentum.

The opposite situation could be seen in the ITDev alliance (Paper IV) where changes of people because of reorganization were more difficult to bridge due to the initially thin interface on the tactical level.

> "There is no one at TeleProvider with whom I could have a strategic dialogue" CEO of ITDev (Paper IV, p.7)

The requirements regarding the interface changed with time but adaptation of the interface was more intermittent. In the outsourcing alliances, learning about the requirements of the collaboration and the need for adaptations to the inter-

face happened because of different incidents that had to be solved. Because of this learning, one of the outsourced units was repurchased and wholly integrated into the divesting firm (ITInt in Paper IV). When, for example, TeleProvider learned that it needed a thicker interface, a point that ITInt had been arguing for a long time, the interface was quickly changed from thin to thick (Paper IV). In the solution alliance, the Moon alliance had a thin interface over time despite Fusion's desire for a thicker interface. In this case, the need for a thicker interface was reduced by Fusion developing an alternative capability to the partner in-house.

While a thick interface supported the bridging of changes of people in the alliance, it was no guarantee for a better adaptation of the interface to the requirement. Instead, adaptation seems to be more connected with problems. The difficulties of having a thin interface to ITInt, which had some of the architectural knowledge needed for TeleProvider, resulted in the interface being radically changed into a thick one and, finally, that ITInt was reintegrated into TeleProvider. In the Sunny alliance, which had a thick interface, the interface continued to be thick although modularization had reduced the need for a thick interface (Paper III).

One conclusion could be that managing the interface is supported by a thick interface while adapting the interface depends on other things, e.g. learning.

### *Propositions for the cross-case analysis*

A thick interface was, as illustrated by the Eurobank-Eurotel alliance, supportive of the management of the interface, for example by bridging changes of managers. However, a thick interface did not guarantee that there would be any learning about what would be an optimal thickness for the interface. This learning and adaptation of the interface in the studied alliance was more in connection with different types of problems that had to be solved.

*Proposition 3.6    A thick interface on the tactical level is supportive of the management of the interface, but not necessarily of adapting the interface*

The need for a thick interface was gradually reduced as the quality of the modularization improved.

*Proposition 3.7    Modularization reduces the need to manage the interface.*

## Finding forums for issues of a strategic nature

It is important to find forums for issues of a strategic nature since there must be some concordance in strategies due to the long-term nature of the investments in alliances that include the commercialization phase.

## *Observations*

Strategic issues, for the partners involved, were not necessarily discussed on the tactical level of the alliance depending on the level of seniority of the managers. Whether or not the interface in the alliance would include enough senior managers from both firms to enable a strategic dialog seems to be related to the way that the alliance was started. In the Sunny alliance (Paper III), where the partners found each other by themselves, it was natural to create this type of forum, and it could even be argued that it was a precondition for the alliance to happen. The Moon alliance (Paper III) and the outsourcing alliances (Papers IV & V) were created under considerable external force. The outsourcing alliance was an inevitable consequence of a divestiture and the Moon alliance was a result of customers that pressured the two partners to form a collaboration. In these "arranged" marriages (except for TeleHard), it was more difficult to establish a forum for issues of a strategic nature. One explanation could be that when the strategic direction is toward a market relationship, interest in participating in a strategic dialogue is reduced. When the partners have different views about the appropriate strategic direction of the alliance, it is most likely that the alliance will remain in status quo or move toward a market relation since a move toward more integration will require both partners' consent.

## *Propositions for the cross-case analysis*

Strategic interest is likely to be low if the strategic direction of the alliance is toward a market relationship. With a low level of strategic interest, it could be expected that it is difficult to establish a thick horizontal interface on the tactical level.

**Proposition 3.8** **The more the strategic direction is toward a market relationship, the less support there will be for a thick horizontal interface on the tactical level.**

# QUADRANT FOUR: OPERATIONAL LEVEL AND COMMERCIALIZATION PHASE

| | Exploration | Commercialization |
|---|---|---|
| Tactical | | |
| Operational | | X |

This research quadrant focuses on the operational level during the commercialization phase. The main challenge for management in this quadrant, which differentiated it from the other quadrants, was the focus on efficient project execution, in contrast to the exploration phase where creativity and learning were paramount. It could also be contrasted with the tactical level where the focus is on the contextual issues regarding the innovation process.

The empirical data for this analysis comes from Paper III dealing with solution alliances. Solutions as innovations differ from most innovations discussed in the other quadrants through having a high variety of innovation, in contrast to the low variety that these other innovations have. The issues in focus are a) Managing risks, and b) Avoiding slack.

## Managing risks

Managing risks is an essential part of managing the innovation process. The accumulated invested resources increase as the innovation proceeds toward market launch and many things could prevent the innovation from having a successful market launch. When the innovation process is within a single firm, the two main obstacles relate to the market and the technology. In an alliance, the organizational boundaries can create additional difficulties in the form of different priorities and no unity of command.

### Observations

Selling solutions integrated into the customers' internal systems for operation entailed a high technical risk compared with selling low variety innovations. This technical risk had its roots in the fact that the innovation is not completely developed before being sold, in contrast to the more traditional paradigm of developing, selling, and delivering the product that was used for the low variety innovations.

This phenomenon was well understood by most customers of the alliances studied and they thus required very clear contracts regarding time of delivery, functionality, quality, and price. The price was generally not very low but the risk being run by the system integrator was high. The direct cost of delivering the solutions could vary between 50% and 200% of the revenues, although cases when costs exceeded revenues were not intentional.

The assessment of what kind of risk a new solution would entail was important for the decision regarding what would be promised to the customer and what guarantees would be given. Both the Moon and the Sunny alliances contained examples of misunderstandings between engineers regarding what could be seen as details but which resulted in very costly additional exploration and development after the solution had been sold. A close dialog between engineers on both sides who could discuss details before the solution was offered to customers was thus seen as important in order to avoid promising too much to the customer. A close dialog on the alliance level was also important in order to ensure that the risks that still existed could be handled in relation to the partners and/or in relation to the customers.

A higher risk was accepted for those parts of the solution that were fully controlled by the system integrator, while there was a lower acceptance of risks that were associated with the partner's components. The components of the partner that were perceived to have a high degree of modularity, i.e. an adherence to specifications and a hiding of internal structures, were perceived to be less risky to use than were those with a lower degree of modularity.

Since the customers, in many cases, pushed the system integrator into promising things with an unknown risk level, risk management had to plan for handling situations when technical problems arose. This was done by ensuring that there was a capability for joint exploration. In the Sunny alliance, this joint exploration could start quickly, while it was more difficult to start in the Moon alliance. An established interface between the engineers on the operational level was one difference that was argued to change the speed with which joint exploration could start.

## Propositions

The description above stresses the importance of an intensive dialog between engineers in order to avoid unnecessary risks. This implies that a thick interface would be beneficial.

**Proposition 4.1**    *A thick horizontal interface on the operational level supports risk management.*

A high degree of modularization makes it easier to manage the risks being run by each partner.

**Proposition 4.2**    *A high degree of modularity focuses the risk on modules which the partner controls, thereby reducing the overall risk.*

## Avoiding slack

A cost category that was difficult to share was that of having slack among the people working with development. Slack is problematic in internal innovation projects, but the difficulties increase in an alliance due to the lack of a single point of responsibility that could prioritize activities in order to avoid it.

### *Observations*

Slack existed in the two solution alliances studied. This slack, essentially engineers that had nothing to do or were engaged in creating excessive quality while waiting for input from others, had it roots in deviations from project plans, in surplus resources to be prepared for problems, and in variations in the volumes of solutions sold.

Deviations from project plans had many causes, ranging from changed customer requirements to miscalculations of the complexity of different parts of the development task. The deviations related to the collaboration were often caused by the partner not delivering modules that complied with specifications, the partner being late, or more often that the specifications were unclear and had been misinterpreted. A delay in one part of the solution often meant that those working on other parts of the solution would experience some slack because the periods of slack were too short (e.g. 1-3 weeks) to justify moving people to other activities.

The slack associated with variations in the sale of solutions was handled in the Sunny alliance by having the same department mix the development of high variety solutions with solutions having a more moderate variety. When few solutions were sold, the development team could work on the solutions that had a more moderate variety. In contrast to the high variety solutions, these solutions were partly developed before being sold. Often, an already-delivered unique solution was the basis and more modularized modules were developed. These modules were not only modularized but also configurable, i.e. they could behave differently by having their parameters set differently instead of adding new program code.

### *Propositions for the cross-case analysis*

A high degree of modularity reduces many of the coupled dependencies between the partners which could result in slack.

**Proposition 4.3    *Increased modularity decreases slack.***

Modularization can also enable a mix of different levels of variety in the innovations thus reducing the slack associated with variations in the sale of solutions.

# CHAPTER SIX

# CROSS-CASE ANALYSIS

The purpose of the cross-case analysis is to compare the propositions identified in both the case-by-case analysis and the papers, across all quadrants in the research matrix, in order to find contrasting situations that can enhance the understanding of the mechanisms linking the structural dimensions and the innovation process. The cross-case analysis results in some tentative conclusions formulated as hypotheses concerning the contingencies between the structural dimensions and the innovation process. These hypotheses form the basis for the synthesis that follows in the next chapter. The function of the cross-case analysis resembles a funnel where a large number of propositions enter at the wide end and a small number of hypotheses leave at the narrow end.

The propositions identified in the case-by-case analysis illustrate several different sub-dimensions in the interface. These sub-dimensions constitute a basis for the categorization of the interface-related propositions. The first sub-dimension focuses on the horizontal interface, which consists of the linkages between the partners. The second sub-dimension concerns the vertical interface, which consists of the linkages between the tactical and operational levels. The third sub-dimension is the width of the social network within the two partners' organizations which the joint alliance management might affect. The fourth and final sub-dimension is the seniority of the alliance management involved. Seniority connects primarily with the hierarchical position and not with age or lengthy experience. Seniority is one well-established success factor within innovation management (Cooper and Kleinschmidt 1987; Zirger and Maidique 1990).

Seniority of alliance management

Partner A

Partner B

Horizontal Interface

Vertical Interface

Horizontal Interface

Width of network within partners

Figure 6-1  A graphical representation of the interface of the alliance.
The four sub-dimensions of the interface are;
▪ Horizontal interface, this could be seen as existing on one or more levels
▪ Vertical interface, the linkage between the horizontal interfaces on different levels
▪ Width of social network within the partners
▪ Seniority of alliance management.

The research quadrants, as well as the structural dimensions, provide the basic division of the propositions into subgroups. The structural dimensions, including the sub-dimensions, form seven groups, of which four are the sub-dimensions to the interface. For each of the groups associated with the structural dimensions, there will be one cross-case analysis structured in a uniform way. As a first step in the cross-case analysis, a table maps the propositions to the research quadrants. The next step compares the effect of the structural dimensions, i.e. the propositions, along the different phases of the innovation process and across the operational and tactical levels in order to identify what seems to be important to the innovation process. The discussion concerning the mechanisms involved uses the variations between the different phases and levels to identify how and why the structural dimensions affect the innovation process. The third step discusses the structural dimension in relation to the other structural dimensions to see if the tentative contingency between the structural dimension and the innovation process is independent of the other structural dimensions. The cross-case analysis for the individual groups ends with a summary of the tentative conclusions in the form of hypotheses describing the relationship between the structural dimensions and the innovation process. The relatively large difference in the number of propositions connected with the individual structural dimensions might be a consequence of differences in how explicit the interviewees experienced the different structural dimensions' effect on the innovation process. The cross-case analysis can identify additional propositions because of the dependency between the structural dimensions, i.e. structural dimensions affecting the innovation process indirectly through other structural dimensions.

Table 6-1 provides a mapping between the propositions and the research quadrants, the structural dimensions and the issues, as an overview before the cross-case analysis starts. The purpose of this table is to enable the reader to make his or her own independent pattern identification. The individual discussions concerning the different structural dimensions start with an extract of this table for the particular structural dimension, which makes it easier to survey than the full table.

| Issue | Proposition | Interface | | | | Business roles | Modularity | Variety |
|-------|-------------|:---------:|:--------:|:-----:|:---------:|:--------------:|:----------:|:-------:|
| | | Horizontal | Vertical | Width | Seniority | | | |
| **Exploration phase/Tactical level** | | | | | | | | |
| Securing joint strategic involvement in idea generation | 1.1　A learning agenda on the tactical level supports the securing of joint strategic involvement in idea generation. | X | | | | | | |
| Enabling flexible management of the project portfolio | 1.2　An easily detachable operational level is supportive of the management of the innovation project portfolio by enabling the easy starting and stopping of the projects | | X | | | | | |
| | 1.3　Modularity supports flexible management of the project portfolio | | | | | | X | |
| Protecting uncertain ideas | 1.4　A thick interface on the tactical level is supportive of the innovation process by enabling joint responsibility for the champion and sponsor roles | X | | | | | | |
| | 1.5　Increased seniority of the management involved in the cooperation supports the protection of uncertain ideas | | | | X | | | |
| Enabling open communication | 1.6　A thick interface on the tactical level is supportive of open communication | X | | | | | | |
| | 1.7　The increased seniority of the management involved in the cooperation supports open communication | | | | X | | | |
| | 1.8　Fixed business roles support open communication | | | | | X | | |
| Creating preconditions for commercialization | 1.9　A thick interface on the tactical level is supportive of finding suitable preconditions for the commercialization phase | X | | | | | | |
| | 1.10　The distinctiveness of the transition from the exploration phase to the commercialization phase is reduced by increased variety | | | | | | | X |
| Defending the alliance against competing internal initiatives | 1.11　The wider the network the alliance management has in the organizations, the better will be the ability to defend the alliance against competing internal initiatives | | | X | | | | |
| | 1.12　The increased seniority of the management involved in the cooperation supports the defending of the alliance against competing internal initiatives | | | | X | | | |
| | 1.13　A thick interface between the partners is supportive of defending the alliance against competing internal initiatives by creating a dialog whereby misunderstandings can be solved | X | | | | | | |
| **Exploration phase/Operational level** | | | | | | | | |
| Anchoring the innovation project to the internal context | 2.1　The wider the network the alliance management has in its own organization, the better will be the ability to anchor the innovation project in the internal context | | | X | | | | |
| Handling two sets of standard procedures | 2.2　Increased seniority of the management involved in the cooperation supports the handling of two sets of standard procedures | | | | X | | | |
| Realizing the cooperation | 2.3　The wider the network the alliance management has in the organizations, the easier will be the realization of the cooperation | | | X | | | | |
| Verifying the partners' business logic and priorities | 2.4　Fixed business roles support the verification of the partners' business logic and priorities | | | | | X | | |
| | 2.5　A thick interface on both the tactical and operational levels is supportive of verifying the partners' business logic and priorities | X | | | | | | |
| Aligning the innovations and the alliance | 2.6　The thicker the vertical interface, the better will be the support for aligning the innovation and the alliance | | X | | | | | |
| | 2.7　Flexible business roles are supportive of the alignment of the innovation and alliance | | | | | X | | |

| Issue | Proposition | Interface | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Horizontal | Vertical | Width | Seniority | Business roles | Modularity | Variety |
| | 2.8    Modularity enhances the possibility of the partners to find a mutually acceptable solution for aligning the innovation and the alliance | | | | | | X | |
| Handling changes in costs and benefits | 2.9    Modularity and a low degree of shared development support the handling of changes in costs and benefits | | | | | | X | |
| Paper II | Alliance structure and innovation design are inter-dependent | | | | | X | | |
| Paper II | The design of the innovation could be dependent on the alliance structure, i.e. a "reversed" dependency | | | | | X | | |
| Paper II | Modularization is supportive of finding agreeable forms of commercialization | | | | | | X | |
| **Commercialization phase/Tactical level** | | | | | | | | |
| Integrating the alliance with internal activities | 3.1    The thicker the horizontal interface, the more support there will be for the integration of the alliance with internal activities | X | | | | | | |
| | 3.2    Modularization reduces the need to integrate an alliance with internal activities | | | | | | X | |
| | 3.3    The degree of integration of the alliance and internal activities will be more related to the strategic direction of the alliance than the need of the innovation process | X | | | | X | | |
| Retaining the capability to handle exploration | 3.4    The thicker the interface on the tactical as well as operational levels, the more support there will be for retaining the capability to handle joint exploration | X | | | | | | |
| | 3.5    Modularization will support the gradual accumulation of architectural knowledge in the partner closest to the customer and will thereby reduce the need for joint exploration | | | | | | X | |
| Managing and adapting the interface | 3.6    A thick interface on the tactical level is supportive of the management of the interface, but not necessarily of adapting the interface | X | | | | | | |
| | 3.7    Modularization reduces the need to manage the interface | | | | | | X | |
| Finding forums for issues of a strategic nature | 3.8    The more the strategic direction is toward a market relationship, the less support there will be for a thick horizontal interface on the tactical level | X | | | | | | |
| Paper III | The actual thickness could deviate substantially from what would be supportive of the innovation process due to an asymmetric dependency and personal relationships | X | | | | | | |
| Paper IV | The thickness of the interface on the tactical level relates to the type of knowledge involved and the strategic direction of the alliance | X | | | | | | |
| Paper V | The alignment of the organizational structure to the product structure is supportive of strategic flexibility | | | | | | X | |
| **Commercialization phase/Operational level** | | | | | | | | |
| Managing risks | 4.1    A thick horizontal interface on the operational level supports risk management | X | | | | | | |
| | 4.2    A high degree of modularity focuses the risk on modules which the partner controls, thereby reducing the overall risk | | | | | | X | |
| Avoiding slack | 4.3    Increased modularity decreases slack | | | | | | X | |
| Paper III | The need for a thick interface decreases as exploration decreases | X | | | | | | |
| Paper IV | The coordination need on the tactical and operational levels could differ | X | | | | | | |

Table 6-1   Mapping between the propositions and the structural dimensions.
The columns, i.e. the structural dimensions, group the propositions for the cross-case analysis into the subsequent sub-sections.

# INTERFACE

## Horizontal interface

| Research quadrant | Proposition |
|---|---|
| Exploration/ Tactical | 1.1    A learning agenda on the tactical level supports the securing of joint strategic involvement in idea generation. |
| | 1.4   A thick interface on the tactical level is supportive of the innovation process by enabling joint responsibility for the champion and sponsor roles |
| | 1.6   A thick interface on the tactical level is supportive of open communication |
| | 1.9   A thick interface on the tactical level is supportive of finding suitable preconditions for the commercialization phase |
| | 1.13  A thick interface between the partners is supportive of defending the alliance against competing internal initiatives by creating a dialog whereby misunderstandings can be solved |
| Exploration/ Operational | 2.5   A thick interface on both the tactical and operational levels is supportive of verifying the partners' business logic and priorities |
| Commercialization/ Tactical | 3.1   The thicker the horizontal interface, the more support there will be for the integration of the alliance with internal activities |
| | 3.3   The degree of integration of the alliance and internal activities will be more related to the strategic direction of the alliance than the need of the innovation process |
| | 3.4   The thicker the interface on the tactical as well as operational levels, the more support there will be for retaining the capability to handle joint exploration |
| | 3.6   A thick interface on the tactical level is supportive of the management of the interface, but not necessarily of adapting the interface |
| | 3.8   The more the strategic direction is toward a market relationship, the less support there will be for a thick horizontal interface on the tactical level |
| | The actual thickness could deviate substantially from what would be supportive of the innovation process due to an asymmetric dependency and personal relationships (Paper III) |
| | The thickness of the interface on the tactical level relates to the type of knowledge involved and the strategic direction of the alliance (Paper IV) |
| Commercialization/ Operational | 4.1   A thick horizontal interface on the operational level supports risk management |
| | The need for a thick interface decreases as exploration decreases (Paper III) |
| | The coordination need on the tactical and operational levels could differ (Paper IV) |

Table 6-2  Overview of the propositions related to the horizontal interface (extract from Table 6-1)

A thick horizontal interface seems to be most important to the tactical level during the exploration phase. The thick interface creates joint understanding of the innovation and supports the unified management of the innovation. This joint understanding is important for the partners in order to be able to find suitable preconditions for the commercialization. The joint understanding also reduces the risk of misunderstandings regarding the partners' intentions.

Understanding is also the motive for a thick interface on the operational level in both the exploration and commercialization phases. While the thick interface is initially important for being able to create something together, it subsequently becomes more important for risk reduction. The need for a thick interface decreases over time as the need for exploration decreases.

The role of the horizontal interface on the tactical level during the commercialization phase seems to be more ambiguous. Several propositions argue that a thick horizontal interface is supportive, while one proposition suggests that a thick interface is negative. At the same time, there are propositions arguing that the thickness of the interface is not determined by the need of the innovation process but by the strategic direction of the alliance, as well as by knowledge concerns. A strategic direction toward the market will result in a thinner interface while shared architectural knowledge seems to imply a thicker interface than if this knowledge had been concentrated to one partner.

The interfaces on the tactical and operational levels could differ as one proposition suggests, based on observations from the commercialization phase. This proposition seems to be non-controversial given the other propositions. The difference identified was between a thin interface on the tactical level and a thick one on the operational level. The opposite is possible, however, in situations where one partner only contributes strategic knowledge, as Werr & Linnarsson's study (2002) concerning alliances with management consultants illustrates.

Four propositions summarize this discussion concerning the horizontal interface. The first two hypotheses concern the role of a thick interface during the exploration phase. These hypotheses argue that a thick interface is initially important to joint understanding and subsequently for enabling an alignment between the innovation and the alliance.

**Hypothesis 1**    *A thick horizontal interface on the tactical level is supportive of the innovation process during the early exploration phase by enabling understanding of the partner's business logic and priorities*

**Hypothesis 2**    *A thick horizontal interface on the tactical level is supportive of the innovation process during the late exploration phase by supporting the alignment of the innovation and the alliance*

The thickness of the horizontal interface on the tactical level during the commercialization phase does not seem to be a consequence of the requirements of the innovation process. Instead, concerns related to the alliance appear to guide the thickness of the interface, e.g. the strategic direction of the alliance and the knowledge involved in the cooperation.

**Hypothesis 3**    *The thickness of the horizontal interface on the tactical level during the commercialization phase is more guided by the strategic direction of the alliance and knowledge concerns than by the need of the innovation process*

On the operational level, the thickness of the interface seems to reflect the need of the innovation process expressed as the exploration need. The joint understanding is important for managing the risk that gradually increases.

**Hypothesis 4**    *A thick horizontal interface on the operational level is important for joint understanding that could reduce risk, but the importance of a thick interface decreases as the need for joint exploration decreases*

## Vertical interface

| Research quadrant | Proposition |
|---|---|
| Exploration/ Tactical | 1.2 An easily detachable operational level is supportive of the management of the innovation project portfolio by enabling the easy starting and stopping of the projects |
| Exploration/ Operational | 2.6 The thicker the vertical interface, the better will be the support for aligning the innovation and the alliance |
| Commercialization/ Tactical | |
| Commercialization/ Operational | |

Table 6-3  Overview of propositions related to the vertical interface (extract from Table 6-1)[1]

The vertical dimension appears to be important to the innovation process during the exploration phase. The two propositions' suggestions regarding how the vertical interface supports the innovation process seem to be contradictory. The contradiction consists of the tactical level seeming to prefer a thin vertical interface, or more precisely, an interface that supports the operational level being detached while the operational level suggests that a thick vertical interface is supportive of the alignment of the innovation and the alliance.

A categorization of the situations when the different propositions are supportive of the innovation process could serve as the basis for better understanding this contradiction. An easily detachable operational level is supportive of the tactical level in order to terminate projects. The easy termination of projects would also enable the easy start-up of projects since there would be less long-term commitment. However, the idea behind easy termination is probably to be able to kill the project after a rather limited exploration period if the possibilities of success seem gloomy, i.e. during the first part of the exploration. The transition between exploration and commercialization is one point where the innovation might be terminated, although this is less common than during the early part of the exploration process. The suggestion that a thick vertical interface is supportive of the alignment of the innovation and the alliance, on the other hand, is something that becomes important at the end of the exploration phase. Alignment is difficult to achieve before the exploration of the innovation has proceeded substantially and architecture of the innovation exists. Combining these two propositions, one conclusion is that they focus on different periods during the exploration phase. An easily detachable operational level is important during the early part of the exploration phase and a thick vertical interface during the late exploration phase.

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[1] To facilitate a visual overview of the number of the propositions from different research quadrants, quadrants with no propositions are also included.

The role of the vertical interface in alignment might explain the lack of propositions from the commercialization phase. While the innovation and the alliance are in the process of being aligned, a tight vertical interface seems important. The idea of the commercialization phase is that the alliance and the concept of the innovation are aligned and stable. When this precondition is true, there is no need to align something that is already aligned and the role of a tight vertical interface becomes less important. However, while this precondition seems to be true in the case of the low variety innovations, the high variety innovations (i.e. the studied solution alliances) seem to continue to align the innovation and the alliance during an extended part of the commercialization phase.

This analysis suggests that the need for a thick vertical interface varies as the innovation matures and is dependent on the variety of the innovation.

*Hypothesis 5*      *A thick vertical interface is supportive of the innovation process during periods when commercial and technological issues are deeply intertwined. The period when commercial issues seem to be intertwined with the technical issues is just before the transition to the commercialization phase for innovations with a low level of variety, while this seems to be an extended period involving deliveries to customers in the case of high variety innovations.*

## Width of the interface

| Research quadrant | Proposition |
|---|---|
| Exploration/ Tactical | 1.11 The wider the network the alliance management has in the organizations, the better will be the ability to defend the alliance against competing internal initiatives |
| Exploration/ Operational | 2.1  The wider the network the alliance management has in its own organization, the better will be the ability to anchor the innovation project in the internal context |
|  | 2.3  The wider the network the alliance management has in the organizations, the easier will be the realization of the cooperation |
| Commercialization/ Tactical |  |
| Commercialization/ Operational |  |

Table 6-4  Overview of the propositions related to the width of the interface  (extract from Table 6-1)

The width of the alliance management's network seems to be more important during the exploration phase than during the commercialization phase. The network supports anchoring the project in the internal context, defending it against competing internal initiatives, and the realization of the cooperation. The propositions indicate that there are many threats and obstacles to the innovation from the partners' own organizations during the exploration phase. Detecting these threats requires early information, which a wide network could provide. A second important factor is that a wide network could be supportive when diminishing these threats. The lack of propositions concerning the width

of the interface during the commercialization phase could be explained by the fact that many of the organizational obstacles have been removed through the decision to make the transition to commercialization. The innovation project is concrete and the people are formally engaged in the project.

Developing a wide network within a large organization seems to take time and 20 years' work experience within their own organization was not uncommon for those who had a wide network, in comparison with many of those who had a narrow network which perhaps had 5-10 years' experience.

To summarize; a wide interface seems important early on during the exploration phase to detect different threats and obstacles. When dealing with these treats and obstacles, a wide interface, or sometimes even better - senior management (see Hypothesis 7), is supportive.

*Hypothesis 6*      *A wide interface is essential during the early exploration phase to protect the innovation until the project has gained acceptance and support in its own organization*

## Seniority of the alliance management

| Research quadrant | Proposition |
|---|---|
| Exploration/ Tactical | 1.5 Increased seniority of the management involved in the cooperation supports the protection of uncertain ideas |
| | 1.7 The increased seniority of the management involved in the cooperation supports open communication |
| | 1.12 The increased seniority of the management involved in the cooperation supports the defending of the alliance against competing internal initiatives |
| Exploration/ Operational | 2.2 Increased seniority of the management involved in the cooperation supports the handling of two sets of standard procedures |
| Commercialization/ Tactical | |
| Commercialization/ Operational | |

Table 6-5  Overview of the propositions related to seniority of the interface (extract from Table 6-1)

The seniority of the management seems to be important during the exploration phase but less important during the commercialization phase (see Table 6-5). Senior management could support the innovation process by protecting the innovation from competitive internal initiatives and from a premature evaluation that could lead to premature termination. Senior management also has a role in enhancing the collaboration by, for instance, finding ways of combining different standard procedures. The combination of proposition 1.12, arguing for the importance of seniority when handling internal threats, and proposition 1.9, suggesting that a thick interface on the tactical level supports the creation of suitable preconditions for the commercialization phase, is argued to imply that it is likely that seniority is important for creating suitable preconditions for the

commercialization phase, since suitable preconditions require a low level of internal threats and obstacles.

Seniority and a wide interface both seem to be important for handling threats and obstacles. While the wide interface is important for detecting these threats and obstacles, a wide interface is not necessarily enough to reduce the negative impact of these obstacles. Seniority could be more effective for handling threats and obstacles in these situations.

The lack of propositions regarding seniority during the commercialization phase could, in analogy with the discussion concerning the wide interface, be related to fewer internal obstacles and threats to the innovation process.

Two hypotheses summarize the analysis. The first connects with the importance of seniority in reducing the negative consequences of different threats and obstacles.

**Hypothesis 7**    *Seniority is important during the early part of the exploration phase for protecting the innovation*

The second hypothesis connects with the linkage between dealing with internal threats and obstacles and the ability to create the suitable preconditions for the commercialization phase.

**Hypothesis 8**    *Seniority is important for creating the suitable preconditions for the commercialization phase*

## BUSINESS ROLES

| Research quadrant | Proposition |
|---|---|
| Exploration/ Tactical | 1.8 Fixed business roles support open communication |
| Exploration/ Operational | 2.4 Fixed business roles support the verification of the partners' business logic and priorities |
| | 2.7 Flexible business roles are supportive of the alignment of the innovation and alliance |
| | The alliance structure and the innovation design are interdependent (Paper II) |
| | The design of the innovation could be dependent on the alliance structure, i.e. a "reversed" dependency |
| Commercialization/ Tactical | |
| Commercialization/ Operational | |

Table 6-6  Overview of the propositions related to the business roles (extract from Table 6-1)

Starting with the exploration phase, an ambiguous picture emerges. Two propositions suggest that fixed business roles are supportive of the innovation process while there is one proposition which suggests that flexible business roles are supportive. A fourth proposition suggests that the alliance structure and the innovation are interdependent, favoring flexible business roles since innovation is anything but stable. However, the alliance might be stable, despite the dynamic character of the innovation and the interdependency, by means of the fifth proposition which suggests that the innovation could be dependent on the alliance structure, i.e. the innovation could adapt to the alliance. Fixed and flexible seem to be each other's opposites and this is not made any easier by the fact that there is one proposition of each type from the second research quadrant, the exploration phase and the operational level.

The reasons for the propositions are different, however. The two propositions arguing for fixed business roles do so by concern for reducing the risk of opportunistic behavior, thereby paving the way for open communication. However, there are alternative ways of reducing the risk of opportunistic behavior, e.g. strong interpersonal ties, reducing the need for fixed business roles.

The need for flexible business roles is more difficult to replace since it concerns the exploration of whole business concept. Observations of the patterns of alignment between the alliance and the innovation, before the transition to the commercialization phase, suggested that the alliance structure and the innovation design are interdependent and that flexible business roles are supportive of the alignment of the innovation and the alliance. Adapting the alliance, including the business roles, to the learning gained during exploration is one way of enabling the necessary alignment between the alliance structure and

the design of the innovation. One conclusion is that the alliance structures, including business roles, emerge if concerns for the innovation process are given priority. A thick interface could probably partly replace the safeguard against opportunistic behavior that the fixed business roles provide.

There is no proposition regarding the business roles during the commercialization phase. One explanation could be that substantial investments have *de facto* made the business roles permanent and seen as givens.

The proposition that the alliance and the innovation are interdependent could be questioned in the multi-innovation alliances studied since the overall alliance structure does not seem to be affected by the situation for one isolated innovation. However, the proposition could still be valid with the addition that it only applies to the local alliance context, i.e. a part of the alliance in the case of a multi-innovation alliance. The proposition that the design of the innovation could be dependent on the alliance structure, i.e. a "reversed" dependency, is not challenged by any of the propositions.

The central finding is that the alliance and the innovation are interdependent, that the innovation design could be dependant on the alliance structure, and that the business roles seem to develop and change during the later part of the exploration phase. One consequence of this is the need to renegotiate agreements since the initial agreements cannot reasonably cover all possible business roles.

*Hypothesis 9*       *The local alliance structure and the innovation design are interdependent*

*Hypothesis 10*     *The design of the innovation could be dependent on the alliance structure, i.e. a "reversed" dependency*

*Hypothesis 11*     *Flexible/emerging business roles support the alignment*

# MODULARITY

| Research quadrant | Proposition |
|---|---|
| Exploration/ Tactical | 1.3  Modularity supports flexible management of the project portfolio |
| Exploration/ Operational | 2.8  Modularity enhances the possibility of the partners to find a mutually acceptable solution for aligning the innovation and the alliance |
| | 2.9  Modularity and a low degree of shared development support the handling of changes in costs and benefits |
| | Modularization is supportive of finding agreeable forms of commercialization (Paper II) |
| Commercialization/ Tactical | 3.2  Modularization reduces the need to integrate an alliance with internal activities |
| | 3.5  Modularization will support the gradual accumulation of architectural knowledge in the partner closest to the customer and will thereby reduce the need for joint exploration |
| | 3.7  Modularization reduces the need to manage the interface |
| | The alignment of the organizational structure with the product structure is supportive of a strategic flexibility (Paper V) |
| Commercialization/ Operational | 4.2  A high degree of modularity focuses the risk on modules which the partner controls, thereby reducing the overall risk |
| | 4.3  Increased modularity decreases slack |

Table 6-7  Overview of the propositions related to modularity (extract from Table 6-1)

Propositions in all research quadrants suggest that modularity is supportive of the innovation process. The way that modularization supports the innovation process differs, however, along the innovation process. In the first research quadrant, modularization supports flexible management of the project portfolio by modularizing the exploration concerning modules in a tentative architecture that lies close to each partner's core interest. This way of distributing the exploration supports flexibility by reducing the negative impact on both partners of terminating the innovation since the learning gained lies close to their core interest and is possible to use in other contexts. This division of the exploration concerning modules is also supportive of the operational level by enabling the handling of changes in cost and benefits. During the late exploration phase, modularization supports the alignment of the innovation and the alliance, thus finding agreeable forms of commercialization. The main benefit of modularization during the exploration phase seems to be the specialization of the two partners, thus reducing the need for joint exploration and the integration of activities at the two partners. Specialization will also concentrate the risk to modules that each partner controls, making it easier to assess the risks. The decoupling effect of modularization is stronger than the increased dependency that specialization could create and it would thus seem that modularization could reduce slack by reducing the dependency.

Specialization, the reduction of slack, and better risk control all seem to be related to effective coordination of the joint innovation process. A reduced coordination need is the traditional argument for modularity (Sanchez and Mahoney 1996). When comparing a thick interface, as a coordination mechanism, with modularization during the commercialization phase, it seems that modularity is favored (see the discussion concerning the issue of "Integrating the alliance with internal activities"). Instead of increasing the thickness of the interface in order to enable better coordination, the goal was to decrease the coordination need by increasing the quality of the modularization.

Modularization, together with specialization, leads to a concentration of the tasks and knowledge connected with the individual modules to either of the partners and reduces the need for joint exploration to issues concerning the overall architecture. Over time, it seems that architectural knowledge accumulates with the partner closest to the customer, reducing the need for joint exploration even further.

Three propositions summarize this analysis. The first one describes how modularization emerges and how it enables alignment between the innovation and the alliance. The second two propositions describe the effect of the specialization that modularization enables.

**Hypothesis 12**     *Modularity emerges during the first part of the exploration phase and enables alignment between the innovation and the organization during the later part of the exploration phase*

**Hypothesis 13**     *Modularity enables the specialization of the task and knowledge during the commercialization phase*

**Hypothesis 14**     *Modularization decreases the need for joint exploration by enabling specialization*

# VARIETY

| Research quadrant | Proposition |
|---|---|
| Exploration/ tactical | 1.10 The distinctiveness of the transition from the exploration phase to the commercialization phase is reduced by increased variety |
| Exploration/ Operational | |
| Commercialization / Tactical | |
| Commercialization / Operational | |

Table 6-8  Overview of the propositions related to the variety of the innovation (extract from Table 6-1)

Variety seems to be a structural dimension that neither supports nor hinders the innovation process. This is quite natural since variety is one of the qualities of the innovation that the innovation process should develop and not a means to any other ends. Instead, the innovation process has to adapt to the degree of variety that has been decided on.

The nature of the innovation process can, however, be different because of variety. The proposition suggests that the transition between the exploration phase and the commercialization phase becomes more gradual as the variety increases. In other words, variety increases the transition period from exploration to commercialization. The nature of the transition period will be a combination of exploration and commercialization. The explorative nature gradually decreases and the commercial nature emerges as the innovation process enters the commercialization phase. An innovation process designed for an innovation with a high level of variety thus seems to have three phases. Exploration of both the technology and the market characterizes the initial exploration phase. The "transition phase" explores the alliance concept by delivering some solutions to customers. The third phase focuses on commercialization, and the relationships between the partners are now almost fixed, with the main activity being regular development as well as the delivery of the innovations.

Although the variety of the innovation is still high, the implementation of these different variations of the innovation is more programmatic since the gradually improved quality of the modularization enables a high degree of variety without changes to the architecture.

**Hypothesis 15**     *With increased variety, both the exploration and commercialization phases become more overlapping and the transition more gradual*

## SUMMARY

This cross-case analysis compared the propositions across the research quadrants and formulated some hypotheses based on the identified contingencies between the structural dimensions and the innovation process. These hypotheses summarize the cross-case analysis and form the starting point for the synthesis, together with the discussion that led to their formulation.

### *Hypotheses from the analysis of the interface*

*Hypothesis 1*      *A thick horizontal interface on the tactical level is supportive of the innovation process during the early exploration phase by enabling understanding of the partner's business logic and priorities*

*Hypothesis 2*      *A thick horizontal interface on the tactical level is supportive of the innovation process during the late exploration phase by supporting the alignment of the innovation and the alliance*

*Hypothesis 3*      *The thickness of the horizontal interface on the tactical level during the commercialization phase is more guided by the strategic direction of the alliance and knowledge concerns than by the need of the innovation process*

*Hypothesis 4*      *A thick horizontal interface on the operational level is important for joint understanding that could reduce risk, but the importance of a thick interface decreases as the need for joint exploration decreases*

*Hypothesis 5*      *A thick vertical interface is supportive of the innovation process during periods when commercial and technological issues are deeply intertwined. The period when commercial issues seem to be intertwined with the technical issues is just before the transition to the commercialization phase for innovations with a low level of variety, while this seems to be an extended period involving deliveries to customers in the case of high variety innovations.*

*Hypothesis 6*      *A wide interface is essential during the early exploration phase to protect the innovation until the project has gained acceptance and support in its own organization*

*Hypothesis 7*      *Seniority is important during the early part of the exploration phase for protecting the innovation*

*Hypothesis 8*      *Seniority is important for creating the suitable preconditions for the commercialization phase*

### *Hypotheses from the analysis of the business roles*

*Hypothesis 9*      *The local alliance structure and the innovation design are interdependent*

*Hypothesis 10*      *The design of the innovation could be dependent on the alliance structure, i.e. a "reversed" dependency*

*Hypothesis 11*      *Flexible/emerging business roles support the alignment*

## Hypotheses from the analysis of the modularity

*Hypothesis 12*    *Modularity emerges during the first part of the exploration phase and enables alignment between the innovation and the organization during the later part of the exploration phase*

*Hypothesis 13*    *Modularity enables the specialization of the task and knowledge during the commercialization phase*

*Hypothesis 14*    *Modularization decreases the need for joint exploration by enabling specialization*

## Hypothesis from the analysis of the variety

*Hypothesis 15*    *With increased variety, both the exploration and commercialization phases become more overlapping and the transition more gradual*

# CHAPTER SEVEN

# SYNTHESIS AND CONCLUSIONS

This chapter uses the hypotheses developed during the cross-case analysis to challenge the research model and to develop a model for the process in innovation-based alliances. Some conclusions regarding how and why the different positions within the structural dimensions associated with innovations and alliances affect the process in innovation-based alliances are presented as a final part of this chapter.

## CHALLENGING THE RESEARCH MODEL

The combined research and analysis model consists of three parts (see Figure 3-3). The first part describes the relationship between the structural dimensions and the innovation process, the second part the division into a tactical and an operational level, and the third and final part the division into an exploration phase and a commercialization phase. The next three sections will discuss the validity of these three parts of the combined research and analysis model.

### From dependency to interdependency — the basic research model revisited

The interdependency between the structure of the alliance and the design of the innovation, suggested by Hypothesis 9, has implications for the research model. This hypothesis suggested that, "The local alliance structure and the innovation design are interdependent". The local alliance context is included in order to reflect the fact that the overarching alliance context in a multi-innovation alliance does not necessarily change because of one minor innovation project.

One effect of this interdependency is that the unidirectional arrows in the initial research model have to be replaced by bidirectional arrows, illustrating that the structures could both affect the process and be affected by it (see Figure 7-1).

The interdependency between the alliance structure and the design of the innovation entails consequences for the alliance process and the innovation process. This interdependency in the "content" dimension, i.e. the structure of the alliance and the design of the innovation, makes it difficult to achieve a separation in the "process" dimension. Instead, of being two separate processes, the alliance process and the innovation process are linked to each other during the exploration phase at least. The exploration phase of the innovation-alliance process thus seems to be a simultaneous exploration of the potential market, the product technology, and the alliance structure.
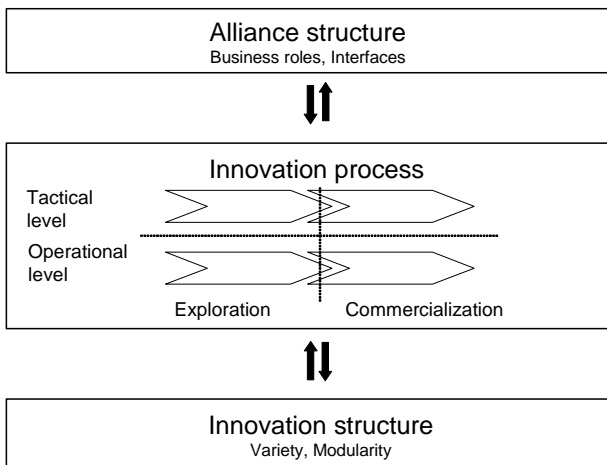


Figure 7-1 An illustration of the alliance-innovation interdependency
The black arrows illustrate the bi-directional dependency between the alliance and the innovation

## From levels to perspectives

The idea of using two analytical levels was established in theoretical arguments concerning the analogy with the innovation process within a firm where a separation on a portfolio level and innovation level is common (Gerwin and Ferris 2004). The separation into two levels received empirical support in the multi-innovation alliances, whereas it becomes more problematic to separate into two levels for the single-innovation alliances. The single-innovation alliance is not, however, an extreme situation, rather it is a common one. While most firms have more than one innovation, it is not likely that all innovations will occur with the same partner. Instead, some innovations will be internal and some with various other partners. Innovation-based alliances that justify a

portfolio perspective on the included innovations are thus likely to be less common than innovation-based alliances with one or a few innovations.

To understand when it is reasonable to separate into two levels for single-innovation alliances, a discussion concerning the possibility of making this separation during the different phases of the innovation process could be supportive. During periods when there is intensive interaction between the two levels, it is doubtful whether these levels are independent enough to justify a separation into two levels, whereas during periods of very little interaction, the division into two levels might be perfectly legitimate. Hypothesis 5 addresses the question of interaction between the levels and suggests that, "The period when commercial issues seem to be intertwined with technical issues is just before the transition to the commercialization phase for innovations with a low level of variety, while this seems to be an extended period involving deliveries to customers in the case of high variety innovations". On the basis of this hypothesis, it could be argued that division into a tactical and an operational level is also reasonable in the case of single-innovation alliances with a low level of variety, except for a brief period before transition. The intertwining of the two levels during long periods, in the case of high variety innovations, makes it less useful to separate into two levels for this type of innovation.

One way of avoiding the conditional division into two levels is by replacing levels with perspectives. Using two perspectives instead of two levels makes the requirement regarding multi-innovation alliances, or at least low variety innovation, unnecessary since these perspectives apply to all types of alliances and all types of innovations. The concept of perspectives implies that the same phenomenon could be studied using different perspectives, but it does not imply that the phenomenon could be divided into different phenomena; an interpretation that could be associated with a separation into levels. With this model, the alliance perspective could relate to the partners' relationship as well as issues concerning the distribution of costs and benefits, while the innovation perspective concerns the innovation process. Even if the difference is small between levels and perspectives, it could bring about another mindset.

## From two separate processes to one coalesced process model for innovation-based alliances

The third part of the research model is the division of the innovation process into two phases. Within each of the two phases, the frame of reference suggested that the characteristics of the tasks are similar and the challenges approximately the same, while both the characteristics and the challenges differed between the phases. The division into two phases, however, is challenged by the consequences of Hypothesis 9 which suggests that there is interdependency between the alliance process and the innovation process (see From

dependency to interdependency — the basic research model revisited p. 129 of this chapter), Hypothesis 10 suggesting that the design of the innovation could be dependent on the alliance structure, i.e. a "reversed" dependency, as well as by Hypothesis 15 which suggests that there is an overlap between the phases.

The interdependency between the alliance and innovation processes will make them coalesce into one unified process. The phases of this coalesced process do not necessarily equal the phases of the alliance process or of the innovation process. As a consequence of Hypothesis 15, which suggests that the phases overlap, it is more likely that the division into phases in the coalesced process will differ from the traditional innovation process that has been the basis of this thesis.

The alliance phases are described as a continual, circular process of learning-reevaluation-revised conditions-learning (Doz 1996). If this model is to coalesce with the innovation process, the least that can be expected is some sort of interaction between these two models. This interaction was discussed in the previous chapter based largely on Hypothesis 5; "The period when commercial issues seem to be intertwined with the technical issues is just before the transition to the commercialization phase for innovations with a low level of variety, while this seems to be an extended period involving deliveries to customers in the case of high variety innovations." An approximation of the innovation-alliance process, using Hypotheses 5 and 9, would divide it into three phases, i.e. the exploration phase, the "alignment phase", and the commercialization phase. The alignment phase is the period when the alliance structure and the innovation design align, which could involve the evaluation of the alliance and revised alliance conditions (see Figure 1-13). In an alliance with only one learning loop, the first execution phase in the alliance model maps to the exploration phase, the evaluation and revised conditions to the alignment phase and the second execution phase to the commercialization phase. The period of this alignment phase will differ due to, among other things, the variety of the innovation. The overlap between exploration and commercialization that Hypothesis 15 suggests is similar to the alignment phase. The period of the alignment phase in the cases varies from some weeks (Internet bank in Paper II) to a number of years (Moon alliance in Paper III).

The starting point of the alignment phase relates to the modularization of the innovation. Hypothesis 12 suggests that, "Modularity emerges during the first part of the exploration phase and enables alignment between the innovation and the organization during the later part of the exploration phase," which could be interpreted such that the alignment phase does not start until there is a modularization of the innovation.

The coalesced process involves, as previously discussed, three phases with a different focus. The exploration phase explores the technology and the market, and results in the architecture of the innovation. The alignment phase explores

the alliance and tries to find a solution to the alignment of the alliance and innovation. The exploration of the alliance could involve sales and deliveries to customers, especially for the high variety innovations. The commercialization phase starts when the partners have found stable structures for the alliance and the innovation.

Variety of innovation

**Alignment phase**

**Exploration phase**

**Commercialization phase**

Maturity of innovation
Relative time allocation
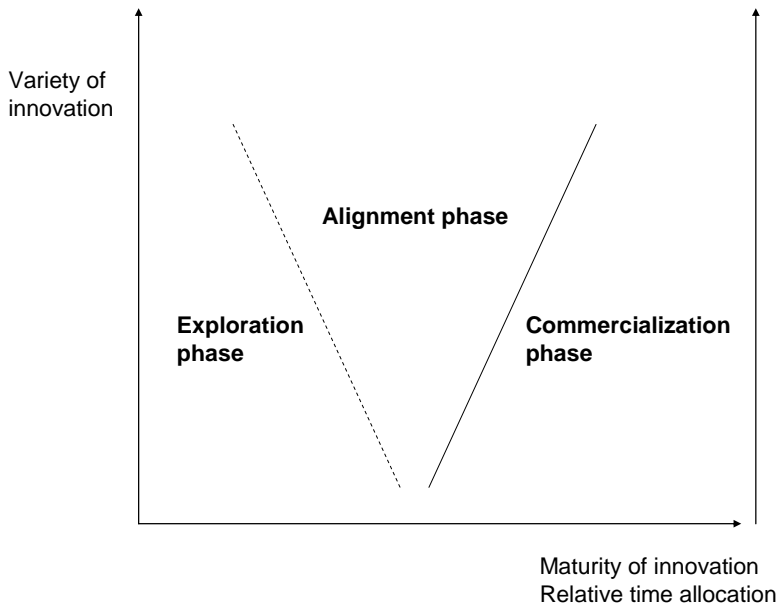
Figure 7-2  The suggested coalesced process model for innovation-based alliances
The model illustrates how the extent of the alignment phase, in relation to the other phases, will vary depending on the variety of the innovation. The comparison regarding variety is between new product lines, not for innovations within a given product line. The minimum requirement for the transition from exploration to alignment is that the architecture for the innovation exists. The alliance is, under all circumstances, in the alignment phase when all technological and market exploration is finished and the only thing that remains is an agreement regarding the commercialization phase. The minimum requirement for transition to the commercialization phase is that the partners have a commercial agreement covering the continual delivery of the innovation to customers and that the exploration of the innovation is finished.

# THE ROLE OF THE STRUCTURAL DIMENSIONS DURING THE PROCESS

After establishing a revisited process model, the time has now come to address the research question posed in this thesis "How and why do the different positions within the structural dimensions associated with innovations and alliances affect the innovation process in an alliance context?" Although the research question states the innovation process, the previous discussion in this chapter has suggested that a coalesced process model of the innovation and alliance processes is more in line with the empirical findings (Figure 7-2). The discussion concerning how and why the different positions within the structural dimensions affect the innovation process will thus be divided into the three phases of the coalesced process model.

## The exploration phase

The purpose of this phase is to explore a technological possibility or a market opportunity and develop it into an innovation concept. It is important during this phase to develop an understanding of both the market needs and the technological challenges, as well as develop architecture for the innovation.

A thick interface on the tactical level is supportive during this phase by means of enabling an understanding of the business logic and the priorities of the partner (Hypothesis 1). Joint understanding can also support a unified sponsorship of the innovation process.

As discussed earlier, the innovation needs to be protected from different types of internal challenges, including evaluations using methods adapted for incremental innovations, competing internal initiatives, and misunderstandings between the partners. To detect many of these threats and obstacles, a wide interface is supportive. A wide interface will be crucial until the innovation project has gained acceptance and support in its own organization (Hypothesis 6). While a wide interface might be supportive when eliminating threats and obstacles, seniority is a more powerful tool in many situations (Hypothesis 7). Seniority is also important for adjusting the conditions for the alliance, e.g. for obtaining more resources to enable a thick interface with the partner.

The innovation process might enter the next phase, when the architecture for the innovation is developed, but it could also continue in the exploration phase until all market and technological exploration is finished. The model suggests that the variety of the innovation guides the choice between early or late entry into the alignment phase.

## The alignment phase

The purpose of this phase is to align the innovation concept with the alliance structure in order to form a joint business concept for repeated business. Individual projects, even though directed toward commercial customers, are not in themselves taken as a sign that there is a business concept for repeated business. The alignment could involve an adaptation of the initial alliance structure to the innovation concepts, as well as an adaptation of the innovation concept to the alliance structure. Individual customer projects enable an exploration of the business concept and supplement negotiations as a method of learning how to align.

The nature of the alignment phase is similar to a melting pot wherein technical, market, and alliance issues are mixed and finally coalesce into a joint business concept. Finding an alignment of these dimensions for the commercialization phase which is acceptable to both partners requires substantial flexibility. This flexibility needs to involve the alliance structures in the form of flexible business roles (Hypothesis 11) as well as a modularization of the innovation (Hypothesis 12). Flexible business roles make it possible to adapt the alliance to the innovation while modularity enables changes to modules in order to make an alignment possible without affecting the whole innovation.

The combination of commercial agreements with customers and an exploration of the alliance concept makes a thick interface between the partners important as regards risk reduction (Hypothesis 4). The alignment phase also includes commercial discussions between the partners concerning how to distribute the costs and benefits of the alliance during the commercialization phase. In order to reach an agreement regarding the commercialization phase, the interface has a crucial role to play. Seniority (Hypothesis 8) and a thick interface on the tactical level (Hypothesis 2) secures a dialog whereby multiple alternatives can be discussed while a tight vertical interface makes it possible to be flexible during the alignment of the alliance and the innovation.

The process moves on to the commercialization phase when the partners have agreed on a joint business concept for repeated business.

## The commercialization phase

The commercialization phase involves commercial development and delivery to the customers and is characterized by less experimentation and more planning and implementation, with efficiency as an important goal.

The importance of the structural dimensions has changed in comparison with the earlier phases. Modularization continues to be important, but instead of being a mechanism to enable alignment, as in the previous phase, modularization enables the specialization of tasks and knowledge between the two partners, which in turn supports the efficiency paradigm (Hypothesis 13). In addition,

modularization reduces the need for joint exploration (Hypothesis 14). The reduced joint exploration reduces the need for a thick interface (Hypothesis 4).

The actual thickness of the horizontal interface is moderated by the strategic direction of the whole alliance, which might include several innovations, as well as by the type of knowledge involved (Hypothesis 3). When both partners share architectural knowledge, a thicker interface will be needed than when they do not. Modularity enables the architectural knowledge to move gradually to the partners closest to the customer.

## Summary of the synthesis

The synthesis has questioned the combined research and analysis model of this thesis and has developed a coalescent process model for innovation-based alliances from the innovation and alliance models described in the frame of reference. The role of the structural dimensions during the different phases of the coalesced process has been identified and is illustrated in Figure 7-3.
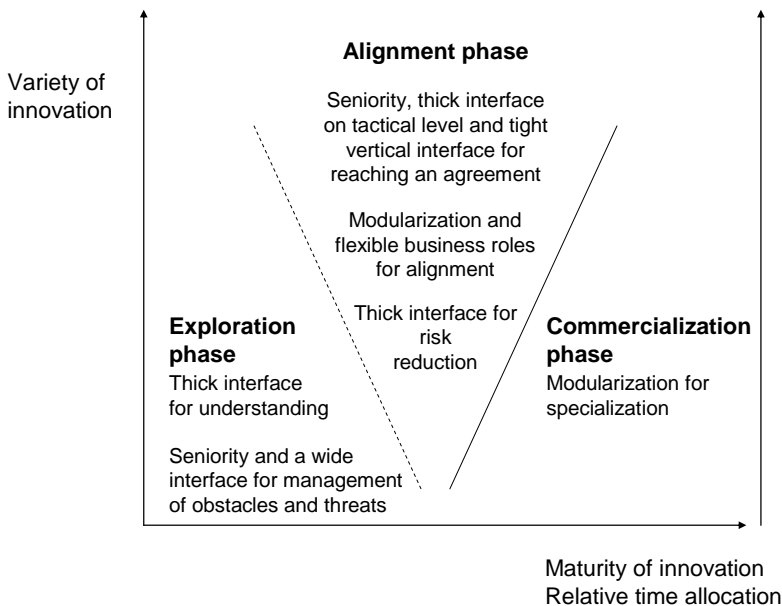


Figure 7-3  A mapping of the supportive structures to the coalesced process model
The line indicating the entrance to the alignment is dotted to indicate a gradual transition to the alignment phase, in contrast to the transition to commercialization which is more distinct.

# CHAPTER EIGHT

# CONTRIBUTION AND IMPLICATIONS

This final chapter presents the central contributions of the thesis, the theoretical and managerial implications, and some suggestions for further research.

## ALLIANCES AND INNOVATION

The starting point of this thesis was the alliance-innovation tension. This tension is essentially a consequence of the recommendations that alliances should have clear contracts due to the risk of opportunistic behavior and that innovation needs flexibility, adaptation to the learning gained, and open communication between all parties involved. In respect of this tension, the problem in focus concerns how to manage innovation-based alliances. One of the few empirical studies of innovation-based alliances suggests that different forms of structures could have an important role in handling this tension (Bidault and Cummings 1994). Based on their observations of innovation-based alliances, this thesis has adopted a structural perspective on the problem, still recognizing the fact that there are other perspectives which could contribute to our understanding of innovation-based alliances. The purpose of this thesis is thus to; *"Describe how and discuss why the structures of both the alliance and the innovation affect the innovation process in an alliance context"*. The literature review resulted in a focus on the structural dimensions *"variety"*, *"modularity"*, *"interfaces"* and *"business roles"*. This review also showed two research streams regarding the alliance process, the rational tradition, with sequential models, and the more recent tradition, with process-oriented models. Based on the literature review, the purpose was transformed into the research question: *"How and why do the different positions within the structural dimensions associated with innovations and alliances affect the innovation process in an alliance context?"* Based on three studies involving an inductive approach, the research question has been investigated using the structural dimension as a starting point. Having

reached the final chapter of the thesis, the time has now come to present the contributions resulting from these studies.

The five contributions of this thesis are: the "reversed" dependency, i.e. that the innovation's design can be dependent on the alliance structure, the alliance-innovation interdependency, the emerging business roles, the interface model, and finally the coalescence process model of innovation-based alliances. The first three contributions are all related to the bidirectional relationship between the alliance and the innovation, and its consequences, but represent such different angles of approach that they are presented as three separate contributions. All contributions are elaborated upon in more detail in the coming sections.

The contributions, together with the findings concerning how various structural dimensions were important during the different phases of the coalescent process model, form the answer to the research question in this thesis. The problem in focus in this thesis; "how to mange an innovation-based alliance given the alliance-innovation tension", has an associated implicit question; "Is it possible to successfully manage an innovation-based alliance?", and this question must be answered positively. Although there is no shortcut to a successful innovation-based alliance, many difficulties could be avoided if management forms and subsequently adapts various alliance structures, in addition to the internal and external design of the innovation, so that the alliance and the innovation become aligned. This alignment requires that the management approach the alliance and the innovation processes as one coalesced process whose character will depend on the variety of the innovation.

## The "reversed" dependency

The first contribution concerns the direction of the dependency between the alliance structure and the innovation. The direction of the dependency identified is from the innovation to the alliance structure as well as from the alliance structure to the innovation. The dependency that the organizational structure has on the innovation is in line with the theories that Woodward (1965) established, which view organizational structures as contingent upon content, e.g. the innovation. The second direction contributes to this theory by illustrating that the dependency could go in the "reverse" direction from the alliance structures to the innovation, e.g. the content is contingent upon the organization.

The modularization of the innovation is a lubricant that enables the alignment of the innovation to the alliance structures by reducing the challenge of redesigning the innovation in order to adapt it to the alliance structure. Modularization is thus suggested not only to reduce coordination costs, as Sanchez and Mahoney argue (1996), but also to increase the possibility of finding what both partners regard to be an acceptable distribution of costs and benefits by enabling the innovation to be adapted to the alliance.

While there is a lengthy tradition of discussing how organizations are contingent on different aspects of technology and innovation (see, e.g., Burton and Obel 2001; Tidd 2001), the opposite direction of the dependency is less discussed in the literature and has more vague claims of being a "reversed" dependency. There are several mappings between the organizational format and the technology, arguing that a particular technology is best suited to a certain organizational context. Roberts and Berry's model for the organizational format of different types of new businesses (1985) as well as Hayes and Wheelwright's (1979) models for the operation types for different levels of variety in the innovation, discussed in the frame of reference, can be seen as examples of this type of mapping between technology and organization. What these models argue is that a lack of coherence between the organizational context and the technology will result in inefficiency. What the "reversed" dependency, as described here, adds is that the innovation may adapt to the organizational context, thus enabling continuation without decreased efficiency.

One implication of the "reversed" dependency for the study of innovation-based alliances is that there are obviously more alternatives regarding the management of innovation-based alliances in industries where the technology supports innovations with modular architecture than there are in industries where technology favors innovations with integral architecture. Whether or not to design the innovation in a modular way is a management choice in the same way as the structuring of the organization is (see for instance discussion in Baldwin and Clark 2000). The existence of a "reversed" dependency challenges the final arguments made by Bidault and Cummings (1994) in their study of innovation-based alliances, i.e. that only the management structures are "action" variables while the nature of the innovation and the context of the partnership are considered to be givens, more or less. The "reversed" dependency illustrates that the nature of the innovation as well, e.g. the degree of modularization, is what they call an "action" variable, i.e. something that management can use to improve the effectiveness of innovation-based alliances.

The "reversed" dependency is less likely to be observed if it is very costly to redesign the innovation in order to align it with the alliance structure; a situation more likely to arise with integral architecture than with modular architecture. Despite Herbert Simon's pioneering work in the early sixties (1962), interest in modularity within innovation management did not get going until the beginning of the 1990s when Henderson and Clark's article about architectural innovation could be seen as a starting point (1990). When many of the nowadays well-established contingency theories between the technology and the structure of the organizations (e.g., Woodward 1965; Perrow 1967) were suggested in the 1960s, the researcher probably did not study industries where modularity was of central importance since the computer industry had only just started to evolve, an industry which is a driving force in the increasing importance of modulariza-

tion and where this is a central concept (Baldwin and Clark 2000). Neither were they inspired to include the possibility on the basis of the literature since this evolved later. A hypothesis is, thus, that their empirical basis was fairly integral technologies and that the introduction of modular technologies might introduce a need to supplement these theories like the "reversed" dependency does.

One hypothesis based on the "reversed" dependency is that innovation-based alliances, using a technology that supports modular architecture, will be more likely to continue to commercialization than will innovation-based alliances where the innovations are created using a technology that favors integral architecture. It is an open question whether or not modularization has such a profound impact on the management of innovation-based alliances that the literature needs to distinguish between innovation-based alliances employing technology which supports modular architecture and innovation-based alliances which, for various reasons, employ technology favoring integral architecture. One implication of the "reversed" dependency is at least the inclusion of modularity as a background variable in studies of the management of innovation-based alliances.

The "reversed" dependency plays a part in the next contribution, i.e. the alliance-innovation interdependency.

## Alliance-innovation interdependency

The second contribution concerns the interdependency between the structure of alliance and the structure of the innovation. This interdependency was observed, in the case of the single innovation alliances, between the whole alliance and the innovation project, and between the innovation and the local alliance context in the case of multi-innovation alliances. This interdependency makes it difficult to separate the process into an alliance process and an innovation process. Instead, the process in an innovation-based alliance, during its early phases, is more of a simultaneous, interdependent exploration of the potential market, the product technology, and the alliance structure. The interdependency is more easily observed if the "reversed" dependency is observable, i.e. modular architecture or at least a modular technology. If the costs associated with a "reversed" dependency are very high, the more traditional models will apply, i.e. the organization will be contingent on the innovation and, if it is impossible to adjust the organization to the innovation, the result will either be inefficiency or the termination of the innovation project.

The various alliance models do not explicitly take a position regarding the possibility of interdependency between the alliance and the content, i.e. the innovation. The implications of the alliance-innovation interdependency for the process-oriented alliance tradition (Ring and Van de Ven 1994), as well as for the more rational alliance tradition (Lorange and Roos 1992), will illustrate potentially implicit positions, however.

The process-oriented tradition often separates the alliance process from the content of the alliance and tries to build generic models of the alliance evolution (Ring and Van de Ven 1994; Doz 1996; Ariño and Torre 1998). This results in conceptually very clear models, albeit it leaving it to the managers to work out ways of applying these models in conjunction with the existing innovation models. One way of interpreting the conceptual character of these models is that the alliance process is independent of the innovation process. By extending the "revision of task" in Doz's model (1996) to include the "revision of the innovation", the model will be more content-dependent and will better reflect the alliance-innovation interdependency.

The idea of separating the theory of alliance management from the content has been challenged by Koza and Lewin (1998) who have made a theoretical contribution that shows the importance of distinguishing between alliances whose purpose it is to explore and alliances whose purpose it is to exploit (see the frame of reference), since the alliance management differs between these two purposes. The identified interdependency between the alliance structure and the innovation implies that the alliance process is content-dependent, thus providing empirical support for Koza and Lewin's (1998) argument for not treating alliances as content-independent.

In contrast to the models of alliance evolution presented in the process-oriented literature, the models originating from the rational tradition (e.g., Lorange and Roos 1992) are often a combination of the alliance process and the content, although the connection is implicit as will be illustrated by discussing the consequences for these models of the interdependency. The idea of having fixed alliance structures, which is common within the rational tradition, is questioned by the interdependency between the alliance and the innovation since the innovation cannot be fixed before the exploration has been conducted. It is therefore likely that the alliance structures have to change during the exploration phase. One explanation for the different conclusions concerning the stability of the alliance structure originating from the rational tradition and the interdependency, respectively, could be that there are differences in the content of the alliances studied, thus affecting the management of those alliances. While this thesis focuses on what the alliance literature would consider to be exploration, e.g. innovation (see Figure 1-14 for the difference in meaning of the term exploration in the alliance and innovation literature), Koza and Lewin (1998) conclude that most alliances studied have an exploitation purpose. Thus, it is possible that the implicit basis for the rational tradition is exploitation alliances such as production alliances. Joint production requires much more stability than innovation and it is therefore a reasonable recommendation that the production alliance should not start up until there is stability. The conclusion that there is interdependency between the alliance and the content could thus be a common denominator between the rational tradition and this thesis, even though the two

focus on different types of content. The rational tradition studies what Koza and Lewin (1998) describe as exploitation alliances, in contrast to this thesis which studies what they would label exploration alliances.

## Emerging business roles

The third contribution of this thesis focuses on the emerging business roles. As discussed in the cross-case analysis (Hypothesis 11), the business roles seem to emerge during the exploration phase. The emergent nature is weaker in situations where the partners can only form one set of business roles because, for instance, one partner lacks contact with the market, than in situations where the partners can form any set of business roles.

The position of the alliance process model (Ring and Van de Ven 1994; Doz 1996; Ariño and Torre 1998) regarding emerging business roles is vague and the conceptual nature of these models makes it possible to include emerging business roles as simply another factor which changes as a consequence of learning.

The existence of emerging business roles entails several consequences for the sequential alliance models (e.g., Spekman, Forbes et al. 1998). The first conclusion is that the sequential models are right in the respect that it seems difficult to create stable structures early on during the process. The second conclusion is that alliances can be started long before stable structures can be created, and this lack of long-term stability in the alliance structures does not necessarily threaten the alliance's survival. This conclusion challenges what these models recommend as a starting point for alliances, which is when the partners know enough about each other, as well as about the joint project, to create stable structures. The third and final conclusion is that stable structures may not even be desirable if the consequence is a lack of adaptation to increased understanding of the innovation during exploration. The hypothesis suggested in the previous section, i.e. that this study and the sequential alliance models apply to different types of content in the alliances, might explain these different conclusions.

There are a number of implications regarding the emerging nature of the business roles. One such implication is that the categorization of alliances using the business roles is likely to be more useful during the commercialization phase than during the exploration phase, but for partners that can only have one type of business role, it can also be used during the exploration phase. When Dussauge and Garrette (1999) describe the business roles as important for categorizing alliances, they do not claim that this categorization would be anything more than a snapshot of the situation, with no predictions as to whether or not it would be stable. Their examples are mainly taken from production or research, but not from joint innovation, an activity where business roles are less likely to be stable.

Another implication is that the emergent nature of the business roles makes fixed contracts more difficult to write. If it is a question of the learning gained during the exploration phase, if one or the other of the partners, or both, should sell the innovation to the customers, it will be difficult to write a fixed contract that would handle all these possible situations and the consequences that these situations entail regarding the financing of different parts of the exploration, etc.

## A model for the interface

The fourth contribution is the empirical identification and linking of the different sub-dimensions of the interface, as illustrated in Figure 8-1. The literature discusses the individual sub-dimensions using various terms, although sometimes not in the actual context of alliances or innovation. Bringing these dimensions together into one conceptual model creates advantages when studying alliances.
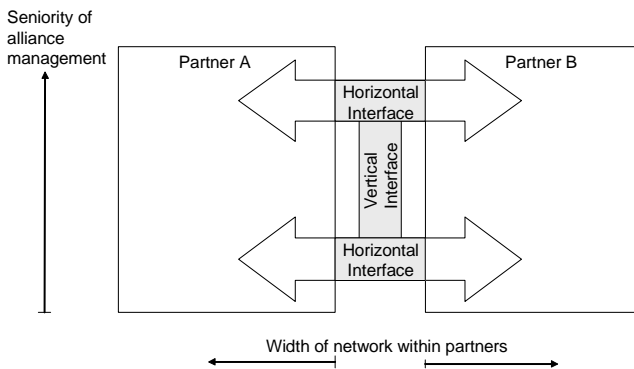


Figure 8-1 A graphical representation of the interface of the alliance
The four sub-dimensions of the interface are;
- Horizontal interface, this can be seen as existing on one or more levels
- Vertical interface, the linkage between the horizontal interfaces on different levels
- Width of social network within partners
- Seniority of alliance management
(this figure is identical to Figure 6-1)

The strength lies in the different forms of coordination and communication mechanisms that these interface dimensions represent, becoming more natural to juxtapose with each other and possibly partly replacing each other in some situations. By understanding during which phase the different sub-dimensions are important for the innovation process, it becomes easier for a manager to guide investments in the interface to the sub-dimension yielding the best return on the investment.

When comparing this model with the two studies identified as being closest to the purpose of this thesis (Bidault and Cummings 1994; Sivadas and Dwyer 2000), some reflections can be made.

Bidault and Cummings (1994) focus on the horizontal interface with their two main dimensions; the division of responsibility and the degree of formality in the relationship. Their conclusion is that management structures that reduce

tensions in the alliance are supportive of the innovation process. They found that the tension decreased when the structures supported some general success factors associated with innovation within a single firm, e.g. a champion of the innovation, a unified sponsorship, flexibility, and information exchange.

What the suggested model of the interface contributes is a broader discussion concerning the causes of the tension and additional structural dimensions that can support the listed success factors. As an example; the flexibility of the relationship with the partner is probably not only affected by the horizontal interface but might also be contingent upon the existence of a wide internal network that can reduce internal threats and obstacles as well as seniority and a tight vertical interface. In addition, the synthesis provides a suggestion regarding how the different dimensions of the interface model contribute to the innovation process during different stages, as the innovation matures. As the discussion concerning the revered dependency earlier on in this chapter shows, the argument of this thesis is that the nature of the innovation is possible to change via management and thus becomes a tool for reducing the tension, not a "given" as assumed by Bidault and Cummings.

Sivadas and Dwyer's study (2000) of organizational factors affecting the innovation process in alliances includes a number of hypotheses that cover several of the dimensions of the interface. Their main concept of cooperative competency, which is a combination of trust, cooperation, and communication, can be regarded as similar to the horizontal interface. This factor received strong support, for enabling the innovation process, in the two populations (the semiconductor industry and the healthcare sector) that were used. The width of the interface is partly mapped by their factor "lack of resistance from key players". This received support from the healthcare sector, but not from the semiconductor industry.

What this study contributes, in relation to their study, is a broader model of the interface, e.g. seniority and vertical interface, a process perspective, and an innovation dimension. Identification of how the different structural dimensions vary in importance with regard to the innovation process, during the different phases (see Figure 7-3), could be important when it comes to understanding some of the unexpected results in Sivadas and Dwyer's study. For example, the importance of a wide internal network was found, in this thesis, to be important during the exploration phase. The relative duration of this phase compared with the other phases, varies with the nature of the innovation, as suggested by the coalesced process model. One possible consequence of the varying role of the different dimensions during the process is that Sivadas and Dwyer's cross-sectional data is overrepresented by cases which, at the time of the study, had long since passed the exploration phase in the semiconductor industry and vice versa in the healthcare sector. The difference that their method then illustrates is the difference in the relative duration of the different phases of the innovation

process, quite a natural difference given the differing nature of the innovations in these two industries, instead of illustrating that a wide interface is less important in the semiconductor industry than in the healthcare sector. Another alternative explanation could be that the alliances in the semiconductor industry had a high level of seniority in the interface, compared with the healthcare sector, and could thus receive the same support hierarchically that had to be achieved via the network in the healthcare sector. Again, this thesis offers a model for discussing the results, not alternative explanations. Since Sivadas and Dwyer made a static analysis, focusing only on dimensions associated with the alliance, it has not been possible for them to develop explanations for unexpected results that are caused by variations in the importance of the structural dimensions during different phases of the innovation process or by a variation in the nature of the innovations and its consequences for the innovation process. Although a similar discussion to the wide interface could be conducted with the other results of their study, this does not decrease the scientific value of their contribution. The authors are very careful in their conclusions, and they state very clearly the limitations of their study and the need for studies of the dynamics of innovation-based alliances. What this study contributes is a model to enable better understanding of their results, not to question their conclusions.

## A model for the process in innovation-based alliances

The discussion concerning the literature relating to alliances and innovation identified several innovation models and several alliance models, but the application of these general models to the innovation-based alliances seemed rare. The tentative model of the coalesced process that the synthesis resulted in could thus be seen as a contribution to understanding innovation-based alliances.

In relation to Millson and colleagues' (1996) model of the formation process in innovation-based alliances, this has more of an innovation perspective and looks in more detail to the different steps of the innovation process than just summarizing them as "implementation and operation" as Millson et al. do. No additional process models claiming to focus on innovation-based alliances have been found, thus the discussion turns to the innovation and alliance literature.

The model contributes to the innovation literature by introducing the alignment phase as an additional phase able to exist in an alliance context, and by suggesting that variety can affect the phases of the innovation process. The alignment phase introduces the organizational aspects more clearly during the process. Even though this study concerns innovation-based alliances, the need for an alignment phase during the innovation process within a single firm would seem to be in line with Galbraith's (1982) reflection that organizational preparation is a difficult part of the transition to the commercialization phase. He does not, however, follow through with the consequences of this reflection by

suggesting that there is a need for an alignment phase within the single firm. With the additional organizational complexity of an alliance, the need for an alignment phase grows stronger. Roberts (1988) and Marquis (1988) both use low variety innovations when they discuss their models. With the alliance context absent and a low level of variety, it seems reasonable to omit an alignment phase. Process models for high variety innovations seem rare and there seem to be few models between the process models for low variety innovation and the project models used when there is only one instance of the innovation.

The model suggested also has to be related to the alliance literature. In this literature, there is a process-oriented school (e.g., Doz 1996) as well as a sequentially-oriented school (e.g. Lorange and Roos 1992), as discussed earlier. These two schools are suggested to cover different situations, as illustrated by the coalesced model (see Figure 8-2). Doz (1996) developed this process-oriented model of alliance development in a context that could be characterized as mainly lying within the exploration and alignment phases. This is in line with the model which suggests that alliance structures are adaptable during these phases. However, Doz does not suggest that the process-oriented nature would diminish at any given point. The distinction between the local alliance context and the overarching alliance context is thus important to remember. While Doz describes the overarching alliance context, the coalesced process model describes the local alliance context encompassing the innovation process. The overarching alliance can continue to be developed in a process-oriented manner, but it is argued here that the local alliance context is more stable upon entering the commercialization phase, but not excluding the possibility of an adaptation of the local alliance context. Alliance models, like innovation models, seem not to include variety despite the fact that this dimension is central to operations management (Hayes and Wheelwright 1979).
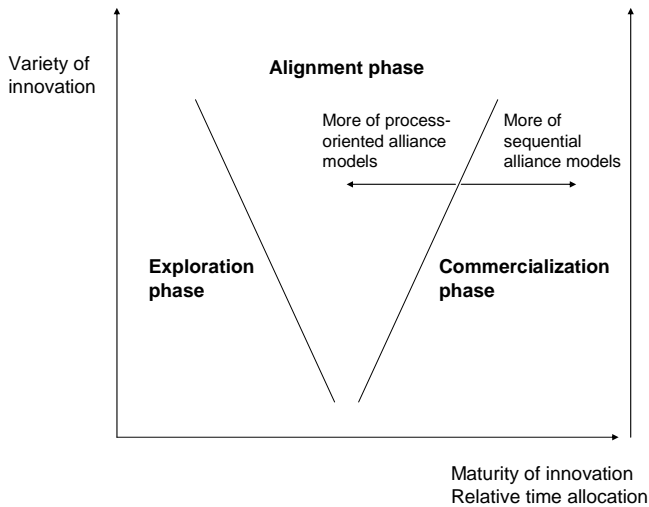
Figure 8-2  The sequential and the process-oriented alliance models in relation to the coalesced process model for innovation-based alliances

The model highlights one easily forgotten prerequisite of Koza and Lewin's model (1998). They use this dichotomy exploration and exploitation to distinguish between different reasons for *entering* an alliance. They argue for the differences between the two types of alliances but do not take into account that an alliance could be linked to an innovation which, during its lifetime, will involve exploration as well as exploitation during its later phases. Exploration and exploitation alliances follow each other (Rothaermel and Deeds 2004) but the management of this transition is not discussed in the literature. The introduction of an alignment phase, together with the findings concerning the role of different structural dimensions, could be one step towards understanding the transition between exploration and exploitation alliances.

## GENERALIZABILITY AND LIMITATIONS

The three studies conducted have resulted in five contributions concerning innovation-based alliances. Before applying these contributions to different contexts, discussing the limitations and possibilities of generalization might be beneficial. Right from the start of this thesis, the two concepts "alliances" and "innovation" have been central. Understanding how these concepts have been handled in the research strategy and how they interact with the context is important in order to know how far the contributions can be generalized and what the limitations are.

The research question "How and why do the different positions within the structural dimensions associated with innovations and alliances affect the innovation process in an alliance context?" paved the way for a research strategy using an inductive approach in order to answer the questions of "how" and "why" that were posed. One consequence of this inductive approach is that the findings are to be seen as hypotheses until they have received additional support from statistical tests using a large sample and a deductive approach. Even so, as argued in the methodology chapter, the external validity outside of the eight innovation-based alliances studied has been substantially increased by the comparison with existing knowledge (Åhlström 1997).

On the other hand, despite a thorough discussion using the literature, there is a limit to how far the claims for generalizability can be made. More research involving a large sample and including a broader variety of contexts is needed in order to validate the findings of this thesis.

However, if the nine innovation-based alliances are regarded as representative of the population, then the results will be valid for this population at least. This population is limited by factors related to the alliance characteristics and the innovation characteristics. This was described, in the "empirical basis" section, as large corporations creating formal cooperative ventures with the purpose of creating "really new innovations" in an innovation domain characterized by technology-based products involving complex operation systems.

The alliances are characterized as formal cooperative ventures between two partners. This implies that extending the contributions outside this population to, for instance, equity joint ventures or networks, requires thorough analysis, analysis that is outside the scope of this thesis. While the purpose of the studied alliances is innovation, some of the contributions do go outside this population, e.g. the contribution suggesting that there is interdependency between alliances and their content.

The innovations are characterized as "really new innovations" (Garcia and Calantone 2002) as well as technology-based products involving complex operation systems. Modularization has been discussed as an important prerequisite for some of the contributions. For technology-based products involving complex operation systems, modularization is a common strategy for mastering the complexity of the systems, albeit not always possible to pursue. The requirement of modularization is thus not considered to decrease the population any further. While the characteristics used for alliances are a little more distinct, i.e. one knows whether it is an equity joint venture or not, the limits of the population set by the characteristics of the innovation are more vague.

Outside the included novelty of the innovation, i.e. "really new innovations", both "radical innovations" and "incremental innovations" exist. While these are clearly outside the defined population, it could be questioned whether this has any practical relevance. Alliances targeting radical innovations are probably

either pre-competitive research alliances, which are not considered to be an innovation process since the partners' intention *a priori* is not to go the whole way to an innovation, or an equity-based joint venture, an alliance form that is outside the scope of this thesis. The remaining radical innovations that involve a contractual alliance are likely to be either close to "really new innovations" or an unplanned consequence of the exploration of an innovation of more moderate novelty. The Internet bank project described, started as the less radical home bank but became, as a consequence of the exploration of the innovation, an Internet bank which could be characterized more as a "radical innovation". Incremental innovations in alliances could be a consequence of a previously developed joint innovation, which could be regarded as being in a late stage of the commercialization phase when the initial innovation has already diffused into the marketplace. It could also be an alliance where one partner is the supplier of expertise to the other one which makes the innovation, i.e. long-term consulting relationships. In this respect, the degree of a joint innovation process could be discussed, i.e. whether it is an innovation-based alliance at all. The outsourcing alliances studied could be framed as "only" supplying expertise, but the intertwined nature of the knowledge base made them *de facto* part of what could be seen as a joint innovation process. To summarize, the novelty of the innovation that exists in an innovation-based alliance does not, in practice, limit the findings.

The limitation "technology-based products involving complex operation systems" is somewhat more distinct than the novelty of the innovation. As discussed in the central concepts section, the combination of "really new" innovations and a high level of complexity make it possible to characterize the innovation domain as "complex" (Tidd 2001). As described in the frame of reference, examples of innovation can be software applications for complex systems such as transportation, telecom, and logistics. However, since the contributions connect with the innovation process, the industry *per se* is of less importance. What is important is the nature of the innovation and the local context of the innovation process. Thus, it is up to the manager interested in applying the contributions to assess whether or not the innovation domain is complex.

A final note concerns the context of the studies. In all but one case, the partners were large corporations with thousands of employees, several business lines, and international operations. The size of the firm has implications for aspects such as culture and the literature provides examples of alliances between large firms and small entrepreneurial firms having a different nature and different sets of challenges than alliances between large firms (Kelly, Schaan et al. 2000). The external context of the studies could also be important for the possibilities of generalizing the results. As the external context was characterized by a booming economy (1995-1999) for some of the studies and a recession (2000-2004) for others, the results could be expected to be valid in different contexts.

The discussion has reduced the population to "Innovation-based contractual alliances between large firms for technology-based products involving complex operation systems" which, although being a significant reduction in scope, still consists of a sufficiently large number of innovation-based alliances to make it an interesting population to address.

## FUTURE RESEARCH

During work on this thesis, a number of exciting opportunities for additional research were identified, but since a thesis cannot cover everything, these ideas will instead be left as suggestions for future research, which is described in this section.

When presenting the coalesced process model to various audiences, a rather common question asked was whether it also applies to innovation within the single firm. Although this has been outside the scope of the thesis, there has been a lingering thought that this might be a correct assumption on the part of the audience. An exciting avenue for future research would thus be to test the model within a single firm. In this context, it would probably be better to call it the variety-process model than the coalesced-process model. Naturally, there is no alignment with a partner, but there might still be an alignment phase where the organization could be aligned with the innovation. Galbraith (1982) discusses the challenges of changing the organizational context when making the transition from the exploration phase to the commercialization phase, which might justify some sort of alignment phase. For high variety innovations such as solutions, it is probably also attractive for a solution provider lacking alliances to sell some solutions to customers in order to learn before moving into a commercialization phase with more stable offerings (Cornet, R et al. 2000). There are examples of process models that take the nature of the innovation into account, but these models focus on the novelty of the innovation and not on variety (see, e.g., Cooper, Edgett et al. 2002a), despite the importance of variety for subsequent operations (Hayes and Wheelwright 1979).

This thesis has taken a structural perspective on the alliance-innovation process. Using this perspective, the coalesced-process model for innovation-based alliances was possible to identify. As recognized at the beginning of this thesis, there are other perspectives contributing to our understanding of innovation-based alliances. One avenue for future research would thus be to elaborate the summary of the synthesis (see Figure 7-3) with other perspectives. When studying the solution alliances, the role of relative power in the collaboration was evident and seemed linked to the nature of the corporation. Introducing the concept of relative power would thus probably enhance understanding of innovation-based alliances. Differences in the relative power, between the partners on different levels of analysis, are expected to complement the synthesis by,

for instance, suggesting that a certain type of power would enhance or impede the effect of the other dimensions during certain phases, etc. The levels of analysis could, for instance, be the partners in general, the partners in the actual innovation context, as well as between the individuals at the two partners.

The results of this thesis have been generalized to an innovation domain that is characterized by complexity (Tidd 2001). When discussing the coalesced process model with researchers focusing on other innovation domains, it seems that different degrees of complexity will affect the model. When the level of complexity is reduced, the relevance of modularization and the "reversed dependency" diminish and the coalesced model might be called into question. An idea emanating from these discussions is to add complexity as a dimension of the coalesced model, instead of being a parameter defining the population. By viewing the coalesced process model as not only related to high or low variety, but to a combination of variety and complexity, it might be possible to use the model in a wider innovation domain.

The three suggestions for future research, i.e. the extension of the coalesced-process model to the single firm, the introduction of relative power into the model, and combining complexity and variety, are all issues holding great promise as fruitful research projects. These suggestions reveal that, despite the large amount of research that has been done, there are still plenty of new and exciting opportunities to explore, especially when combining concepts from different research traditions such as innovation and alliances.

## MANAGERIAL IMPLICATIONS

The research project has generated many insights into the challenges facing managers of innovation-based alliances. These insights have been summarized in the commitment challenge and the execution challenge, based on the findings described in the thesis and on additional observations made during the studies. These two challenges are primarily described in order to support managers in being better prepared for future alliances. However, managers working with organizational development might also obtain ideas regarding how to design organizations that strongly support innovation-based alliances. In contrast to the previous chapters, a less restrictive interpretation of the possible implications of the findings has been allowed in this chapter. Managing innovation-based alliances is not trivial, but by understanding the commitment challenge and the execution challenge, it could be much easier.

## The commitment challenge

The commitment challenge concerns how to create commitment in the two partners in order to pursue the alliance. This is more easily said than done and a number of issues have to be resolved in order to obtain the strong commitment that a successful alliance needs from both partners.

### *The need for a communicable strategy*

One experience shared by many managers when meeting potential partners is the importance of having a communicable business strategy that makes sense in an alliance context. The corporate strategies might be clear but unfortunately irrelevant to the actual situation and the strategies tied to the particular business area or product line might be unclear, or even worse, non-existent. However, a clear strategy is not enough. The strategy should be coherent and possible to communicate to the partner. If one partner perceives the strategy to be unclear, uncertainty will remain regarding the other partner's intentions. The lack of a clear strategy did not always stop the studied alliances from starting up, but it impeded them and, in one case, temporarily stopped the collaboration until the strategy had been clarified. Before entering into an alliance, it is thus advisable to be clear about both your own strategy and the alliance's role in this strategy. Formulating this strategy as an attractive proposition for a partner could enhance one's possibilities of being chosen by that partner.

### *The need for a common internal language concerning alliances*

The difficulties of understanding a partner due to the lack of a common professional language are well known and most alliance managers would probably spend considerable amounts of energy avoiding misunderstandings with their partners. The studies showed that misunderstandings were rather common within the internal organization of each partner with regard to the alliance strategy, indicating that the need for a common language concerning alliances might also be an issue within the partners themselves. It was striking that the level of precision when describing alliance strategies was substantially lower than the descriptions of sales or operational strategies. A common way of describing and classifying the different aspects of alliances as regards, for instance, purpose, value creation logic, etc, was lacking. This lack of a common language for describing the different aspects of alliances could be one explanation for the difficulties of formulating clear and communicable alliance strategies. The lack of a common language makes it difficult to develop routines connected with alliances since it is difficult to describe when they should be applied. It also becomes difficult to accumulate knowledge, with the result that decisions tend to be haphazard. A consequence of this is that similar alliance situations will be managed very differently, depending on which managers are involved.

This thesis could provide some support to managers with regard to finding a common language. The section "central concepts" provides a definition of alliances as well as a division of them into three groups, depending on their purpose. These groups are; a) a strategic purpose based on market power as well as resource-based theories, b) an operational purpose involving transaction cost and resource dependency theories, and finally c) an innovation and learning purpose. The structural dimensions of the alliance are captured in the degree of integration (see Figure 1-9), the business roles (see Figure 1-11), and the interface (see Figure 6-1). Using these models, it might become easier to categorize the actual alliance in a communicable way, also theories and experiences could be tied to different categories. For innovation-based alliances, which are in focus here, additional categorization could be achieved by using the coalesced-process model suggested (see Figure 7-2) and the categorization of innovation domain (see Figure 1-8).

### The need for organizational commitment

The partner's perception of the firm on a regular basis was that it lacked organizational commitment to the alliance. The factors behind this perception included a constantly changing interface in the alliance, i.e. the firm constantly changed staff, introducing new people into the alliance interface. A second factor was the slow response to different types of requests. The third and final factor was the firm's unwillingness to utilize the full value of the alliance.

The *constantly changing interface of the alliance* seems related to the rate of change of issues in focus for the alliance and in changes to the phases of the innovation process. New issues or new phases often involved new people. These constant changes made it difficult for trust to develop between people. The changes of staff also made it difficult to understand the decision-making process of the partner and the chain of command, understanding that was considered to be important for assessing the potential of the collaboration. Frequent changes increased the uncertainty of the assessment of the potential and reduced the perceived commitment of the partner. Since trust has been found to be critical in order for innovation to secure flexibility and open communication, the changes of staff in the interface impeded the innovation process. The reason for the constantly changing interface is likely to be a combination of an organization not adapted to alliances and a tradition of favoring specialists over generalists, hence changes in staff in order to involve a specialist. In alliances where the interface was more elaborated and where there were permanent resources in the interface, the perceived need for organizational commitment was less of an issue.

The *slow response to different types of requests* was perceived to be a sign of a lack of commitment to the alliance, a typical situation being that answers to requests were postponed from meeting to meeting. The perceived lack of commitment

created uncertainty as regards whether or not the actual alliance would be a potential vehicle for achieving the intended innovations. The reasons for the slow response were normally not negotiation tactics, rather a consequence of the difficulties that the alliance manager experienced in anchoring the alliance in the internal context and coaxing the organization to obtain the necessary decisions and mandates. This inertia seemed to relate to processes and routines that were highly adapted to supporting internal activities with a low degree of support for partly external activities. The lack of an alliance strategy and a common language played an important role in this weak organizational support for the alliance. The response times became even longer during times of reorganization and it was natural for the partner to draw the conclusion that the organizational commitment had faded away. Even though the alliance managers remain the same, with a high degree of individual commitment, they were often paralyzed during reorganization due to the difficulties of obtaining support and a mandate from the rest of the organization. Individual commitment was not enough, organizational commitment was also needed.

The *unwillingness to utilize the full value of the alliance* created uncertainty regarding the firm's intentions and the veracity of the communicated strategies since it seems strange not to utilize what one declares to be within one's strategy. Hidden strategies were rare in the cases studied and the lack of willingness to utilize the full value was instead created by alliance managers adapting the alliance to the internal management control systems. One expression used was whether the alliance went "along" the organizational structure, i.e. in harmony with the organizational structure, or whether it was "across" the organizational structure, i.e. against the organizational structure. An example of "across" the organizational structure could be constituted by the innovation-based alliance that was connected to a functional unit at one of the partners. In these situations, it was more the rule than the exception that the costs and benefits of the alliance, for the individual partner, would not be linked to each other. What chastened alliance managers did then was to optimize the benefits and costs of the alliance in line with the management control system, which would make everything easier for them even though less value was being utilized. The organizational position of the alliance managers thus matters with regard to the result of the alliances, and how the firm is perceived by its partner.

For the partner perceiving that its opposite party lacked organizational commitment, e.g. through experiencing a constantly changing interface or a slow response time, it was important to distinguish between a real and a false lack of organizational commitment. Good personal relationships with people understanding the political arena at the partner firm was one way of distinguishing between a real or a false lack of organizational commitment. A lack of organizational commitment was seldom overcome by the individual commitment of alliance managers, which is why the correct assessment of this issue could save

substantial time avoiding a dead-end. Another implication is the need for the firm to avoid unintentionally sending signals indicating a lack of organizational commitment in situations when organizational behavior could easily be interpreted this way, e.g. during reorganization.

## Execution challenge

The execution of an innovation-based alliance includes both the exploration and commercialization of the innovation. The handling of the commitment challenge is important for securing a good start-up for the alliance and continues to be important during the execution. The execution challenge summarizes a number of additional issues that are important to handle in order to secure the execution, including issues related to the process, structure, and context of the innovation-based alliance.

### Which process model?

One issue that was largely omitted when starting up the alliances in the cases studied was the model of how to work together during the innovation process. This lack of discussion and agreement regarding a process model was, however, a source of inertia for the innovation-based alliances. Three factors seemed to be important to reflect upon when deciding which process model was to be used. These factors relate to the scope of the alliance, the process model to be used as a starting point, and the adaptation of the process to the nature of the innovation.

*The scope of the alliance* was one of the first issues for the alliance manager to decide upon. For the large corporations studied, it was rather common to have multiple relationships between the partners of an alliance nature. The decision was thus whether or not this new alliance should be seen as a part of the already existing alliances, creating a multi-project alliance. The decisions took three paths. The first path was to incorporate the new alliance into the existing ones, thereby profiting from an existing established framework for working together. The second path was to pursue it as an independent alliance, but internally coordinating it with the other alliances vis-à-vis the partner, thereby creating the flexibility to use the other alliances as an argument when it suited the firm's purposes. The third path was to regard the alliance as independent of the other alliances, both in relation to the partner and internal. Of importance to the decision as to whether or not to incorporate the alliance into the existing alliances is whether the purposes of these alliances were the same. Alliances with an innovation purpose require both a different process and different management compared with, for instance, a sales alliance, and mixing these two purposes might create more problems than it solves.

An implicit understanding was to use an *existing process model as a starting point* although it was seldom made explicit which model would be used. The large corporations studied normally supported their innovation projects using models of both the innovation process and the project management. While these models are likely to be supportive of the internal innovation process, the studies illustrate situations where the combination of the two corporations' models impeded the joint innovation process, in one case even creating a deadlock situation. One partner's innovation process required commercial installation of the innovation for a few customers in order to validate the concept before the decision to commercialize. The other partner's process did not allow commercial installations of the innovation before the decision to commercialize had been made. Comparing the partners' models for the innovation process at an early stage and deciding which one would be used as a starting point could reduce many future difficulties.

An *adaptation of the innovation process to the nature of the innovation* early on in the alliance is important in order to share a common perception of how things will unfold over time. The coalesced-process model for innovation-based alliances, which was suggested in this thesis (see Figure 7-2), takes the nature of the innovation into account in the form of variety and highlights important aspects of the management of innovation-based alliances. Even if many parameters of the innovation are difficult to predict early on in an innovation-based alliance, it is likely that the partners will have a common view of whether the variety of the innovation is going to be high or low. The relative periods of the different phases are suggested to depend on the variety of the innovation. The process for a standard product aimed at high volumes is rather similar to the traditional models of exploration-commercialization, while the process for very high variety innovations aimed at tailor-made customer solutions could continue to be in the alignment phase practically forever. The introduction of the alignment phase into this model, whereby the innovation and the alliance can be aligned to secure the transition to the commercialization phase, rests on the observation that the exploration concerns the market, the technology and the alliance. Alliance structures are, thus, not fixed during the exploration and alignment phases, they evolve. Even in cases when the partners had created what they believed to be smart contractual models that would cover both exploration and commercialization, learning during the exploration of the market and the technology made these models inadequate and the alliance structures had to be revised to enhance the value creation potential of the innovation. It might thus be better to view the contract at the beginning of the exploration phase as a starting point for discussions concerning the agreement for the commercialization phase than as something that will be valid for the commercialization. This mindset supports active management which could help the innovation and the alliance to make the transition to the commercialization phase. The often sug-

gested recommendation to write fixed contracts for alliances may be true for other types of alliances, e.g. production alliances, but would not only be practically impossible to apply to innovation-based alliances, but also directly counterproductive. A consequence of this is the need to involve people with business development knowledge, besides the traditional product development expertise existing during the exploration and the alignment phase.

### *What structures?*

The interface between the partners plays a central role in the coordination of the alliance activities of the two corporations. The role of the interfaces varies along the innovation process, thus it is important to manage the interface actively. This thesis contributes two tools for managing the interface in innovation-based alliances, e.g. the interface model (see Figure 8-1) and the process model (see Figure 7-2), which are combined into one illustration of how different aspects of the interface are important during different parts of the process (see Figure 7-3). The exploration phase requires a thick horizontal interface, a large width of the interface, and high seniority. The alignment phase adds the importance of a tight vertical interface but relaxes the requirements regarding the width of the interface. Upon reaching the commercialization phase, most interface dimensions could be relaxed, at least if the partners have understood the importance of modularity, which will be discussed below. Among the more difficult things to achieve is a thick interface on the tactical level, involving senior managers. A trick used at one of the alliances studied was personal incentives for senior managers in the form of a learning agenda connected to the alliance.

Cooperating across firm boundaries with another company increases the costs of coordination and introduces an additional uncertainty into the distribution of costs and benefits between the partners. Modularization of the innovation was identified as supportive by reducing the coordination costs, introducing principles regarding how to distribute future changes in costs and benefits, and enabling the alignment between the alliance and the innovation which was necessary for making the transition from the exploration phase to the commercialization phase. Modularization also enables specialization, which was recognized as having the consequence that the architectural knowledge was gradually accumulated with the partners closest to the customer. The impact that modularization has on the alliance makes it advisable not to regard the modularization strategy as solely an innovation issue, but also as an integrated innovation-alliance issue requiring multiple competencies to be resolved.

### No alliance is an island

An alliance does not exist independently of the other activities conducted by the partner, or what is happening in the world around us. Competing internal initiatives seem to be a rather common reason for the premature termination of innovation-based alliances. For alliance managers, it is important to identify these competing internal initiatives in order to redirect them or to prepare the partner in such way that it does not regard this as competitive.

If not directly an alliance killer, re-organizations have the tendency to paralyze alliances, a condition from which many alliances never recover. One antidote is to make the interface thicker than would otherwise be necessary in order to withstand the changes of staff that are common during reorganizations. Furthermore, if possible, the alliance management could reduce the level of dependency on future internal decisions by reducing the number of stage-gates that have to be passed through during the reorganization.

Alliances are, as with all business activities, affected by changes in the external context, e.g. the market, but such consequences have not been studied in this thesis.

## Summary

This section has described two main challenges for innovation-based alliances, i.e. the commitment challenge and the execution challenge. There are several important implications for the management of innovation-based alliances originating from these challenges. Drawing on the discussion above, three could be highlighted as a summary, albeit not reducing the value of all the other implications described. The *first* implication concerns the importance of creating a common language within the corporation with regard to alliances. Without this, alliance management is not likely to be effective since it is difficult to formulate a strategy, build routines, and accumulate knowledge. The *second* implication is accepting that the exploration phase can affect the alliance structure regardless of whether this is desirable or not. This makes it important to have sufficient management resources during this phase to take advantage of the possibilities that might emerge. The *third* implication concerns the importance of the modularization of the innovation in order to enable low coordination costs, a low level of tension, and enhancing the possibility of finding alignment between the innovation and the alliance, which could bring the innovation to the commercialization phase.

Coming to the end of the thesis, its main message is worth repeating. The perception that innovation-based alliances cannot work will hopefully be shown in this thesis to be a misunderstanding. Innovation-based alliances are not fundamentally more difficult to manage than other business activities, as long as managers apply the knowledge that already exists to handling innovation-based

alliances. Although there is no shortcut to a successful innovation-based alliance, many difficulties could be avoided if management forms and subsequently adapts various alliance structures, in addition to the internal and external design of the innovation, so that the alliance and the innovation become aligned. This alignment requires that the management approach the alliance and the innovation processes as one coalesced process whose character will depend on the variety of the innovation.

# CHAPTER NINE

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# PAPER I

Overcoming the innovation – alliance paradox:
A case study of an explorative alliance

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2004

***A note to the reader***

The terminology used in this paper differs from the terminology used in the thesis in the sense that the tactical level is here called the strategic level. The intermediate level described in the paper has no clear equivalent in the thesis but could be regarded a part of the tactical level, i.e. the tactical level is in this paper divided into one strategic level and one intermediate level.

# Overcoming the Innovation–Alliance Paradox: A Case Study of an Explorative Alliance

## Abstract

Alliances are an increasingly common way of organizing the uncertain exploration phase of radical innovation. It may, however, be argued that there is inherent tension between the logic of alliances and the logic of innovation. Whereas innovation is generally argued to require flexibility, political protection, and extensive communication, the commonly mentioned key characteristics of alliances are detailed contractual regulation, political struggles, and limited information exchange. On the basis of an in-depth case study of a largely successful alliance for innovation between a European bank and a European telecom operator, this paper argues that the tensions between innovation logic and alliance logic may be overcome by creating a multilevel governance structure for the alliance containing a learning agenda on both the operational and tactical levels. The different levels of the structure are described and their contribution to the success of the alliance discussed. A three-level structure, consisting of an operational level on which explorative projects were carried out, a tactical level providing legitimacy and support to the alliance, and an intermediate level supporting the tactical and operational levels, as well as linking these, was of central importance to the alliance's success since it allowed flexibility and protection against premature termination and managed to overcome the communication barriers that are common in alliances. It highlights the importance of a managerial platform that holds together the different collaborative activities occurring between alliance partners and suggests the use of educational visits as a way of creating this platform. Explorative alliances, it is thus argued, will benefit from the creation of a learning agenda, not only on the operational level but also on the tactical level, giving the alliance a *raison d'être* beyond single successful or failed alliance projects.

## Introduction

Technological discontinuities have been a central source of innovation, repeatedly leading to the restructuring of entire industries (Freeman 1982). During the past decade, Information Technology and the Internet have been new technologies by means of which the boundaries between industries have been broken up

(e.g. the one between IT and Telecom) and in the wake of which new business opportunities have been created in the borderland between the established industries (e.g. retail and banking, as reflected in the retail chains' offerings as regards banking services). The opportunities provided by Information Technology in combination with advances in telecommunications and the emerging Internet have created opportunities for major product and service innovations, the application of new technology to new markets, and architectural innovations (Henderson and Clark 1990) recombining existing technology in order to create new markets (Tushman, Anderson et al. 1997).

The emergence of new technologies, creating what might be called new fields of innovation— new technology and market combinations that may be explored by organizations in order to create new strategic positions — provides organizations with a specific challenge. These situations provide great opportunities, but they also entail high risks for established organizations especially (Christensen 1997). Christensen (1997) argues, for instance, that established firms often fail to recognize the innovative opportunities in disruptive technological advances. Consequently, these opportunities are often explored by small entrepreneurial firms, which are new to the industry.

The exploration of these high-risk opportunities, which are often at the limits of a single firm's expertise, may benefit from partnering with organizations that have complementary capabilities and resources (Roberts and Berry 1985). In spite of this potential, the literature on innovation and new product development typically focuses on the operations of a single firm (Millson, Raj et al. 1996). In recent years, however, the potential of partnerships in innovation and NPD has increasingly been identified as a strategic issue (Millson, Raj et al. 1996; Kim and Wilemon 2002).

However, conducting the innovation process in collaboration with other organizations poses its own set of challenges (Bidault and Cummings 1994; Millson, Raj et al. 1996; Kim and Wilemon 2002). As has been argued by Bidault and Cummings (1994), there is fundamental tension between the dynamics of innovation and the logic of alliances. Innovation, especially of a more radical kind, is generally described as demanding freedom and flexibility, a politically sheltered environment and extensive communication. The alliance literature, however, typically presupposes a well-defined situation in which a clear contract can be formulated between the partners of the alliance, and in which suspicion of opportunistic behavior by the partners leads to political struggles and restricted communication (see e.g. Kale, Singh et al. 2000).

In handling these potential tensions between the fluid logic of radical innovation and the contractual logic of alliances, the design of the alliance structure has been identified as central (Bidault and Cummings 1994). However, current knowledge is limited regarding how this structure may look and how it may be managed. As pointed out by several authors (Spekman, Forbes et al.

1998; Barringer and Harrison 2000; Ireland, Hitt et al. 2002), there is a general lack of studies concerning the practicable management of alliances. The few studies that exist (e.g. Doz 1996; Ariño and Torre 1998) do not distinguish between alliances aimed at exploring new, innovative opportunities and alliances aimed at exploiting existing capabilities, even though the management challenges may be very different (Koza and Lewin 1998).

Against the above background, this paper aims to increase our understanding of how to structure and manage alliances with the purpose of exploring the opportunities emerging from technological advances. More specifically, we study the collaborative efforts of a European bank and a European telecom operator in order to explore the emerging field of innovation created by the merging of IT and telecommunication and the emerging Internet. This alliance was regarded as successful by both parties, producing a number of groundbreaking innovations such as one of the first Internet banks in the country and the first application for electronic billing services to consumers in Europe. Special attention is given to the multilevel governance structure of the alliance, as this was found to be an important factor for success.

In what follows, we will start of by elaborating on the tension between an innovation logic and the logic of alliances. This is followed by a description of the case. The case is discussed and conclusions are drawn in the two final sections of the paper.

## INNOVATION IN ALLIANCES

Exploring new fields of innovation- emerging at the borders of industries undergoing change provides a considerable challenge to the existing players of the industry (Tushman and O'Reilly III 1996). In this situation, there is no dominant design to build on (Utterback and Abernathy 1975) and technology, the market and the competition are difficult to predict. Different innovations compete to become the dominant design, making innovation management an activity dealing with large amounts of uncertainty (see for instance Drejer 2002).

In this situation, the innovation process requires a high level of flexibility, as it will go through a number of iterations, as well as political shelter, as it will otherwise be killed in favor of less uncertain endeavors (see e.g. Drejer 2002). Since innovations of the type discussed here typically involve new technology as well as new links with the market, existing routines and business processes will typically be insufficient, or even counterproductive. To create a flexible and innovative space for these non-incremental innovations, we are often recommended to organize the early, explorative phases as fairly autonomous ventures (Drejer 2002). As the character and potential of the innovation become increas-

ingly clear, the venture may be reconnected to the host organization, reintroducing more strict controls and procedures (Galbraith 1982).

The uncertain outcomes of innovations also make them highly vulnerable to premature termination (see for instance Kim and Wilemon 2002). Ensuring resource allocation for these uncertain ventures involves ongoing negotiations and power struggles. Besides capital, some important resources that have to be attracted are; knowledge of technology and the market, management capabilities, distribution and production skills, etc. In obtaining these resources, the *product champion* and the *product sponsor* play important roles (Brown and Eisenhardt 1995). The product champion is a person or team strongly connected with the innovation, prepared to defend and argue for it in times of tough questions. For support, the product champion needs a product sponsor, a representative of senior management able and willing to back and protect the innovation project. Furthermore, innovations depend on access to knowledge through *extensive communication* within the project group and with other internal functions, as well as with the external environment (Allen 1977; Brown and Eisenhardt 1995).

The high-risk character of radical innovations, as well as the need to combine and develop new knowledge, makes alliances a suitable arena for these kinds of projects (Roberts and Berry 1985). Especially in times when organizations are increasingly specializing in their "core-competencies" (Prahalad and Hamel 1990), the need for, and the potential of, cooperation increases during the innovation process. However, the success factors for radical innovation indicated above may be difficult to create within a traditional alliance logic (see e.g. Bidault and Cummings 1994).

A primary area of conflict involves the innovation logic's focus on flexibility and evolving concretization, as opposed to traditional alliance research which stresses the need for a firm contract, agreed upon by all partners before starting the alliance, as a central success factor (Lorange, Roos et al. 1992). Within this stream of research, much effort has been directed toward defining the initial conditions (e.g. partner choice, alliance form, etc.) most able to secure successful alliances. This focus on the initial contract has, during recent years, been supplemented by a "process perspective" which views alliances as evolving, thus making their success dependent on the ongoing process, along with the initial conditions (Madhok and Tallman 1998). In the "process stream" of research, the focus turns to the alliance's adaptability. The alliance process is viewed as circular, consisting of consecutive negotiation-execution-assessment loops (Ring and Van de Ven 1994; Doz 1996). To make this process work smoothly, good communication and conflict resolution mechanisms are emphasized (Ariño and Torre 1998), as well as the structural conditions enabling these (Doz and Hamel 1998). Especially in alliances aiming toward radical innovation, the management structure, as well as its ability to handle the ongoing redefinition of the alliance, has been suggested to be important (Koza and Lewin 1998). Millson et al.(1996) thus propose

different kinds of relatively unstructured partnerships that do not involve any equity commitment as the most suitable form for NPD alliances, due to their flexibility. Little is said, however, in the literature about how these structures may be designed, thus further research is called for (Bidault and Cummings 1994).

A second area of contradiction between the innovation logic and the alliance logic concerns the political dimension of the alliance process. While resource attraction has been identified as a central challenge for internal ventures, the magnitude of this challenge is multiplied in an alliance context in which an innovation must be constantly championed versus two organizational systems and strategic contexts. This makes the work of a product champion considerably more complex and the role of the product sponsor highly ambiguous (Bidault and Cummings 1994).

Finally, open and extensive communication, a third success factor in radical innovation, is not generally a natural trait of alliances. Fear that the company's core competencies may diffuse to the partner and ruin the bargaining position vis-à-vis the alliance partner and the company's competitive edge, create substantial barriers to open and free communication (Hamel 1991; Kale, Singh et al. 2000). A dependency on the partner may further hamper creativity and thereby slowly erode the competitiveness of the company entering into the alliance (Anand and Khanna 2000).

Alliances thus provide a large potential for improving the innovation process (Millson, Raj et al. 1996), however the realization of these potentials poses some significant managerial challenges based on the differences between the logic of innovation and the logic of alliances, as reflected in much of the classic alliance literature. In overcoming these challenges, the management structure of the alliance has been repeatedly indicated (Bidault and Cummings 1994). In what follows, we will look more closely at how this was organized in a successful alliance for innovation between a bank and a telecom operator.


## RESEARCH METHOD

This paper is based on an in-depth case study of a single alliance between a bank and a telecom operator. The alliance was in operation between 1995 and 2001. During this period, alliances were a common tool for banks as regards dealing with uncertainty and acquiring knowledge (Lambe and Spekman 1997). The choice of alliance studied was based on its relative success and exploratory purpose. The characteristics of non-incremental innovations that have a high degree of context dependency, such as history, experience, corporate cultures, personalities and informal relations (Leifer, McDermott et al. 2000) limit the generalizations that could be made. However, in line with Eisenhardt's (1989) argument, for instance, we believe that a thorough empirical understanding of a

phenomenon may be a suitable starting point for theorizing about it (see also Strauss and Corbin 1990). The main aim of the case study is thus to provide some ideas as regards how alliances for innovation may be structured and managed in order to provide a supportive environment for radical innovations.

In order to obtain a detailed picture of the alliance, both written material and interview data were collected. The written material consisted of protocols from the steering committee, as well as presentations and reports. Based on the written material, a detailed case description was produced. This case description then guided the process of choosing eight interviewees, four from each organization, who together represented the steering committee throughout the period. We also interviewed four project managers and concept developers in order to check the stories in respect of the executive level. The interviews were semi-structured and covered the process, the structural design, and the outcome of the overall alliance, as well as the innovation projects carried out within the alliance framework. The interviews ranged between 40 and 120 minutes in duration, and were recorded and transcribed. Some informants were interviewed several times. The interviews were conducted between September 2001 and March 2002.

Analysis of the interview data was supported by the software tool N-Vivo, which systematized the structuring of the interview data (Richards and Richards 1991). The documents produced by the alliance were considered too numerous (more than 700) to be analyzed using N-Vivo. Instead, the conclusions drawn from N-Vivo analysis of the interview protocols were checked against these documents. The final case description and the central findings of the study have been validated by a key informant.

## THE EUROBANK — EUROTEL ALLIANCE

The alliance between Eurobank[1], a European bank, and Eurotel, a European telecom operator, was in operation between 1995 and 2001. The purpose of the alliance was to explore the field of innovation emerging between banking and telecom which was being opened up by technological advances linking IT and communications technology. Through the alliance, the partners wanted to develop new capabilities and create innovations. In the letter of understanding, a very general document governing the alliance, the purpose of the alliance was defined as follows:

> "…Eurobank shall gain an understanding of new technology and how it best may
> be applied to business…. Eurotel shall learn how to increase its competencies as
> a solutions provider …" (Letter of understanding)

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[1] Eurobank and Eurotel are pseudonyms.

Eurobank expected to learn about new information and communications technology and how this could be applied in order to change the banking industry. Eurotel expected to learn how to get better at providing integrated solutions to the changing banking industry, instead of just being a supplier of basic telephony services. Both parties regarded exploration of the new field of innovation as important due to the challenges they had seen arising from the deregulation of their respective industries which had recently taken place. The two partnering organizations also shared, in many senses, a common history coming from a nonprofit or cooperative tradition and focusing on consumers and small companies.

The alliance is judged successful by the participants and has produced a number of radical service innovations, such as one of the first Internet banks in the country and the first demonstration of electronic billing services to consumers in Europe:

> "…When the prototype [of the electronic billing service] with 500 users was ready, we prepared an advertisement saying first in the world with electronic billing. Somebody had seen something similar in the US just before, so we changed it to first in Europe" (Senior Executive Eurotel)

During the alliance period, the Internet evolved into the dominant design for communication-based IT services. At the beginning of the alliance, the Internet had not yet been defined as the one-and-only communications solution. The explorative focus and the focus on radical innovation were at their strongest at the beginning of the alliance period. In what follows, we will describe the operations of the alliance in accordance with the different levels of the governance structure. This comprised of three levels - the operational, the intermediate and the strategic levels.

The operational level consisted of a number of joint explorative projects, all clearly focusing on exploring various new business opportunities from a technical and/or marketing perspective. The projects were jointly managed, rather small (less than €300k), short-term (<6 months), and staffed by people from both organizations. The project managers reported to the alliance secretariat, which was an intermediate level between the operational and strategic levels of the governance structure.

The alliance secretariat representing the intermediate level was staffed by one employee of each partner. The intermediate level reported to the strategic level, which included an alliance steering committee consisting of 3-4 people from each corporation, including at least one member of each company's executive board. The steering committee was chaired by an alliance manager from each organization who reported directly to the CEOs. The alliance managers were in close contact with each other, as well as with the alliance secretariat. The CEOs of both companies met twice a year to discuss the alliance. All activities, except

the alliance secretariat and steering committee, were connected to projects financed by equal cost-sharing, unless otherwise agreed. Table 1 below, provides a summary of the actors, functions and activities of the different levels of the governance structure.

| | Operational level | Intermediate level | Strategic level |
|---|---|---|---|
| Function | To explore a certain product or a service innovation or a critical subsystem.<br><br>Limited experiments | Idea generation for innovations; controlling and supporting the operational level. | To explore the new field of innovation.<br><br>Sponsoring and creating legitimacy |
| Actors | People from both organizations combining knowledge of technology and market. | One senior manager from each partner working full-time until 1999, then half time. Two vice presidents working as part-time alliance managers. | Vice presidents from business areas or functions that had a close connection with market or business development. |
| Activities | Developing prototypes and small-scale live experiments in order to test the validity of product/service concepts | Networking inside as well as outside the two partner organizations.<br><br>Arranging idea generation and learning arenas. | Selecting ideas, initiating (and terminating) explorative projects. Participating in learning tours. Developing a common agenda |

Table 1 Summary of the functions, actors and activities on each structural level

## The operational level — explorative projects

The alliance between Eurobank and Eurotel initially comprised of five explorative projects with the purpose of learning more about the different emerging technologies and their possible application to the business of Eurobank and Eurotel. Two of these projects soon became product development oriented—the home-bank that became the Internet bank, and electronic communications for reducing postal costs which developed into a consumer e-billing system. The other three projects were one aimed at improving the bank's customer contacts using new technology, and two embryos of products made obsolescent by the Internet-bank and the e-billing projects. Additional projects came about as the alliance evolved.

The projects carried out on the operational level were initiated by the strategic level on the basis of suggestions coming from the intermediate level, which were often based on insights gained in previous alliance projects. Common to all projects was the aim to explore potential future opportunities, while the willingness to explore visionary (and uncertain) ideas was substantial:

> "Many projects were too visionary…they never succeeded, they were ahead of their time." (Project manager)

In cases where exploration revealed a potential for innovation, the future financing and intellectual property rights would be negotiated on the strategic level in order to find a solution reflecting the respective partner's potential gains. Once a commercial concept had been developed and the focus had shifted to more traditional product development, the responsibility of the project was, in most cases, moved outside the alliance and into the traditional hierarchy of the alliance partners.

The explorative projects on the operational level of the alliance were typically staffed by project members from both organizations, with each organization carrying the costs of its staff. In Eurotel, an internal consulting unit was often used to staff the projects, which made it easy to switch these projects from cost-sharing to product development paid by the bank, since this only entailed a change of who paid the consultants their fees. Eurobank staffed the projects with resources from its central units for business development and IT, as well as with local bank managers.

The work-climate during the explorative projects was described as open and the information flow as rather free between the members of the partnering organizations. Project members were typically located at a single site in order to maximize interaction and communication opportunities. The open climate of the projects was attributed to the open atmosphere on the strategic level, where learning and exploration were explicitly in focus. Potential conflicts of interest and approaching disputes could easily be escalated for resolution to the intermediate and strategic levels as there was a quick and informal channel of communication between the projects on the operational level and the intermediate level of the alliance. Most conflicts arose when an innovation had proved both its technical and commercial viability and product development was about to start. The terms and conditions of the project then had to be renegotiated by the partners. These renegotiations were seldom problematic in cases where the business concept was clear in the sense that the planned product and customer relationship could be clearly attributed to one partner. When this could not easily be done, the question was placed on hold but could, in most cases, eventually be resolved.

## The intermediate level — the alliance secretariat

The alliance secretariat together with two alliance managers linking the operational level of the alliance with the strategic level represent the intermediate level of the alliance. The alliance secretariat was staffed by one experienced senior manager from each partner, working full-time for the alliance during the first four years and half time during the last two. The members of the alliance secretariat worked in close collaboration with the two alliance managers — one from each partner — who were part of the corporations' top management. The alliance managers both held the position of Vice President of Business Development when the alliance commenced and continued as alliance managers even after their positions had changed. They were strongly committed to the alliance personally.

The role of the intermediate level of the alliance management structure was to create arenas for the generation of new ideas, which could become new projects, and to oversee and support existing projects. The idea generation arenas could be workshops involving the two partners and workshops involving the partners and important customers of both corporations. Another type of arena was the learning tours that the intermediate level organized for the strategic level (the top management teams of the partners) each year. These learning tours repeatedly headed for the US, Japan and destinations in Europe. During these tours, the strategic level was confronted by leading thinkers, entrepreneurs and examples of new applications.

In overseeing and supporting the explorative projects of the alliance, the intermediate level made extensive use of its profound understanding of the organizational structures of both organizations. Even if there were similarities between the partners as regards size, geographical distribution, target markets and culture, there were great differences in the way they were managed. Eurobank was highly centralized, with all its business and product development resources close at hand, in both organizational and geographical terms. Eurotel, on the other hand, was highly decentralized, with its business and product development resources spread across independent and geographically distributed business units. Both corporations were puzzled by the way in which decisions were made by the other. Here the intermediate level had an important role to play in bridging the different organizational routines of the companies.

The intermediate level was also of central importance in creating an understanding, on the operational level, of the content of top management's psychological contract for guiding the alliance. Furthermore, intermediate level managers were involved in convincing people within their own organization to adjust their agendas in favor of alliance projects. In many situations, the intermediate level was highly involved in supporting managers of explorative projects when navigating the complex political terrain and ensuring resource

allocation for their projects. The individuals on the intermediate level had developed a lot of confidence in each other, as well as an atmosphere of trust in which they could share almost all kinds of information.

## The strategic level — the top management team

The alliance between Eurobank and Eurotel had been initiated at the very top management level. Brought together by a joint management consultant, the CEOs of the two partner organizations realized that their organizations might be facing similar challenges posed by technological advances in IT and telecommunications. The main purpose of the alliance on the strategic level was, consequently, the exploration of these upcoming opportunities, i.e. learning more about what these developments could mean for the two partner organizations.

Against this background, top management, represented by the partner organizations' management teams, was highly involved in the alliance, taking part in learning tours and workshops, and actively monitoring the explorative projects. The purpose of the learning tours was to provide the group of senior executives from both companies with an opportunity to learn about new trends. The tours had an intensive program, which included visits to companies at the cutting-edge of IT and financial services. An example of an insight arising from these tours was the early identification of the huge consequences of the Internet for both organizations. These learning tours were highly appreciated by top management as personal development, being important for maintaining top management's attention to the alliance:

> "The most interesting part [of the alliance] was the learning tours we did
> together, and the work related to them" (VP Eurobank)"

The explorative projects, together with the learning tours, helped the strategic level to build a shared understanding which facilitated decisions concerning the direction of single projects and the alliance as a whole. The strong commitment to the alliance on the strategic level was well known within the organizations and supported the building of trustful relations throughout the alliance, creating a positive innovation climate.

The alliance was formally evaluated by the two partners in 1999. The evaluation indicated that the alliance had created large assets for both companies. The main asset for Eurobank was increased IT development expertise, especially in Internet-banking, while Eurotel had significantly increased its sales volume to Eurobank. The alliance had also produced some significant products such as an Internet bank and an e-billing system that would give the partner organizations strategic advantages in these specific areas for several years.

# DISCUSSION

The above-described explorative alliance between Eurobank and Eurotel was successful, despite the potential difficulties originating in the differences between an innovation logic and an alliance logic discussed earlier in this paper. In what follows, we will discuss how this success may be understood, and how the central challenges facing alliances for innovation were dealt with in the case. We will focus especially on the structural configuration of the alliance, as this has been identified as a way of dissolving the paradox between the logic of innovation and the logic of alliances (see e.g. Bidault and Cummings 1994; Koza and Lewin 1998).

## Enabling flexibility

A first challenge identified in relation to innovation in an alliance context concerns the creation of an alliance contract that allows sufficient flexibility. As both costs and outcomes are uncertain, rigorous contractual agreements or equity-based arrangements are seldom possible (see e.g. Millson, Raj et al. 1996; Koza and Lewin 1998; Mauri and McMillan 1999). Rather more flexible forms of collaboration have to be found. In the above case, the alliance was formally regulated by a very simple "letter of understanding" which specified the principle of each party bearing its own costs. However, this kind of agreement was only made possible by the trustful relationship between the partners existing at the highest management level (see also Kim and Wilemon 2002). In the present case, this trustful relationship was linked to a feeling of affinity between the companies which was based on a common history and similar market positions within their respective industries. The trustful relationship between the partnering organizations was further supported by the recurring learning tours for top management. During these tours, a common understanding was developed and trustful personal relationships were formed.

The flexibility of the alliance was further supported by the focus on creating relatively limited projects involving 2-3 representatives from each partner organization in order to explore new product or service ideas. These project teams were located outside the existing organizational structures of the partners, thus freeing them from established, limiting organizational routines (see also Doz 1996), and were given considerable freedom. However, when concepts started to become clearer, enabling a clear assessment of their economic value, the projects would typically be renegotiated and continued under different contractual forms (e.g., buyer supplier, equity j/v, etc.). The trust mentioned above enabled the typically unproblematic handling of these renegotiations.

Rather than putting great efforts into the formulation of a detailed alliance agreement, the Eurobank-Eurotel alliance was thus formed on the basis of

"let's try it and see what happens". A number of initial projects were defined early on as the core of the alliance. Further projects were formulated along the way. The long-term survival of the alliance was largely made dependent on the joint generation of and agreement upon new alliance projects, thus requiring positive effects to be experienced from earlier efforts. Re-evaluation of the alliance thus took place in each decision to start a new, joint project and gave both parties the continual possibility to adapt their engagement in accordance with their present valuation of the collaboration (see also Ring and Van de Ven 1994; Kumar and Nti 1998).

It could be argued that the contract in this alliance was still emerging, starting with a loose contract initiating the governance structure and different explorative projects. Over time, as some projects moved into commercialization and uncertainty was reduced, firmer contractual forms were chosen for these projects. This emerging nature of the contract could be seen as an extension of the adaptive contracts that Doz (1996) and Ariño and Torre (1998) describe as important for the success of alliances.

The multi-level alliance structure in the Bank-Telecom case thus provides an organizational mechanism for creating a stable basis for explorative alliances, while maintaining flexibility and adaptability. Stability — in the sense of providing a stable basis for the alliance — originates from the trust and common understanding that develops among top management during repeated learning tours. Creating a separate learning agenda for top management ensures its commitment to, and its engagement in, the alliance. Flexibility, on the other hand, was achieved on the project level. Limited projects could be started with an explorative intent. Some could then be scaled up to larger collaborations (e.g. the Internet bank) under different contractual forms, while others were discontinued.

This design made it possible to gradually create a stable and, at the same time, flexible foundation for the alliance based on common understanding and commitment at the top management level. However, this layout may not be without risk. As pointed out by Spekman et al. (1998), alliances may be hard to discontinue, even if their economic rationale has disappeared, when they are based on strong interpersonal ties. Although there were no concrete signs of this in this specific alliance, there is a risk that top management's personal learning agenda might keep a commercially inefficient alliance alive.

## Protecting uncertain innovations

A second challenge related to managing innovation in an alliance context concerns the protection of the early phases of the innovation process against being called into question and premature termination. The roles of the product champion and product sponsor are identified, in the innovation literature, as of central importance in protecting vulnerable radical innovations. However, it has also

been argued that the fulfillment of these important roles is much more challenging in an alliance setting than in a single organization setting (Bidault and Cummings 1994).

In the Eurobank – Eurotel case, the intermediate level (the alliance secretariat and the alliance managers) partly fulfilled the central roles of the product champion and sponsor regarding the explorative projects. With its elaborate organizational networks and direct access to top management, the intermediate level of the alliance structure was essential for generating resources for the projects and protecting them from critical assessment during early phases. By making this role a joint one involving managers from both partner organizations, the problem of the champion's and sponsor's limited understanding of and network in the other organization was overcome. The consistent attention of top management, fueled by the recurrent learning tours organized by the intermediate level, also provided the alliance projects with great legitimacy. The learning tours, together with other learning activities, provided the benefits that top management needed to continually prioritize this activity. It also gave top management a deep enough understanding of the field of innovation they were exploring to make them comfortable with the investments and stabilize the decision making process at the top management level. This enabled a more predictable sponsoring of the different projects.

## Enabling open communication

The third challenge related to managing innovation in an alliance context concerns the establishment of open communication between the alliance partners. Open communication, being a widely recognized success factor for radical innovation, is often described in the alliance and partnering literature as a challenge since it involves the risk of losing strategic knowledge and capabilities to a partner. In the Eurotel – Eurobank alliance, communication was generally described as very open on all levels — from the operational level, with its individual projects, to the strategic level, with its recurrent learning tours.

The learning tours may be argued to have had a specific impact in this context. The close collaboration on the strategic level resulted in a psychological contract that contained many of the factors enabling a good innovation climate, e.g. openness, clear motives and collaboration practice (see for instance Wathne, Roos et al. 1996). This psychological contract and involvement by top management legitimized the collaboration on all levels. Furthermore, communication was facilitated by the similar background of the organizations in terms of markets and corporate culture. This made it easier to understand each other on all levels. There was a wide range of communication channels between the two organizations, starting at the very top of the organizations and continuing down to the local level where the two corporations were engaged in joint market

activities concerning innovations. The interactions between the alliance partners were not only broad but deep. The explorative activities were carried out in collaborative groups where different experience from both organizations was brought together in order to create radically new ideas.

## CONCLUSIONS AND MANAGERIAL IMPLICATIONS

Radical innovation provides organizations with great challenges, and it might be argued that some of these challenges could be reduced by engaging in collaborative arrangements such as alliances for innovation. However, the logic of alliances, building on a contractual relationship, is in several ways at odds with the logic of innovation calling for flexibility and trust.

Previous discussions about collaboration in radical innovation, or the early (uncertain) phases of new product development, have emphasized the importance of choosing a suitable alliance structure. Often, high-level structural alternatives are identified and discussed — such as M&A vs. Joint Venture vs. contractual agreements (Millson, Raj et al. 1996). More detailed discussions about different structural arrangements are rare however. The description of the Eurobank – Eurotel alliance aimed to contribute to this neglected area.

Our examination of the Eurobank – Eurotel case confirms the importance of the structural design of an alliance in creating the prerequisites for radical innovation. The three level structure, consisting of an operational level on which explorative projects are carried out, a strategic level, providing legitimacy and support to the alliance, and an intermediate level, supporting the strategic and operational levels as well as linking these, was of central importance to the alliance's success since it allowed flexibility and protection against premature termination and since it managed to overcome the communication barriers that are common in alliances.

From a managerial perspective, the study provides an example of how to organize radical innovation in an alliance setting. It highlights the importance of a managerial platform that holds together different collaborative activities between alliance partners and suggests the use of learning tours as a way of creating this platform. Explorative alliances, it is thus argued, will benefit from the creation of a learning agenda, not only on the operational level but also on the strategic level, giving the alliance a *raison d'être* beyond single successful or failed alliance projects.

Based on our findings regarding the importance of detailed structural arrangements in supporting radical innovations in alliances, we also call for more detailed case studies which may test the generalizability of the Eurobank – Eurotel design, and which may add to our understanding of the management of innovation in alliances by means of further examples of successful (or less successful) structural setups of innovative alliances.

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# PAPER II

Patterns of alignment in alliance structure and innovation

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2005

Technology Analysis & Strategic Management

Forthcoming

***A note to the reader***

The terminology used in this paper differs from the terminology used in the thesis in the sense that instead of discussing communication and coordination in terms of the thickness of the interface, as in the thesis, the paper uses the concept of the closeness of the cooperation. A thick interface is described as close cooperation while a thin interface is described as distant cooperation.

# PATTERNS OF ALIGNMENT IN ALLIANCE STRUCTURE AND INNOVATION

## ABSTRACT

Alliances are becoming an increasingly common strategy for product development despite the intrinsic tension between alliance logic and innovation logic. This paper investigates the development of alliance structures during the exploration phase of the innovation process. Based on a study of five service development alliances in the telecom industry, three patterns are identified by which the alliance structure and the innovation are brought into alignment. Such alignment seems to be a necessary condition for the transition into commercialization. The patterns identified are: 1) Learning about the innovation may trigger changes in the alliance structure; 2) Learning about the innovation may suggest changes in the alliance structure which are impossible to implement, however, thus triggering changes in the innovation; 3) Planning the future alliance structure may suggest changes in the innovation. Based on these patterns, some conclusions and implications are identified, for both theory and practice.

## INTRODUCTION

Alliances are becoming an increasingly common strategy for product development[1]. The drivers of this development include globalization, shorter product lifecycles, escalating R&D costs and economies of scale and scope[2]. Alliances enable firms to handle these challenges by providing access to complementary knowledge and resources, and by sharing investments and risks. Alliances for product development are to an increasing extent being based on non-equity arrangements[3], which will be the focus of this article.

Managing innovation in an alliance context involves a number of managerial challenges that are linked to tensions between an alliance logic and an innovation logic. According to the literature, the alliance logic presupposes a well-defined situation where a clear contract can be agreed upon by the partners before the alliance starts[4] and where communication is limited due to the risk of opportunistic behavior by a partner[5]. In contrast, the innovation logic is based on an evolving concretization, open communication, and the flexibility to adapt to what is learned during the process[6]. The differences between the alliance logic and the innovation logic may create tensions that hamper the innovation process, thereby threatening the benefits provided by alliances[7]. This tension will be more significant during the first explorative phase of the innovation process,

when the level of uncertainty is substantial, than during the subsequent commercialization phase, which contains a more moderate level of uncertainty and thus requires less flexibility.

Studies of the innovation process at individual firms show that the differences between the two phases of the innovation process[8] require different types of organizational structures, as well as a process for managing the difficult transition between these structures[9]. This transition could be even more difficult in an alliance due to a dependency on two strategic and organizational contexts, as well as a reduced ability to adapt to changing requirements due to the recommendation for clear contracts[10]. Several authors[11] argue that alliances are evolving, thus making goals, tasks, and skills part of the exploration process, despite the recommendation for clear alliance contracts[12]. Whether evolution of the alliance will also be allowed to change the structures of the alliance, i.e. the division of tasks and the mechanisms for controlling and integrating them[13], remains unclear. It is, however, plausible that this evolution could include alliance structures since these are guided by coordination costs, appropriation concerns[14] and value creation[15], factors that are all linked to the innovation developed during exploration. Koza and Lewin[16] observe, using March's[17] concept of exploration and exploitation, that managerial challenges differ between alliances that focus on exploration and alliances that focus on exploitation. Alliances aiming to achieve innovations have to embrace both types of activities, including the transition between the two. Exploitation as a term is used to describe a purpose in the alliance literature[18] and to describe the second and final phase in the innovation literature[19]. To avoid unintentional direct mapping between the alliance purpose of "exploitation", which is not limited to activities during a late innovation phase, and the second phase of the innovation process, the latter will here be referred to as the commercialization phase.

Against this background, the purpose of this article is to explore the development of alliance structures during the early phases of the innovation process preceding the commercialization phase. The development of alliance structures has only received limited attention in the literature. Sividas and Dwyer[20] investigated the importance of different factors for cooperative competency, a factor argued to be linked to the success of innovations developed by alliances. They found that cooperative competency was enhanced by a shared vision of the goals, by mutual dependency between the partners, by institutional support, and by the collaboration being based on each organization's core competencies. Sividas and Dwyer recognized that, in addition to the static view presented in their article, a dynamic view of cooperative competency would be important. The dynamic view is central to Doz's[21] study of the evolution of strategic alliances focusing on new business or product development. The article analyzes conditions that foster or block inter-partner learning and presents a

model for alliance evolution, which will be used in this article. While Doz's article discusses, in an exemplary way, the evolution of alliances in general, it does not cover the linkage between the alliance and the innovation process.

In this article, five service innovation alliances are studied and the development of the alliance structures over time is analyzed. The outline of the paper is as follows. First, a framework is proposed for the study and the analysis. This is followed by a description of the method and the empirical cases. The cases are discussed prior to the conclusions and managerial implications being presented. It is argued that there is an interdependency between the alliance structure and the innovation, leading to a need for content-specific alliance models. It was identified that the innovation could be dependent on the alliance structure, an observation that reveals the importance of modularization and a potential need to distinguish between populations where technology is used in a modular way and populations where technology is used in an integral way when conducting research into alliance management.

## THEORETICAL FRAMING

To facilitate this study of the alliance structure and its evolution over time in alliances for innovation, a conceptual framework is developed using theories from both the alliance and the innovation literature.

The design of alliance structures is, according to Gulati and Singh[22], guided by anticipated coordination costs and expected appropriation concerns. Coordination costs are associated with the complexity created by decomposing and allocating tasks between the partners, together with the ongoing coordination of activities to be completed across organizational boundaries and the related communication and decisions needed. Coordination costs are thus affected by the way that the activities are structured and the character of the task, in this case the innovation. Appropriation concerns relate to the valuation and distribution of the value created within the alliance, e.g. anticipated future revenues, as well as the contributions that have to be made by the partners. Both coordination costs and the appropriation must be balanced in such a way that the alliance creates enough value for each partner to offset the partners' contributions[23].

The structural aspects determining coordination costs and appropriation concerns in non-equity alliances focusing on innovation include the partners' relative positions to the market, the extent to which the partners have envisioned shared revenues, the closeness of the cooperation and the architecture of the innovation. In addition, the phase of the innovation process affects the coordination requirement.

Dussauge and Garrette[24] use the partners' relative positions to the market in order to classify alliances as either *horizontal* or *vertical.* If both partners target the same markets, the alliance will be horizontal. If, however, one partner acts as a supplier to the other, who in turn delivers to the market, the alliance will be vertical. In a horizontal alliance where the partners are in the same industry and deliver to the same market, there could be a competitive situation between the partners, greatly increasing the challenges of coordination and appropriation, and even threatening the survival of the alliance[25]. A horizontal alliance between competitors will entail more suspicion regarding opportunistic behavior than will a vertical alliance, due to the intrinsic feature of ambiguity in the relationship involving rivalry and cooperation[26]. Opportunistic behavior could decrease the value-creation potential, i.e. hamper the innovation process and increase coordination costs through the need for more formalized cooperation[27]. Trust is argued to be one important feature of the cooperation which could reduce the risk of opportunistic behavior[28]. Trust supports open communication, which is also important during the innovation process[29].

One way of building trust within alliances is by close cooperation. Henderson and Clark[30] describe the cooperation occurring in an innovation context as all the linkages between different workgroups and the communication channels, information filters and repertoires of problem-solving strategies that are used in these linkages. *Close cooperation* is characterized by frequent and intensive communication between actors on different organizational levels, few information filters, and a broad repertoire of problem-solving strategies. Close cooperation is often connected with learning, which is a prerequisite for innovation[31]. *Distant cooperation*, analogously, involves few actors with a limited repertoire of problem-solving strategies, where communication is infrequent and non-intensive, thus creating an atmosphere in which learning is more limited.

The ease of coordination and appropriation during the joint innovation process may be further influenced by the degree to which the alliance partners have joint goals[32]. In this article, the joint goals in focus will be the *extent to which the partners have envisioned shared revenues.* When partners aim at a *high degree* of shared revenues, they will share all revenues from the innovation in accordance with a predefined formula. A *medium degree* is exemplified by the partners selling complementary parts of the innovation on the market, or parts of the innovation being licensed by one partner to the other. A *low degree* of shared revenues occurs when both partners sell the innovation on the same market in competition with each other. The lower the degree of shared revenues, the greater will be the perceived risk of opportunistic behavior, possibly hindering the close and open cooperation which is important during the exploration phase of the innovation process.

In addition to the partners' positions relative to the market, the closeness of their cooperation, and their sharing of goals, Sanchez and Mahoney[33] argue that the degree to which the innovation has been given a modular architecture during the early exploration phase is an important determinant of the coordination requirement during the subsequent innovation process. An innovation with a modular architecture, in contrast to an integral architecture, entails lower coordination costs due to the intrinsic coordination of the architecture. Modularization also supports the appropriation occurring between the partners by linking benefits and contributions to individual modules; modules which could be connected to either of the partners. In an innovation with a *modular architecture*, the modules have a low interdependency through being separated by well-specified interfaces. Changes within one module will not affect the other modules in a modular architecture, as long as the interface is unchanged. In an *integral architecture*, the number of interdependencies between the modules is high, reducing the decomposability. Thus, it is not possible to change one part of the innovation without affecting other parts of the innovation.

The coordination requirement during the innovation process will vary as the innovation advances from idea to commercial launch. The innovation process is often conceptualized as consisting of two principal phases, whereby the first phase could be characterized as explorative and the second phase as more exploitative[34]. The *exploration* phase starts with the recognition of a technical opportunity or market potential. These possibilities are transformed into a design concept that is gradually refined into a detailed product or service concept. At the end of the exploration phase, the architecture of the innovation has become clear and the critical aspects of the modules have been tested. During the exploration phase, increased understanding is created of the innovation and its commercial potential, with many ideas being abandoned. The exploration phase may thus be described as a funnel wherein the number of ideas is gradually reduced[35]. Gradual reduction of the ideas in the funnel may also result in the termination of the alliance, if the increased level of understanding calls the innovation into question, i.e. the reason for the cooperation's existence in the first place.

The exploration phase is followed by the *commercialization* phase during which the concept designed during the exploration phase is commercially developed and brought to a larger market. This second phase of the innovation process is characterized by less uncertainty than during the exploration phase. The main challenges of the commercialization phase include the forecasting of market demand and the implementation of the innovation as regards large-scale operations. Flexibility is central to the exploration phase, whereas the focus during the commercialization phase is more on stability in order to facilitate implementation of the (at that stage) rather well-understood innovation in all business processes. The difficulties of making plans during the exploration phase and the

need for flexibility require substantial coordination between the partners during this phase. The relatively higher level of stability during the commercialization phase supports firmer plans and reduces the need for coordination.

The transition between the two sets of requirements is challenging even when the innovation takes place within one organization, and the different requirements vis-à-vis the organizational structures during the two phases often lead to a change of structures, e.g. the role structure[36]. At most firms, the transition involves an active decision regarding the continued funding of the innovation based on some kind of evaluation[37]. A dependency on two strategic and organizational contexts, such as within an alliance, makes the transition even more complex, especially since alliances are recommended to have clear contracts[38], potentially making it difficult to act on the learning that takes place during exploration. This learning could change the partners' perception of what would be an acceptable way of resolving issues of coordination and appropriation, thus calling for changes to the agreements. Some scholarly writing concerning alliances recommends that alliances are not created before the uncertainty is low enough to allow the creation of stable structures[39] which, in the case of innovation, would imply waiting until the start of the commercialization phase before forming alliances. Even if alliances appear to exist during an exploration phase, knowledge of practical management is less developed in the case of the exploration phase than it is in the case of the commercialization phase[40].

The consequences of the different choices of alliance structures during the exploration phase are discussed in this article in terms of the ability of the innovation project to advance to the commercialization phase. In the cases studied, stage gate models similar to those described by Cooper et al[41] were used during the innovation process. In these models, the transition is considered to take place after a business case has been developed for the product/service concept, but before commercial development starts, i.e. gate three of a five-stage model[42]. Even if this is not a guarantee of successful innovation, it is still an indication that those who are close to the innovation project, and have to evaluate it, have made the assessment that the innovation is expected to have a good potential for success and that both partners consider the alliance a suitable vehicle for commercializing the innovation. A performance measure based on the innovation's profitability, market share, etc., is considered to have a weak causality with the alliance structures during the exploration phase since the success of the final innovation would not be able to be evaluated until several years after the innovation had been launched. An alternative performance measure is whether or not the innovation project meets its time, cost and quality goals. This performance measure is also rejected since it depends on the ability to set relevant goals, which is difficult in an explorative endeavor. Moreover, there is no guarantee that the innovation is expected to be a successful one or

that it will be allowed to be commercialized even if the time, cost, and quality goals of the innovation project during its exploration phase are met.

In what follows, the factors identified above – i.e. the partners' positions relative to the market, the degree to which the partners have envisioned shared revenues, the closeness of the cooperation, and the architecture of the innovation - will be studied within five alliances with the focus on their development over time, as the innovation advances from exploration to commercialization. A graphical representation of the framework is presented in Figure 1.
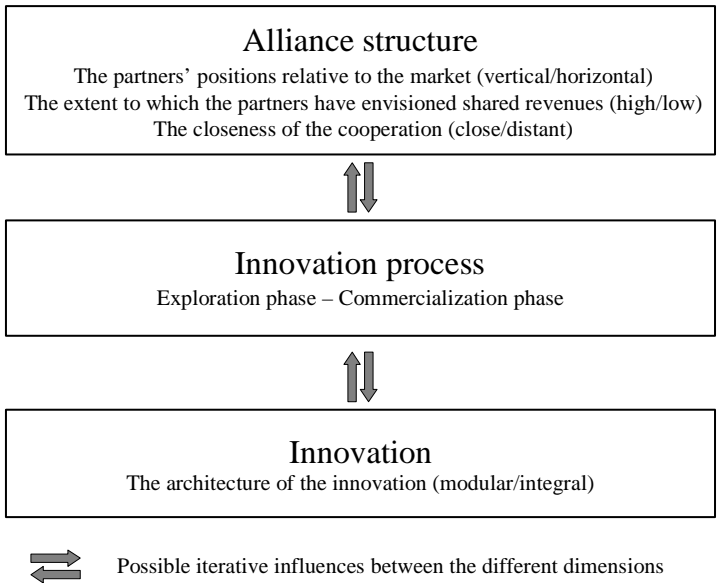


Figure 1: A graphical representation of the research model.

## METHOD

The cases selected are characterized by some common properties in their organizational structure, as well as the technology used, in order to reduce the number of contingency factors affecting the alliance structure[43] that differs between the cases. Thus, all the alliances studied are non-equity alliances and have one partner in common. The technology is represented here by the newness of the innovation and the type of technology. Using Garcia and Calantone's nomenclature[44], the innovations could be characterized as "really new innovations", i.e. requiring that either the market or the technology is new to the industry. The technology basis for the innovations is software application technology.

Within these limitations to the characteristics of the cases, a corporation has been selected on the basis of access, while the individual cases have been selected on the basis of creating variety as regards consumer and industrial innovations. The corporation selected is an incumbent northern European telecom operator. The empirical basis for the five cases is presented in Table 1. The innovation is the unit of analysis used in each of the cases.

| | Cellphone position | Internet bank | E-billing | Fleet management | Unified messaging |
|---|---|---|---|---|---|
| Innovation | Service to locate cellphones | Financial transactions from home using the Internet | Substitution of the sending of bills with mail sent by electronic means | Information-wise integrating of trucks with their command centers | Integrating telephony, voice messaging and e-mail into a single communication hub |
| Partners | Telecom corporation<br><br>Telecom operator | Bank<br><br>Telecom operator | Bank<br><br>Telecom operator | Haulage contractors' association<br>Telecom operator | IT corporation<br><br>Telecom operator |
| Period | 2000-2002 | 1995-1997 | 1996-1999 | 2002-2003 | 2002-2003 |
| Information sources | 3 Interviews | 5 Interviews Various internal material Public material | 7 Interviews Various internal material | 3 Interviews Various internal material | 5 Interviews Various internal material |

Table 1: Overview of the empirical data

The general market situation differs from case to case. Two of the cases started just before the boom in the software industry at the end of the 1990s. The other three cases started some years later when large parts of the IT and telecom industries were more or less in recession.

To get a detailed picture of the alliances and the innovation process, both written material and interview data were collected. Between three and seven interviews were conducted for each case. The people interviewed came from both partners and were either part of the steering committees of the different alliances or project managers. The interviews were semi-structured and covered the process, the structural design, the outcome of the innovation process, and important issues and incidents occurring during the early phases of the innovation process. Twenty-one face-to-face interviews and two telephone interviews were conducted. The face-to-face interviews ranged between 40 minutes and two and a half hours and were recorded and transcribed. The telephone interviews ranged between 40 minutes and one hour and detailed notes were taken which were written up after the interviews. The interviews were conducted between November 2001 and February 2004. The written material consists of internal material, e.g. presentations and protocols, and public material,

e.g. press releases. The final case descriptions and the central findings have been validated by the key informants of the different cases.

For the purposes of protecting the information sources, the organizations will remain anonymous.

## FIVE ALLIANCE-DRIVEN INNOVATIONS

In this section, the exploration phase of five innovation projects being carried out within alliances is presented. The first two cases advanced, via exploration, to commercialization rather directly, the next two cases advanced to commercialization, but with the scope of the cooperation reduced, while the fifth case was terminated prior to commercialization. An overview of the five cases, in relation to the structural dimensions discussed in the framework, is presented in Table 2. This is followed by a description of each case.

| | Cellphone positioning | Internet banking | E-billing | Fleet management | Unified messaging |
|---|---|---|---|---|---|
| Partners' position relative to market | Vertical / Vertical | Horizontal / Vertical | Horizontal / Vertical | Horizontal / Horizontal | Horizontal / -- |
| Extent to which the partners have envisioned shared revenues | High / Medium | Medium / Medium | Medium / Low | Medium / Medium | Medium / -- |
| Character of cooperation | Close cooperation / Close cooperation | Close cooperation / Close cooperation | Close cooperation / Distant cooperation | Close cooperation / Distant cooperation | Careful cooperation / -- |
| Architecture of innovation | Modular | Modular | Modular | Integral | Integral |
| Unexpected discoveries during exploration | A different market concept | A different technology concept | A different market concept | Integral technology concept | Integral technology concept |
| Changes as a consequence of discovery | Market concept in line with discovery Revised model for revenue sharing | Technology concept in line with discovery Revised alliance structure from horizontal to vertical | Market concept partly in line with the discovery. Revised alliance structure from horizontal to vertical. | Some parts of the innovation were launched and some remained a concept for system integrators | Alliance dissolved due to unclear alliance structure for subsequent phases |

Table 2: An overview of the structural dimensions described in the framework for the different innovations. In the diagonally-split cells, the upper part describes the situation at the start of the exploration of the innovation while the lower part describes the situation upon commercialization.

## Cellphone positioning

Cellphone positioning is a service which locates cellphones and which could be used for various purposes such as finding out where your friends are (or at least their cellphones). This service was developed as a result of collaboration between a telecom product company and a telecom operator. This cooperation started off as a vertical alliance with a predefined model for sharing revenues. The telecom operator contributed the service design and the necessary processes for sales and the operation of the service. The telecom product company contributed the application platform and the technical design. The level of cooperation was close, which was argued to be a consequence of the shared revenue goal.

> "What is valuable [as regards revenue–sharing] is the different kind of commitment you get, suddenly there are incentives for the supplier to take part in a completely different way", product manager of telecom operator.

Exploration of the design of the innovation revealed that the service would commercially benefit from being bundled with other services, instead of being a stand-alone service. There was no significant technical challenge in this bundling since the service modules could be recombined with other services without any major effort. The foundation for the cooperation, the revenue-sharing model, would no longer be applicable, however, since there would no longer be any separately measurable revenue streams for the service. Instead, the revenues would become an inseparable part of the revenues of the bundled services. The model was founded on the implicit assumption that the innovation would be a stand-alone service. To advance to commercialization, the structure had to be renegotiated in order to eliminate the shared revenue concept. This renegotiation took some time as the switch from revenue sharing to a buyer-supplier model would entail both pros and cons for the partners, e.g. a higher level of investment for the telecom operator. Renegotiations resulted in the alliance changing into a buyer-supplier relationship without any direct revenue sharing. This redesign was obviously considered to be better than launching a stand-alone service where the revenues would be lower, but still measurable.

> "...we have jointly learned that it is difficult to have revenue sharing, since new applications appear and it is difficult to have the same kind of business model for all applications of the service, especially as regards the business applications", manager of telecom corporation

So, even though the design of the structure had been elaborated, exploration had created new knowledge that made it necessary to renegotiate the structure before commercializing the service.

## Internet bank

An Internet bank was developed as a result of the concept of carrying out financial transactions from home by means of electronic communication with the bank. This innovation was developed as a result of cooperation between a regional bank and a telecom operator based on the conclusion that this type of concept would require both financial services and communication products in order to move the bank to the home virtually. The exploration was governed by a loose contract whereby both partners were responsible for their own costs, which was considered reasonable since both partners would obtain their own revenue streams from the innovation, i.e. the bank from the financial services that would be needed and the telecom operator from the software and hardware that would be needed by consumers. A joint project group developed a concept, that included "mockups", which was discussed with the top management of the partners at two workshops. A decision was made to continue the process and evaluate how the different modules would be realized. During this evaluation, a new technology concept for application at customers' premises was identified in the web technology. The original idea was to use a standard PC home finances program as the base for the consumer application and then add the ability to send requests for transactions via a modem to a central application server connected to the banking system. The advantage of using the web technology was that future functionality enhancements (and bug fixes) would not require any software distribution, thereby making maintenance of the entire system much easier. The switch to web technology deprived the telecom operator of the revenues raised from delivering the software needed for the innovation to consumers since it would then only be necessary to have standard equipment at consumers' premises. This was an easily accepted loss since the revenues raised by the telecom operator from the connection time for data communication via the telephone network, between the consumer and the bank, would increase substantially in relation to the original idea. This change of user interface also altered the commercial relationship between the two partners. When the individual consumer's need for software and hardware disappeared, the alliance logically switched from being a horizontal alliance to a vertical one, during the commercialization phase, with the telecom operator becoming the supplier of integration and communication services to the bank.

## E-billing

The e-billing service was born out of a vision to replace the mail-based delivery of bills with their electronic equivalents, thus reducing expensive postage costs and administration. The two partners, a European bank and a telecom operator, both wanted to make their own operations more efficient and create a service that could be sold on the market. The market concept was rather vague in the

beginning; although the need for a large customer base was recognized as important in order to obtain economies of scale, which were necessary for this type of infrastructural investment. By targeting the combined customer base of the two corporations, a sufficiently large volume was expected. The concept involved several different challenges that had to be resolved and an exploration was initiated on condition that the costs were shared between the partners.

The exploration started off with a joint investigation of the different technical opportunities for obtaining broad utilization of the innovation. A concept was developed that involved modules for the firm issuing the bills, the bank, the consumer, and the clearing house, etc. The concept became the basis for a market test which enjoyed the overwhelming acceptance of the consumers. Although the technical concept was clear, the business concept had evolved at a later stage and had not become clear until the market test had been conducted. The initial image of a consumer service had changed into a business service, with consumers having the role of users. This changed the relationship between the two companies. Instead of being a horizontal alliance between two companies in different industries, it had now become more of a horizontal alliance between two competing companies within the same industry, which was also reflected in a gradually more distant cooperation. The partners saw two alternatives for continuation; creating an equity-based joint venture or each partner continuing with the innovation alone.

> "I think that we could have selected e-billing as a joint area [equity joint venture] …. but we fought about the business logic so, in the end, we thought of ousting the Telecom operator from the concept." VP of Bank

Neither of the alternatives was acceptable to the partners and the cooperation was distant for a long time, resulting in slow progress for the innovation. After a year, agreement was reached regarding the commercialization whereby the telecom operator would supply the bank with communication modules and integration services while the bank would supply the telecom operator with the financial modules. In other words, the horizontal alliance changed into a bi-directional vertical cooperation. Instead of operating some modules jointly, the solution was more a case of having a joint architecture, operating the different modules individually. By means of this redesigning of the innovation, and of the alliance, the potentially competitive situation was eliminated. The reason that the cooperation survived this long transition period, before a suitable model for continued cooperation was found, was probably a combination of the need for each other's competence in order to make the innovation possible, the potential for both enhanced internal efficiency and new revenues, and, finally, very good relations on the executive level.

## Fleet management

In cooperation with a haulage contractors' association and a lead user, the telecom operator developed a "fleet management" concept by adding an application to the trucks that were connected, through an adapted mobile data communication network, to the existing information systems at the haulage contractors' command centers. The expected gains arising from fleet management were quicker and more accurate invoicing, easier processing of transport documentation, and the more efficient dispatching of orders to the trucks. The cooperation was based on the assumption that each partner would be responsible for his or her own costs. The final innovation would then be offered to the members of the haulage contractors' association at a reduced rate. For this reason, the alliance between the haulage contractors' association and the telecom operator could be argued to be a horizontal alliance whereby the haulage contractors' association got its revenues from the haulage contractors' fees and the telecom operator from the different haulage contractors.

A test installation for the lead user, a haulage contractor's fleet of trucks, showed that the expected gains were achievable. The initial assumption that the innovation could be delivered to other haulage contractors simply by reconfiguring the innovation turned out to be wrong, however. Complex integration and adaptation of the innovation was necessary for each new customer, which would also need to involve different IT consultants for different customers.

> "If the interfaces had only complied with some kind of XML standard [a standard for computer communication], it would have been possible to extend the same offering to a number of customers", manager of telecom operator.

As a consequence, the alliance could not continue on course toward commercialization. The cost of integration and adaptation reduced the potential market by excluding smaller haulage contractors. Upon commercialization, the functionality of the telecom operator's product was reduced to a level where it was possible to make a standardized offering to haulage contractors. The extra functionality needed for the innovation could then be added by the haulage contractors' IT consultants, without involving the telecom operator. By using this strategy, no deep-level cooperation was necessary between the telecom operator and the different haulage contractors' IT consultants, and the initial alliance constellation could continue. The decreased level of functionality reduced the need for cooperation between the partners during the commercialization phase. Later on, new versions of the communication platform used by the telecom operator increased the level of functionality and reduced the integration challenge by enabling better separation between the different parts of the application.

## Unified messaging

The purpose of this service is to integrate different communication channels, e.g. telephony, voice messaging, and e-mail, into a kind of communication hub for the purchasers of the service. This communication hub would provide both the corporations and their employees with the possibility of configuring policies and personal preferences concerning how to handle communication with customers and colleagues. To make this idea possible to implement, an alliance between a global IT corporation and the telecom operator was created. The basis for this cooperation was the telecom operator's experience of its users' reactions to different kinds of unified messaging services and the IT corporations' experience of systems integration. The innovation would require customers to buy different elements from the two partners, thus making the cooperation horizontal.

The cooperation started on a small scale, gradually increasing with a balanced flow of information being exchanged via what might be described as the gradual building up of confidence in each other. A basic concept was developed and various crucial aspects were explored. An initiative by the IT corporation to formalize the exploration phase, including a test conducted jointly with a lead customer, resulted in an early evaluation of the cooperation and the innovation. Although the sponsors of the project at the telecom operator accepted the alliance and the innovation on the abstract level, they were concerned about how the cooperation would look in the subsequent commercialization phase. At this stage, the innovation had no concrete modularization that could provide a tentative idea of which part of the innovation naturally belonged to each partner and which could form the basis for the alliance's structure. Without any idea of the alliance's structure during the commercialization phase, the telecom operator decided that it would not continue with the exploration, even though the innovation looked promising, since future costs and appropriation within the alliance were too uncertain. The cooperation did not receive any further funding and thus faded away.

## ALLIANCE STRUCTURES IN AN INNOVATION PROCESS

The above-described cases of alliance-driven innovation show successful as well as less successful outcomes. In what follows, these outcomes will be related to the structural development of the alliance, while the mechanisms contributing to this development will be analyzed. The discussion consists of three parts. This introductory part compares the similarities and differences of the five cases with regard to the alliance structures, both at the beginning of the exploration phase and at the beginning of the commercialization phase. The next part depicts three patterns for the changes by which alignment is achieved between

alliance structures and the innovation during the exploration phase. The last part relates these patterns to both alliance and innovation theory and discusses the possible implications for theory.

The dimensions identified in the framework have been used to identify both the processes and the patterns of change of the alliance structures. Events that have caused any of these dimensions to change are identified and the associated patterns of change are outlined. There is no intention in this study to establish causality between these dimensions, it is more a case of identifying patterns in the development of alliance structures that could be tested in future multi-sample studies.

At the beginning of exploration, the five cases displayed some similarities and differences concerning the extent to which the partners had envisioned shared revenues, the partners' position relative to the market, and the closeness of the cooperation (see Table 2). All the alliances had envisioned shared reve-nues, four out of five alliances enjoyed close cooperation, with the fifth being more cautious, and all but one of the alliances were horizontal. Upon transition from the exploration phase to the commercialization phase, one or more of the various dimensions of alliance structures had changed in all the alliances that were proceeding. Of the alliances that were proceeding to commercialization, the extent to which the partners envisioned shared revenues had decreased in two alliances while two alliances had switched from horizontal to vertical, result-ing in three out of four being vertical. The closeness of the cooperation decreased in e-billing because of suspicions arising from a competitive situation, as well as in fleet management as a result of the decreased level of functionality, reducing the need for cooperation.

Three patterns can be identified in these changes to the alliance structures and these will be described next.

## Three patterns of alignment

When plotting the changes to the alliance structures on a timeline, together with the triggers of these changes, three patterns were identified regarding the devel-opment of alliance structures between the start of the exploration and the start of commercialization (see Figure 2).
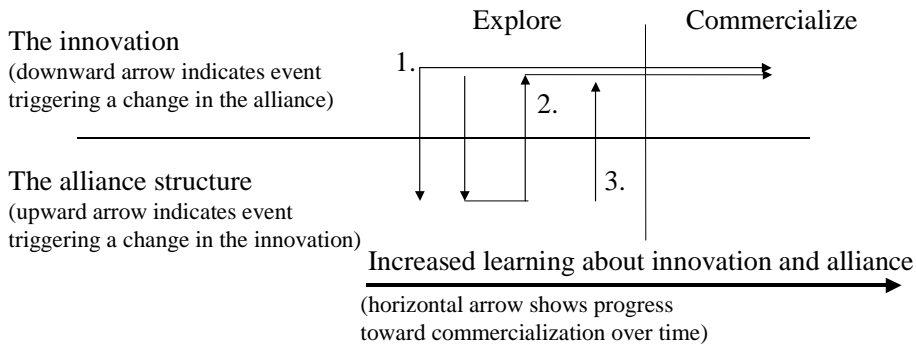
Figure 2: Three patterns for the development of alliance structures during the exploration phase of the innovation process.

These three patterns differ in the way in which the alliance structure and the innovation interact with each other. In the first pattern, the alliance structure was guided by the design of the innovation. In the second pattern, the design of the innovation was adapted to the structure of the alliance. The third pattern was a variant of the second pattern, but differed in that the initiative for alignment between the innovation and the alliance structure arose from the partners' concerns about the future alliance structure and not from exploration of the innovation, as in the first two patterns. In other words, the initiative originated from the development of the alliance instead of the innovation process.

In the *first pattern*, findings made during exploration of the innovation came to suggest a different alliance structure for the commercialization. The alliance structure was changed in a way that would support the suggested concept of the innovation, a concept that reflected what was expected to be the maximum value creation potential of the innovation. Both the cellphone positioning and the Internet bank followed this pattern. In the cellphone positioning, changing to a better market concept would only be possible if the shared revenue model was abandoned in favor of a model where a license was sold. The change was not without problems since there were pros and cons for the partners with both models, although they finally agreed to the change. As regards the Internet bank, the change in the technical concept from a proprietary client program to an Internet solution made the horizontal alliance structure inapplicable since there was no longer a two-part innovation to deliver to the market. The alliance changed into a vertical one seemingly painlessly. This smooth transition was probably as a consequence of both partners gaining; there were no drawbacks for either of them.

The *second pattern* started in a similar way to the first, with a finding during the exploration of the innovation which came to pre-require a changed alliance structure for commercialization. In contrast to the first pattern, the alliance structure was not changed in the way suggested to enable implementation of the

innovation concept. For some reason, the suggested alliance structure was not acceptable to both partners, so instead the innovation was changed in order to fit an acceptable alliance structure. E-billing is an example of this second pattern. The partners perceived that the suggested innovation concept would either pre-require an equity-based joint venture to be formed, or each partner to continue alone with the innovation. Neither of these alternatives was chosen. Instead, the innovation had to be adapted to fit a noncompetitive, non-equity alliance structure. The architecture of the innovation was flexible enough to be reconfigured to adapt to this restriction. Maximization of the value creation potential of the innovation had to give way to an acceptable compromise between the alliance structure and the innovation.

A variation of the second pattern is fleet management where the innovation challenged the partner constellation, thus rendering structural changes of the alliance insufficient. The integral design of the innovation required each customer's preferred IT consultant to be involved in deliveries. A change in the structure of the alliance would not have been sufficient in this case; the constellation of the partners had to be changed. Faced with this situation, the innovation was adapted to the alliance structure, which meant functionality scaling that required another alliance constellation.

In the *third pattern*, the initiative for interaction between innovation and the alliance structure originated from the partners' considerations regarding the future alliance structure, which resulted in demands being placed on the innovation. This could be contrasted with the first two patterns where the initiative for interaction came from findings made during exploration of the innovation. In unified messaging, future costs and benefits were a major concern early on in the process, requiring an early indication of the alliance structure of the commercialization. There were no major concerns regarding the feasibility of realizing the innovation, but it was unclear what parts could be developed independently by either of the partners, as well as what parts would have to be developed jointly. A lack of modularization made it difficult to see how commercial development could be divided up between the partners, with the result that it was also difficult to envision the future alliance structure. The uncertainty of the future alliance structure, which also made future costs and appropriation uncertain, forced one partner to withdraw from the alliance before the exploration had come to an end.

The first two patterns illustrate a dependency between the innovation and the planned alliance structure for commercialization. The dependency could, as in the first pattern, be directed from the innovation to the alliance, i.e. the alliance would have to adapt to the innovation, or it could also, as in the second pattern, be directed from the alliance to the innovation. Baldwin and Clark[45] have argued that the detailed design of an innovation and the task structure of the innovation process are linked and that the physical and logical constraints of the

innovation affect the task structure of the innovation process in deep and unavoidable ways. They leave open whether or not the detailed task structure will be reflected in the organization, since the latter is also affected by other factors. This study contributes by showing that the linkage between the innovation and the innovation tasks which Baldwin and Clark identified on a detailed design level of the innovation, could also exist on an organizational level, e.g. between the innovation and the alliance structure. The second pattern illustrates that the opposite direction of the dependency, from organization through tasks to the design of the innovation, is possible. This dependency from organization to innovation is of particular interest since the traditional wisdom, based on Woodward[46], holds that the organizational structure is dependent on the technology.

## An intertwined alliance and innovation process

The dependencies between the structure of the alliance and the innovation warrant a discussion about what this implies for the linkages between the alliance process and the innovation process. Traditionally, the evolution of alliances has been described as a sequential process consisting of various stages, e.g. exploring relationships, forming alliances, expanding cooperation, and termination[47]. More recently, the sequential model has been complemented by circular models that depict evolution as a continual process of learning, reevaluation, and changed conditions[48]. The innovation process during exploration could be described as a parallel exploration of market and technology; an exploration that coalesces into a business concept, which is the last activity prior to the decision regarding whether or not to enter the commercialization phase[49]. Refinements of these models, based on the cases, will be discussed next.

In relation to the sequential alliance model, the three discovered patterns challenge what the sequential models recommend as a starting point for alliances. These models recommend that alliances start when the partners know enough about each other, as well as about the joint project, to create stable structures. All patterns started at a time when neither partner knew enough about the joint project, the innovation, to create stable structures for the alliance. The first two patterns showed that it is possible to advance into commercialization even though one of the fundamental principles of an alliance, e.g. appropriation, has changed as a result of the exploration. These observations entail several consequences for the sequential alliance models. The first conclusion is that the sequential models are right in the respect that it seems difficult to create stable structures early on in the process. The second conclusion is that alliances could be started long before stable structures can be created, and this lack of long-term stability in the alliance structures does not necessarily threaten the alliance's survival. The third and final conclusion is that stable structures

may not even be desirable if the consequence is a lack of adaptation to increased understanding of the innovation during exploration. If the long-term structures created in cellphone positioning had not been changed, the innovation would have had a significantly lower market potential.

The circular models of alliance evolution are more open to adaptations of the alliance to the learning that takes place during exploration and are therefore conceptually in line with the patterns identified. Some of the mechanisms that trigger reevaluations during the learning loops described in these models could be identified in the empirical data. It could be seen that once exploration of the innovation had been completed, the alliance partners seemed to reevaluate the alliance before making the transition to commercialization. Different findings of a market or technological nature that challenge the basis for the alliance structures, or even the existence of the alliance, were other triggers of reevaluation. These triggers, initiated by findings, are impossible to foresee, in contrast to the triggers that seem to appear once exploration is completed. For the third pattern, the trigger of evaluation came when one of the partners wanted to leapfrog exploration and try out innovation on real customers on a small scale. If the first two categories of triggers were connected to the innovation process *per se*, this trigger is more related to cultural differences between the partners, e.g. differences in the degree of risk adversity. The alliance literature[50] describes cultural differences as a major source of conflict; conflict that may create reevaluations. Less described are the triggers created by the innovation process, which could create reevaluations independently of whether or not the partners fit together perfectly. These triggers, initiated by the innovation process, show the importance of the content of the alliance process. An adaptation of the general alliance process models to the different contents of alliances, in this case an innovation process, opens the door for more concrete and actionable models of the process of alliance-driven innovation.

The changes to the alliance structure occurring between the exploration and commercialization phases are in line with the literature concerning the innovation process, which presumes different organizational contexts during the two phases[51]. The existence of organizational design activities once exploration of the innovation has been completed, as the first pattern illustrates, is not clearly described, however. The second pattern illustrates an additional complication in the sense that there could be organizational design activities during the middle of the exploration phase, which introduces new limitations to the design of the innovation. The alliance structure and the innovation have to align in order to proceed to commercialization. For the first pattern, this meant that the alliance structure had to adapt to the innovation, while for the second pattern, it meant that the innovation had to adapt to the alliance structure. The first and second patterns illustrate how the alliance process is subordinate to the innovation process in the sense that exploration of the innovation triggers alliance design

activities. In the third pattern, the interaction between the alliance structure and the innovation is triggered by discussions regarding the future alliance structure, i.e. the alliance process. The moment of this interaction is difficult to connect to any specific situation during the innovation process, and it is thus an example of where the innovation process becomes subordinate to the alliance process. From these three patterns, it could be argued that the innovation process is difficult to untangle from the alliance process. Neither process is superior to the other; both could independently take the initiative regarding interaction. The process of innovation in an alliance context could, based on this discussion, be framed as a simultaneous interdependent exploration of market, technology, and alliance, as well as where the results of this exploration need to be aligned in order to advance to commercialization. During this exploration, the alliance would probably create at least one learning loop[52] since alliance structures seem likely to be changed.

This simultaneous exploration of market, technology, and alliance concept requires a high degree of adaptability in each dimension in order to make a convergent exploration possible. Adaptability in both the market and technological concepts could be achieved through modularization of the innovation's external characteristics and/or its internal architecture[53]. The alliance could also have an adaptable structure[54] which, together with an adaptable market and technology concept, support multiple ways of achieving commercialization and thereby increasing the possibilities of finding a win-win situation[55] for both partners, and advancement toward commercialization.

Modularization of the innovations' internal architecture supported the adaptation of the innovation to the market and technological findings, as exemplified by the first pattern. Modularization of the innovation supported alignment of the innovation with the given alliance structure, as pattern number two shows, while the lack of modularization in the third pattern created uncertainty regarding the possibilities of finding an acceptable solution for commercialization. In the literature, the modularity of innovations, in an alliance context, is mainly connected with the ability to reduce coordination costs[56], but as is argued here, it is also likely to be an important enabler for aligning the results of the exploration of market, technology, and alliance.

## CONCLUSIONS

The analysis identifies three patterns by which the alliance structure and the innovation are brought into alignment: 1) Learning about the innovation can trigger changes in the alliance structure; 2) Learning about the innovation can suggest changes to the alliance structure which are not, however, possible to implement, thus triggering changes in the innovation; 3) Planning the future alliance structure

can suggest changes to the innovation. Bearing these patterns in mind, some tentative conclusions and implications are then presented concerning the interdependency and the direction of the dependency between the alliance structure and the innovation. As a final point, the possibilities of generalizing the results are discussed and some managerial implications provided.

The *first* conclusion concerns the interdependency between the structure of the alliance and the innovation. The three patterns demonstrate the need for the alliance structure and the innovation to be aligned in order for the collaboration to advance to the commercialization phase. This implies that there is interdependency between the alliance structure and the innovation. This interdependency makes it difficult to separate the process into one alliance process and one innovation process. Instead, the process in an innovation-driven alliance, during its early phases, could be seen as a simultaneous exploration of the potential market, the product technology, and the alliance structure. This conclusion has implications for both the process-oriented alliance tradition[57] and the more rational alliance tradition[58].

The process-oriented tradition often separates the alliance process from the content of the alliance and tries to build generic models of the alliance evolution[59]. This results in conceptually very clear models although it leaves to the managers to work out how these models would be applied in conjunction with the existing innovation models. The idea of separating the theory of alliance management from the content has been challenged by Koza and Lewin[60] who have made a theoretical contribution that shows the importance of distinguishing between alliances whose purpose it is to explore and alliances whose purpose it is to exploit, since the alliance management differs between these two purposes. The interdependency discovered between the alliance structure and the innovation implies that the alliance process is content-dependent and thus provides empirical support for Koza and Lewin's argument of not treating alliances as content-independent.

In contrast to the models of alliance evolution presented in the process-oriented literature, the models originating from the rational tradition are often a combination of the alliance process and the content, although the connection is implicit[61]. A consequence of the interdependency between the alliance structure and the innovation is that the idea of having fixed alliance structures in an alliance must be questioned since the innovation is anything but fixed during exploration. The likelihood that the alliance structure is in need of change is therefore substantial. One explanation for the different conclusions concerning the stability of the alliance structure arising between the rational tradition and this article could be that there are differences in the content of the alliances studied, thus affecting the management of those alliances. While this study focuses on exploration in alliances, most alliances have an exploitative purpose[62]. Thus it is possible that the implicit basis for the rational tradition is exploitation alliances

such as production alliances. An important research question arising from the conclusion that alliance theory is dependent on alliance content is; which dimensions distinguish different content-alliance combinations as regards the type of alliance management?

The *second conclusion* concerns the direction of the dependency between the alliance structure and the innovation. The dependency could be directed both from the innovation to the alliance structure and from the alliance structure to the innovation. The first pattern illustrates a dependency from innovation to alliance structure, which is in line with the theories that Woodward has established which view organizational structures as contingent upon content, e.g. the innovation[63]. The second pattern makes a contribution to this theory by illustrating that the dependency could go in the "reverse" direction from alliance structures to the innovation, i.e. from the organization to the content. Modularization of the innovation is a lubricant that enables the alignment of innovation to alliance structures by reducing the challenge of redesigning the innovation in order to adapt it to the alliance structure. Modularization could thus be argued to reduce coordination costs [64] as well as increase the possibilities of finding what both partners regard to be fair appropriation by enabling the innovation to be adapted to the alliance structure. The structure of alliances is, according to Gulati and Singh[65], dependant on coordination costs and appropriation. One consequence of the influence modularity has on these two dimensions is that modularity indirectly affects the alliance structure.

An implication of the "reversed" dependency for the study of innovation in alliances is that there are obviously more alternatives regarding the management of alliances in industries where the technology supports innovations with modular architecture than is the case in industries where technology favors innovations with integral architecture.

The second pattern, i.e. the "reversed" dependency, is less likely to exist if it is very costly to redesign the innovation in order to align it with the alliance structure; a situation more likely to arise with integral architecture than with modular architecture. One hypothesis could be that non-equity alliances creating innovations using a technology that supports modular architectures will be more likely to continue to commercialization than will alliances where the innovations are created using a technology that favors integral architecture. It is an open question whether or not modularization has such a profound impact on the management of alliances that the literature needs to distinguish between alliances employing technology that supports modular architecture and alliances which, for various reasons, employ technology that favours integral architectures, although one implication of the "reversed" dependency would be to see modularity as a background variable for alliance management studies.

This potential need to differentiate between alliances employing technology that supports modular architectures and alliances that employ technology which favors integral architectures affects the generalization of this study. The dependency from alliance structure to innovation was identifiable purely because the innovation could be redesigned with a reasonable amount of effort due to its modularity. In industries where the reconfiguration of innovations is costly due to integral architectures, a more likely scenario may be that the cooperation would fail since it is not possible to create alignment through innovation reconfiguration. Thus, the result of this study is limited to alliances employing technology that supports modular architectures, which is common in the IT industry but less so in, for example, pharmaceuticals. The results given are based on non-equity alliances and should not be extrapolated to equity-based alliances without conducting further studies.

The implication of these tentative conclusions for the practical management of innovation-driven alliances is the importance of regarding alliance structures as something that could evolve as a consequence of the exploration of the innovation. Flexibility in the choice of alliance structure for commercialization, thus enhancing the ability to adapt to the findings made during exploration of the innovation, is likely to improve the ability of the cooperation to advance to commercialization. The extent to which the alliance's structure could be adapted to the innovation could be limited, thus calling for the innovation's architecture to be designed in such a way that it could be adapted to the alliance's structure. Modularization of the innovation supports the alignment of the market and the technological and organizational dimensions needed for continuing the innovation process beyond exploration.

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59    Doz, *Op. cit.,* Ref 11, Ring and Van de Ven, *Op. cit.,* Ref 11, Ariño and Torre *Op. cit.,* Ref 48.

60    Koza and Lewin, *Op. cit.,* Ref 16.

61    cf. Lorange and Roos, *Op. cit.,* Ref 4.

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# PAPER III

Managing the relationship between system integrator and product supplier

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2005

Under review in the Journal of Change Management

***A note to the reader***

The terminology used in this paper differs from the terminology used in the thesis in the sense that instead of discussing communication and coordination in terms of the thickness of the interface, as in the thesis, the paper uses the concept of the closeness of the cooperation. A thick interface is described as close cooperation while a thin interface is described as distant cooperation.

# Managing the relationship between system integrator and product supplier

## Abstract

This article asks how a system integrator should manage its collaboration with product suppliers on the basis that different solutions can vary between a minor and a major need for adaptation of the platforms and products to be integrated; two degrees of adaptation requiring different styles of management of the collaboration with the product supplier. The dynamics of such collaboration have been studied in two solution alliances between one system integrator and two of its products suppliers for periods of nine and fourteen years. In this paper, the closeness of the collaboration has been related to the exploration need, creating a model containing four generic types of solution alliances. These generic types of solution alliances are labelled; the innovation alliance, hedged alliance, precarious alliance and reselling alliance. The different types of alliances are discussed and different moves are identified for dealing with an unfavourable balance between the exploration need and the closeness of the collaboration.

## Introduction

The role of delivering integrated solutions has become an increasingly important one in the IT market (Sandberg 2003). As customers and product suppliers specialize and focus on their core competencies, a new role of building solutions for individual customers, by integrating and adapting different products and services, has emerged, and system integrators are quick to seize the opportunity.

System integrators cannot afford to deliver customer solutions to all their customers, i.e. solutions that are unique to each customer, since only a few customers will be willing to pay the premium price associated with uniqueness. Instead, they need to strike a balance between customer solutions and standard solutions, as argued by Sharma and Molly (1999). Customer solutions are sold to major customers with advanced needs and deep pockets, and the experiences gained are leveraged by transformation into more standardized solutions, i.e. solutions with a high degree of the reuse of knowledge, albeit integrated with the customers' existing systems, that are sold on a repeated basis. Using the dichotomy of exploration and exploitation (March 1991), customer solutions

could be described as requiring exploration, while the more programmatic delivery of standard solutions could be described as the exploitation of existing capabilities. System integrators use largely standardized platforms together with components from different suppliers and combine these in a novel way to create a solution. The exploration connected with a customer solution requires innovation and adaptation on the part of the system integrator, but does not necessarily lead to adaptations of the platforms by the product supplier. The relationship that the system integrator has with its central product supplier, with which exploration may to some extent be needed, is often of a long-term nature and is recognized here as an alliance.

The question of whether or not exploration is necessary in relation to the product supplier entails consequences for the way that the alliance should be managed, according to Koza and Lewin (1998). According to them, explorative alliances focus more on behaviour and process control, e.g. communication quality and task fulfilment, which requires close collaboration, while exploitation alliances focus on output control, e.g. sales volumes, which is more associated with distant collaboration.

The different focus of alliance management in exploration versus exploitation alliances creates a managerial dilemma for the manager of a solution alliance as regards choosing the degree of closeness of the collaboration of the alliance, since solution alliances are a mix of exploration and exploitation. The choice is between investing in close collaboration, as in an exploration alliance, or refraining from an investment in close collaboration and being content with an exploitation alliance, e.g. a reseller alliance, despite the potential need for joint exploration that could be necessary in some solutions. The decision rests on two difficult assessments; the exploration needed for the customer solutions and the degree to which this necessary exploration is propagated to the collaboration with the product supplier. Despite this dilemma in managing collaboration between system integrators and their product suppliers, it has only received limited attention in the literature.

Against this background, the purpose of this article is to explore how system integrators manage their collaboration with product suppliers over time.

The empirical setting stems from the software industry where the collaboration between one system integrator and two of its product suppliers has been studied retrospectively for periods of nine and fourteen years. The focus is what Venkatesan (1992) calls strategic product sourcing which, for the collaborations studied, concerns the unique software packages that are important in helping system integrators differentiate themselves from their competitors, and not commodities such as personal computers and standardized development tools such as compilers.

No empirical study discussing the collaboration between system integrators and their product suppliers over time (solution alliances) has been found. The scholarly literature concerning system integrators is sparse and the literature that exists is more oriented towards the relationship between the system integrators and the customer (Shepherd and Ahmed 2000), or organizing the system integrator (Galbraith 2002; Sandberg 2003). The relationship with the product supplier is regarded as rather unproblematic, in line with the gospel of system integration which argues that system integration is about combining and integrating different standard products (Cornet, R et al. 2000).

The paper is structured as follows. A framework elaborates the central challenges associated with the purpose, followed by a description of the research method and the two cases. Both the exploration need and the closeness of the level of collaboration in the two cases are discussed before a summary of the conclusions and implications of these for theory and practice are presented. It is argued that there is an ideal balance between exploration need and closeness of collaboration. Deviation from this balance could be caused by a lack of knowledge, creating a risk of underestimating the exploration need, an unfavourable power balance locking adaptations of the closeness of collaboration to the exploration need, and personal relationships which maintain a close level of collaboration even though the exploration need has diminished.


## THEORY

When designing and managing a solution alliance, senior managers face a number of challenges related to the collaboration. Assessment of the exploration need is one of these challenges, one which has a strong influence on the design of the collaboration, as described in the introduction. A second challenge is the actual design of the collaboration.

When it comes to the need for exploration, this could be framed using the dichotomy of exploration and exploitation, which Koza and Lewin (1998) have suggested for describing the alliance purpose on the basis of March's (1991) work on organizational learning. In March's terminology, exploration is associated with search, experimentation, innovation and risk-taking, while exploitation includes refinement, production, selection, efficiency and execution. The intention when entering into an exploration alliance is to discover new opportunities, e.g. build new capabilities or innovation (Cohen and Levinthal 1990). A solution alliance with a high degree of exploration could involve solutions containing new challenges that require the co-creation of new knowledge using a combination of the two partners' existing knowledge. In exploitation alliances, one or both partners exploit their core capabilities through, for instance, licensing

(Koza and Lewin 1998). A solution alliance with an exploitation purpose, i.e. a low degree of exploration, focuses on the efficient execution of well-known solution concepts, which does not require any new knowledge. The extent of the exploration needed is not always obvious due to the complexity associated with solutions (Davies and Brady 2000).

The design of the collaboration in a solution alliance could be described, using Henderson and Clark's (1990) model, as all the linkages between the different workgroups of the two partners and the communication channels, information filters, and repertoires of the problem-solving strategies used in these linkages. The collaboration could be described as close if there is frequent and intensive communication between actors on different organizational levels, few information filters, and a broad repertoire of problem-solving strategies. Analogously, distant collaboration could be described as infrequent communication between actors on few organizational levels, substantial information filters, and a limited repertoire of problem-solving strategies. Close collaboration between people is associated with learning and learning is a prerequisite for exploration and innovation (Brown and Duguid 1991; Brown and Eisenhardt 1995). Close collaboration is also essential for exploration alliances, although the recommendation is to be somewhat careful compared with exploration conducted inside one corporation (Bidault and Cummings 1994) since unintentional information leakage could harm the negotiation positions of the partners (Hamel 1991). In exploitation alliances such as reseller alliances, the collaboration is more distant while quick information-sharing through information systems is essential (Weber 2001).

## RESEARCH DESIGN

The information and communication technology industry targeting a business market is the population from which the alliances studied have been selected. To enable the study of the management of the collaboration between the partners, cases having similarities with regard to partner characteristics, business environment, and technology were considered to be important. Based on this requirement pertaining to the sample, two cases were chosen where a good level of access could be achieved. The solution provider, Fusion, is the same in both alliances. The alliances are with two of its product suppliers, Sunny and Moon (the names of the companies have been changed). The product suppliers were similar as regards product focus and geographical origin, and the time periods of the alliances overlapped to a high degree (see Table 1).

|  | Fusion | Sunny | Moon |
|---|---|---|---|
| Business | System integrator | Software products for voice response systems and voicemail | Software products for call centre systems |
| Year firm established | 1984 | 1983 | 1990 |
| Year when alliance with Fusion was initiated | -- | 1990 | 1995 |
| Geographical origin | Northern Europe | US | US |
| Turnover M€ in 2000 | 40 | 100 | 120 |

Table 1 Comparison of the system integrator with the two product suppliers

To obtain a detailed picture of the alliances, both written material and interview data were collected. Since the author, before returning to the academic world, had been a manager employed by the system integrator in a third solution area which had no contact with the two being studied, a very good level of access to the company archive was provided and there were no difficulties in arranging interviews with people who had been involved in the alliances, both inside and outside the company. Most people interviewed had only been working with one of the alliances, although the Vice President level, for obvious reason, had insight into both. Ten formal semi-structured interviews were held which covered the collaboration, important issues, and incidents occurring during the alliance. Eight of these interviews were with people employed by Fusion. These interviews ranged between one and three hours in duration and were recorded. The interviews were conducted between October 2003 and April 2004. The written material consisted of reports discussing the market, the suppliers and strategic choices. A key informant, with knowledge of both alliances, has validated the final case descriptions and the central findings.

## MANAGING SOLUTION ALLIANCES — THE SMOOTH AND THE TROUBLESOME

Fusion was a wholly-owned subsidiary of a Nordic telecom operator. It focused on consulting and integrated solutions for call centres and customer relationship management (CRM), although there was greater scope at the beginning of the period studied.

## Sunny alliance

As a consequence of a strategic decision to cease operations in internally-developed products at the end of the 1980s and focus on being a system integrator, Fusion selected Sunny as a product supplier for replacing its internal products. Sunny was evaluated from the business, technological and financial perspectives and was found to be the best candidate, despite its lack of understanding of the European market; a lack of understanding that it shared with the other US candidates. Sunny, however, in contrast to the other candidates, was of a size more comparable to Fusion, which was considered important in order to guarantee a balanced relationship.

> "We wanted a stable company with whom we could establish a balanced dialogue. In Sunny, we found a stable partner and the possibility of a balanced dialogue due to our similar size" Alliance Manager at Fusion, responsible for Sunny

As a final technical evaluation, an engineer from Fusion spent three weeks at Sunny learning and evaluating its technology. Sunny considered Fusion important since it opened up a market via two telecom operators. One of the telecom operators was Fusion's owner, while the other was collaborating with Fusion.

The alliance managers of both partners met on a quarterly basis. The focus of these meetings was market information and activities aimed at solving technical problems. The relationship was characterized by trust, which could be exemplified by the way that the product licenses were handled.

> "… since we had the manufacturing specification, we could deliver solutions without prior information to Sunny. At the end of the month, we faxed a specification of what we had sold and got an invoice in return." Manager at Fusion, responsible for technology

The regularity of the management meetings decreased after five to six years when Sunny's acquisition of a European company resulted in a gradual moving of the responsibility for the European market to the UK.

There was significant collaboration in the technical area right from the beginning. Even though Fusion's engineers had a good understanding of this type of product, due to the historical internal development, everyone working with Sunny's platform had been trained by Sunny. Once the partnership agreement had been signed, an engineer from Sunny spent a month at Fusion training Fusion's engineers in the product. The training, together with the fact that one Fusion employee had worked for Sunny for six months, created networks between the people in the two organizations, resulting in many technical problems being solved by phone or email, between engineers on Fusion's integration team and Sunny's development engineers. Problems regularly occurred when new types of functionality were added to the solutions, but were normally

solved through collaboration between the engineers at the two firms without the involvement of management.

One challenge in the alliance was the difference between the market requirements that Fusion was facing in comparison with Sunny's products, products that were primarily targeted on a US market where solutions were on average larger than those on Fusion's market. Early on in the alliance, this difference led to the joint exploration of solutions for medium-size firms, whereby Sunny conducted market-based product development, i.e. it disabled part of the existing product's capacity along with some functions and reduced the price to suit the needs of Fusion's customers. These more standardized solutions were a success and became a significant part of revenues in the years to come. Later on in the alliance, new requirements for less advanced products, with a substantially lower price than Sunny could offer, caused Fusion to source these other types of products from other suppliers. Although both the exploration need and the sales volume between the partners had decreased, their collaboration remained rather close.

## Moon alliance

During the first half of the 1990s, Fusion experimented with and delivered some small-scale call centre solutions. Depending on the customers' requirements and the existing systems that the solution would be integrated with, different call centre products were used.

One major customer with whom Fusion had had a long-term relationship wished to implement a call centre where telephony and computers were integrated. The customer had scanned the market for call centre products and had found Moon's product to be the most promising for its type of application. The customer thus ordered a pilot installation based on Moon's platform where Fusion sold the integration work and Moon sold the platform. Fusion preferred this way of splitting the business to avoid assuming the responsibility for an unknown platform. The pilot performed well and plans for a full-scale implementation were discussed. The customer requested that Fusion should assume full responsibility for the solution and a value added reseller agreement was signed between Fusion and Moon.

Some engineers went to Moon's head office in California for training, although contacts regarding sales and technical issues were directed to the newly-established European office. When Fusion encountered problems with Moon's products, which needed joint exploration, the formal procedures of reporting faults to the European office, instead of having direct contact with the engineers at the US headquarters, were perceived as problematic and delayed the implementation of the projects.

> "We were obliged to use the London office which did not have any more knowledge about the product than we did. Everything was to be directed through them and we did not have any contact with the developers in the US who had deeper knowledge" Project Manager at Fusion

The lack of, or at least delayed, technical dialogue resulted in Fusion solving a number of problems itself, since waiting would delay the delivery of the solution to the customer. Most problems originated from the differences between US and Europe in the contextual systems that Moon's products were integrated with, as well as in the way the systems were used, which was linked to different call centre management practices. To avoid problems, Fusion decided to use Moon's products only for solutions that were integrated with the US types of systems.

A number of solutions were delivered during the next two years, encountering varying amounts of problems related to Moon's products. Implementation of the solutions was rather straightforward if they were integrated with the US types of systems and did not involve any new types of functionality. New functionality or European types of systems, however, created severe problems. One solution became very problematic and, despite Fusion's efforts, it was not possible to deliver all the functionality promised to the customer. The problems resulted in a number of emergency meetings between the senior managers of Fusion and Moon. As a consequence, experts from the US development unit were allocated to Fusion until the problems had been fixed, and improved quality and support programs were put in place. The project reduced Fusion's confidence in Moon's products and they were regarded as unpredictable if used just slightly outside of what had been working very well before. As a consequence, Fusion became more cautious and only used Moon's products for proven types of solutions. Whether it was this decision, the improved technical contact that had been established, or a better product is hard to say, but subsequent projects have not experienced anything other than minor technical problems.

Besides the technical exploration, there was also a need for commercial exploration. The medium-size segment had shown an interest in this type of integrated call centre solution but Fusion was unable to offer any competitive solutions to them as long as Moon's price model was designed for large and centralized call centres, while the actual market consisted of many small and geographically-distributed call centres. Moon was reluctant to adapt its price model to the medium-size segment and, as a consequence, Fusion started to search for alternatives to Moon's product in order to be able to address this segment. They realized that they were capable of doing this by themselves and developed, after a while, a set of components that made it possible to deliver solutions to the medium-size segment, albeit with a lower functionality level than was possible with Moon's products. The sustained problems of integrating Moon's products with European systems caused Fusion to further enhance the

functionality to a level comparable to Moon's products so that they could also be used for large-size solutions. Moon did not appreciate Fusion developing a competing product and thus intensified its sales efforts on the market by recruiting a sales manager from Fusion and by obtaining new distributors on the market. They lowered their prices in what could be seen as an attempt to undermine the business logic of Fusion in having an in-house product, instead basing all their solutions on Moon's products. However, Fusion continued to have both its own product and Moon's products for solutions. Towards the end of the period described, Fusion succeeded in selling a huge solution to a corporate customer based on Moon's products. The project was very successful and reduced the level of tension between the partners. The situation could be described as stable in the sense that the two partners would collaborate on complex solutions since they saw no alternative. There was no realistic alternative for Fusion since Moon was the market leader in this type of high-end product, and high-end customers demanded that solutions be based on Moon's product. For Moon, Fusion was the only solution provider capable of delivering these kinds of complex solutions on the actual market.

# DISCUSSION

## Four types of solution alliances

The main dimensions used in the framework for understanding the management of collaboration in solution alliances, the closeness of the collaboration, and the dichotomy of exploration and exploitation, will be used to describe and discuss the two solution alliances.

A diagram is created by using the two dimensions as axes and the combination of the two dimensions' end-poles, i.e. close-explore, close-exploit, distant-explore, distant-exploit, forming four squares which are used as generic alliance types (see Figure 1). The evolution of the two alliances is plotted in the diagram and, for each square, a description will be provided of a) the reason bringing the alliance to the square, b) how the system integrator perceived the situation and the challenges that were identified, and c) what actions were taken as a consequence of the perceived situation.
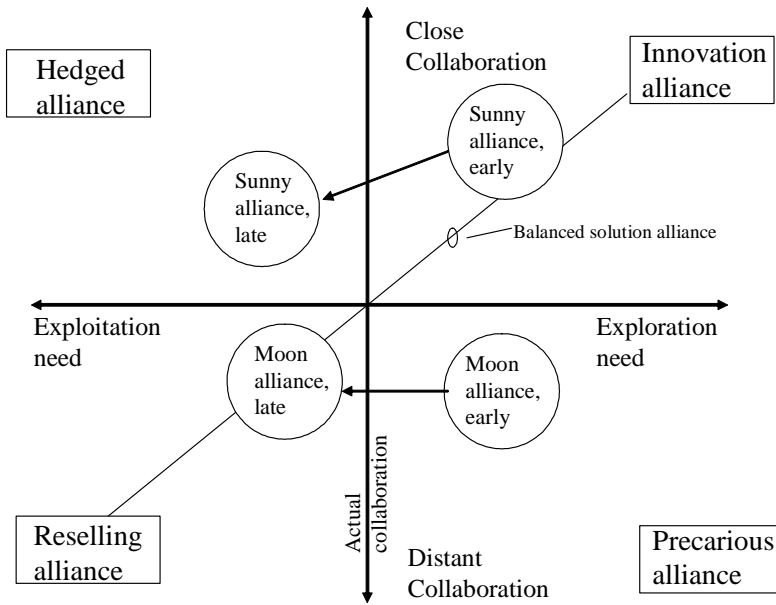
Figure 1 Four generic alliance types: The evolution of the Sunny and Moon alliances over time.

The Sunny alliance started with a close collaboration and a high exploration need. The combination could be designated as an *innovation alliance*. The reason for the close collaboration was that Fusion, based on its in-depth knowledge of the product area, considered this to be necessary. The close collaboration supported the planned exploration as well as the unexpected exploration that appeared during the implementation of solutions. In the latter situation, engineers at the two partners could directly contact each other and solve the problems. Exploration was needed not only when the product technology was new to the system integrator but also when the new functionality of the product was used. The combination of high exploration need and close collaboration seems to have entailed few problems.

The Moon alliance started with a distant interface and what was afterwards recognized to be a great exploration need. The alliance was a result of a major customer creating an "arranged marriage" between the partners. The combination of a distant collaboration and a great joint exploration need could be seen as a *precarious alliance*. The reason for the initial distant collaboration seems to be a combination of Fusion's underestimation of the exploration need and Moon's reluctance to prioritize close collaboration with Fusion. During implementation of the solutions, there seem to have been a number of situations calling for joint exploration related to Moon's products and perceived as problematic by Fusion since the lack of close collaboration delayed the start of the joint

exploration and thus implementation of the complete solution. The reasons for the delays to the joint exploration include information filters in the form of support help-desks, management that had to approve direct contacts between the engineers and a lack of linkages between the engineers at the two firms. The discussion regarding a closer level of collaboration did not seem to have been in the interests of Moon and so Fusion developed, in parallel to using Moon's products, its own products that were in competition with Moons products in order to avoid what they regarded to be a problematic dependency. Fusion also became more careful through not selling customer solutions that required extensive exploration based on Moon's products since this could propagate and require exploration jointly with Moon.

In the Sunny alliance, the need for exploration declined over time, although the closeness of the collaboration did not decline at the same pace. The situation that emerged could be described as a *hedged alliance*, i.e. an alliance that was prepared for more difficult tasks than those it had to deal with. The closeness of the collaboration was perceived as very suitable for supporting the more advanced solutions, but it seems that Sunny became too expensive for a growing number of solutions, which could be seen as a consequence of their choice of technology as well as the cost of the close collaboration and the good service that this entailed. As a consequence Fusion began to source the products for the less advanced solutions from other suppliers.

The need for exploration also declined in the Moon alliance. A situation appeared that could be designated a *reseller alliance* with a low exploration need and distant collaboration. Moon's willingness to support technical exploration had improved slightly since the early phases. This was probably a consequence of Fusion having developed alternatives to Moon as regards their solutions. The level of tension seems to have decreased as both partners had accepted the situation.

## A comparison of the two alliances

This section starts by describing the common characteristics of the two alliances, prior to an analysis of the differences and a discussion on the involved mechanisms being presented.

### Common observations

The *first* observation is that it seems to be difficult to assess in advance the exploration need for the individual solution. Difficulties in assessing the exploration need seem to have led to an underestimation of the exploration need in some cases and, as a result, few preparations being made for dealing with exploration in the form of resources or routines. The low state of readiness of

the partners to deal with these situations calling for joint exploration resulted in the delayed implementation of the entire solutions. This major impact on the entire implementation of the solution explains the *second* observation that Fusion had emphasized the importance of a quick start-up of joint exploration when this was required during implementation of the solution. The actual speed at which joint exploration started up seems to have differed between the alliances. In the Sunny alliance, the start-up was described as quick, while it was described as delayed in the Moon alliance. The difference in the closeness of collaboration could be one explanation for these time differences in starting up joint exploration. The *third* observation is that the need for exploration decreased over time. As a consequence, the need for close collaboration also decreased. Increased knowledge could be one of the reasons why the exploration need decreased over time.

## Differences in collaboration

The closeness of collaboration was different at the outset and evolved in different ways for the two cases. The Sunny alliance started with a close level of collaboration, while the Moon alliance had a distant collaboration. This difference in the closeness of collaboration could be explained by a difference in the perceived exploration need, which was formed by Fusion's knowledge of the product areas. In addition, an unfavourable power situation for Fusion caused by the arranged marriage did not provide Fusion with any possibilities of dictating the closeness of collaboration; instead it had to accept the more distant collaboration that Moon preferred. A possibly hasty conclusion might be to argue that system integrators should not accept arranged marriages, or at least not accept them without very good knowledge of the area. What will then be forgotten is the differences in investment and risk that the two strategies entailed. The advantage of an arranged marriage is that the system integrator does not need to invest in finding a suitable partner, taking the risk that the customer will prefer solutions built using other types of products. With an arranged marriage, there is a customer right from the start together with a product supplier which at least one customer has evaluated as having good products for use in building solutions.

In the Sunny alliance, the closeness of collaboration decreased over time, although not at the same pace as the exploration need. As pointed out by Spekman *et al.* (1998), alliances could continue to be close even if the economic rationale has declined, when they are based on strong interpersonal ties. The collaboration did not change so much in the Moon alliance, despite a decreasing exploration need. The reason for this lack of reduction in the closeness of collaboration can be found in an initial precarious alliance where Fusion was

eager to improve rather than reduce the closeness of collaboration so that the collaboration would better match the exploration need.

### Patterns of evolution

The dynamic nature of the solution alliances can be illustrated by the two cases' different patterns of evolution. To recapitulate the analysis provided at the beginning of this section, Sunny started as an innovation alliance and went on to become a hedged alliance. Moon started as a precarious alliance and went on to become a reseller alliance. Both cases thus show how the alliances can change their positions in relation to the "ideal" balance between exploration need and closeness of collaboration. Maintaining an ideal balance, as the Sunny alliance initially did, the closeness of collaboration needs to be continually changed in response to changes in the exploration need. Obtaining an ideal balance after being a precarious alliance could be difficult, as described in the Moon alliance, due to the unfavourable power situation. Fusion used several classical moves to reduce Moon's power (Pfeffer and Salancik 1978), e.g. reducing the joint exploration need by lowering the exploration involved in solutions using Moon's platform and by acquiring alternative sources to Moon. The change in relative power also made Moon more open to joint technical exploration, despite the more competitive situation that had appeared as a consequence of Fusion's internal alternative to Moon's products. To obtain the desired closeness of collaboration, a system integrator is, thus, greatly supported by a favourable power relationship with the product supplier.

## CONCLUSIONS

The study of the Sunny and Moon alliances has led to some tentative conclusions concerning the typology of the solution alliances. By combining the two dimensions, exploration need and closeness of collaboration, it was possible to identify four generic alliance types for solution alliances, thus the diagram could be used as a language for describing the evolution of solution alliances. While several of the more generic buyer-supplier models use variations of closeness of collaboration to describe the relationship, they use the partner's investment in the relationship as the second dimension instead of the character of the task, as in this model (c.f. Cox, Lonsdale et al. 2003). The strength of the suggested model, in comparison with these generic models, is that it takes into account the character of the task of the collaboration. While the character of the task is implicitly assumed to be rather constant in the more generic buyer-supplier models (Bensaou 1999; Cox, Lonsdale et al. 2003), this is not a valid assumption for solution alliances as the cases illustrate. Instead, the closeness of collabora-

tion seems to change over time, which could be attributed to increased knowledge. The suggested model supports a description of the changing character of the solution alliance by including the character of the task, i.e. the exploration need, into the model. The exploration need, together with the closeness of collaboration, creates a diagram that contributes by constituting a tool for the classification, diagnosis and management of solution alliances over time.

The implication for theory of these conclusions is the need to distinguish between the four generic alliance types described since the different positions will entail consequences for managing the development of the alliance with the product supplier, e.g. the moves described above, but also because the relationship with the customer could be affected due to the moves used in relation to the product supplier, e.g. the system integrator offering the customer less innovative solutions to reduce the need for joint exploration with the product supplier. One way of framing the move of reducing the need for exploration by offering less innovative solutions is arguing that the solutions are dependent on the closeness of the collaboration with the product supplier, or in other words, the task is dependent on the organization. This dependency is of particular interest since academics from Woodward (1965) and onwards have suggested that the organization is dependent on the task.

The result of this study introduces an additional challenge to the previously described challenges to managers of solution alliances in that the design of the collaboration has to be continually adjusted in order to adapt to changes in the exploration need. The good news is that the suggested models could be used as a tool for the initial design of the collaboration, with an ideal balance between exploration need and closeness of collaboration as a goal, as well as a diagnostic tool for identifying the need to change the collaboration over time. Two important factors are knowledge of the product area, which affects the ability to make a correct assessment of the exploration need, and the system integrator's power in relation to the product supplier, which determines whether or not a change to the initial closeness of collaboration is possible.

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# PAPER IV

Outsourcing Service Innovation[1]

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2005

To be revised and submitted for a second review in
Creativity and Innovation Management

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***A note to the reader***

The terminology used in this paper differs from the terminology used in the thesis in the sense that instead of discussing communication and coordination in terms of the thickness of the interface, as in the thesis, the paper uses the concept of the tightness of the coordination. A thick interface is described as a tightly-coordinated alliance while a thin interface is described as a loosely-coordinated alliance.

# OUTSOURCING OF SERVICE INNOVATION

## ABSTRACT

Outsourcing innovation has become an increasingly common strategy for enhancing effectiveness and flexibility in many industries (Higginbotham 1997). Outsourcing innovation activities, in the form of divesting R&D units with the purpose of buying back their R&D services, is a challenging endeavor due to the strategic role played by R&D. Purchasing R&D services requires close collaboration with the supplier, i.e., an alliance, since this involves uncertainty and the transfer of tacit and complex knowledge (Inkpen 2000).

The coordination needed between the partners of an R&D alliance is influenced by many factors, among these the character of the task, e.g. modularity (Sanchez and Mahoney 1996; Gerwin 2004), the knowledge of the partners, e.g. familiarity with technology/markets (Roberts and Berry 1985), and the objectives of the collaboration, e.g. exploration or exploitation (Koza and Lewin 1998). A common assumption in all these models, albeit often implicit, is that the alliance is created between two independent firms and that these firms are moving from an arm's length relationship to a situation somewhere between market and hierarchy (Williamsson 1991; Lorange and Roos 1992). This assumption is not valid as regards alliances created by firms and their outsourced R&D units. This type of alliance starts with two firms having a joint history where the evolution of the collaboration is from hierarchy toward a more distant relationship. This difference in origin could result in an initially more extensive network between the people in the two firms entering into an alliance created by outsourcing vis-à-vis an alliance initiated by two independent firms. In consequence, coordination could be expected to face different challenges in alliances based on both types of origin.

Against this background, the purpose of this paper is to explore the organizing of the alliance created when outsourcing R&D for services. Some important aspects concern the type of knowledge outsourced and the relationship between R&D and the operation.

As an empirical basis, two outsourcing alliances are used which were created when divesting R&D for telecom service innovation. These have the outsourcing firm in common but differ in their main tasks, with one focusing on specification and the detailed design of service innovations and the other focusing on testing service innovations.

It is argued that discussions regarding alliance coordination need to distinguish between a strategic/tactical level and an operational level since the need for coordination may differ greatly between these levels. While the coordination needed

on the operational level is connected to the nature of the task (Gerwin 2004), it is suggested here that the coordination needed on the strategic/tactical level is influenced by the type of knowledge being used by the outsourced firm, and the interaction between the partners prior to initiating the alliance, e.g. whether it is an outsourcing alliance or an alliance initiated by two independent firms

## INTRODUCTION

Outsourcing R&D has become an increasingly common strategy for enhancing effectiveness and flexibility in many industries (Higginbotham 1997). Outsourcing R&D activities, in the form of the divesting of R&D units with the purpose of buying back their R&D services, is a challenging endeavor due to the strategic role played by R&D. Purchasing R&D services requires close collaboration with the supplier since this involves uncertainty and the transfer of tacit and complex knowledge (Inkpen 2000).

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Compared with outsourcing product innovation, outsourcing service innovation adds a challenge in the larger overlap between development of the service innovation and development of the service operation (Johne and Storey 1998), i.e. a higher degree of coupled interdependency (Thompson 1967), making it more difficult to untangle R&D from operations when divesting. In consequence, closer coordination in the subsequent outsourcing alliance could be necessary than would be needed if outsourcing R&D for products.

Against this background, the purpose of this article is to explore the organizing of the alliance created when outsourcing R&D for services. Some important

aspects concern the type of knowledge outsourced and the relationship between R&D and the operation.

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## KNOWLEDGE, COORDINATION AND THE SERVICE INNOVATION PROCESS

The activities in the service innovation process overlap many times (Gerwin and Barrowman 2002), and instead of grouping them into phases, these could be seen as parts of tasks that focus on different parts of the process (Krishnan, Eppinger et al. 1997). The *upstream* tasks consist of opportunity recognition and specification of the service concept, service system and service process (Edvardsson and Olsson 1996). The *midstream* tasks involve detailed design of the service system and service processes. The *downstream* tasks focus on testing, putting into operation, market introduction and operation. To complete these different types of tasks, various types of knowledge are required.

Two aspects of knowledge are of particular interest when discussing outsourcing and alliances: Private versus public knowledge and architectural versus component knowledge (Matusik and Hill 1998). *Private knowledge* is unique to the firm while *public knowledge* is known in a wider external domain. Private knowledge could be a source of competitive advantage, a core competency, if it is useful for a wide variety of markets, contributes significantly to the perceived customer benefits, and is difficult to imitate (Prahalad and Hamel 1990; Barney 1991). Public knowledge could be important for firms as it includes best practices in a number of areas, although it could not be the basis of competitive advantage since it is not proprietary. *Component knowledge* relates to only a part of the firm's operation, rather than the whole. One could see an example of component knowledge in the knowledge connected to IT systems for a particu-

lar function as it only corresponds to a part of the overall knowledge structures of the firm. Component knowledge could be both private and public. *Architectural knowledge* relates to the whole, e.g. processes for putting the different components into a whole (Henderson and Clark 1990; Matusik and Hill 1998). Rather than being the sum of all component knowledge, it is the knowledge needed to integrate the component knowledge into a whole. What is considered architectural knowledge will depend on the level of analysis. Within each area of component knowledge, there is architectural knowledge concerning how to integrate the sub-component of knowledge. In this article, the outsourcing firm's overall business is used as a level of analysis. The development of architectural knowledge is the result of a path-dependent evolutionary process, thus two firms could not have the same architectural knowledge, i.e. it is private knowledge.

The innovation process rests within an organizational structure. The role of this structure is to support the allocation of work activities during the innovation process and to be a mechanism for coordinating these activities (Mintzberg 1979). Two examples of these structures could be the decision-making systems and the design of lateral linkages (Galbraith and Kazanjian 1986). The interface between the partners plays a central role in coordination and could exist on both the *operational level,* where the service innovation projects are conducted, and on the *strategic/tactical level,* where overall goals, policies and programs are discussed (Quinn and Voyer 1998). The combination of the strategic and tactical levels is used to acknowledge a size difference between the firms in the alliance where one partner's strategic issues could be regarded as tactical by the other partner. Henderson and Clark (1990) describe the interface as all the linkages between the different managers and workgroups, and the communication channels, information filters and repertoires of problem-solving strategies used in these linkages. *Tightly coordinated* alliances require thick interfaces with frequent and intensive communication between actors on different organizational levels, few information filters, and a broad repertoire of problem-solving strategies. *Loosely coordinated* alliances require thin interfaces which, analogously, involve infrequent communication between few actors, etc.

## METHOD

The selected cases, ITDev and ITInt, have been outsourced from the same firm, TeleProvider, and have similarities as regards R&D focus, size, the time for the outsourcing and the initial design of the interfaces. They differ in the sense that ITDev focuses on upstream and midstream tasks, while ITInt focuses on downstream tasks.

To get a detailed picture of the alliances, both written material and interview data were collected. Since the author, before returning to the academic world,

had been a manager at TeleProvider with some contact with the two firms being outsourced, a very good level of access could be achieved. On a strategic/tactical level, all four CEOs were interviewed (TeleProvider, ITDev, ITInt, acquiring firm), together with the VP of Network Services and corporate staff responsible for strategy and outsourcing. On an operational level, interviews were held with purchasing managers, product managers, and project leaders. In total, fourteen semi-structured interviews were held, covering the divesting and alliance process, the logic behind the outsourcing, the character of the outsourced firms, the coordination, the character and knowledge of the R&D resources, and important issues and events during the process. These interviews lasted between 45 minutes and two hours and were recorded. The interviews were conducted between October 2002 and May 2004. Written material consisted of presentation material for potential investors, standard procedures for the service innovation process, access to the outsourcing firm's corporate intranet, and public domain sources such as articles, etc. An earlier version of this article had been discussed with the CEO of ITInt about nine months prior to the repurchasing of ITInt being announced.

## OUTSOURCING R&D FOR SERVICE INNOVATION

TeleProvider is a north European incumbent telecom operator with more than 20,000 employees. It focuses on fixed and mobile telephony services, together with the Internet and other data communication services. At the end of the 1990s, it initiated a major organizational change propelled by the Internet, market liberalization and market consolidation. TeleProvider decided to focus on its core businesses and activities. Internal R&D for service innovation was not considered competitive in the long run since TeleProvider in itself was not a sufficiently large market. By outsourcing its R&D units, it was expected to be able to serve multiple customers, build new capabilities, and grow in size. TeleProvider would become more focused as a result of this outsourcing, something which was appreciated by the financial markets.

R&D was mainly conducted in two separate legal entities within the TeleProvider group of companies. ITDev focused on specification and the detailed design of the service innovations while ITInt focused on the integration and testing of service innovations. Both firms had between 500 and 1,000 employees and were located near TeleProvider's premises. They worked closely with TeleProvider and their employees were seen as a natural part of TeleProvider's projects. At the time of divestment, ninety percent of the turnover of both firms related to projects with TeleProvider

The outsourcing strategy was selling both units, as a package, to an outside venture cap company with the strategy to develop the companies before selling

them on to industrial buyers. The relationship between TeleProvider and the two outsourced firms was regulated via contracts stipulating certain minimum purchasing volumes, the guaranteed volumes to decrease with time. Even before outsourcing, assignments were being conducted in a project form that made the changes on the operational level small. The downturn and the emerging recession in the telecom industry made it difficult for the outsourced units to find new markets outside TeleProvider which would compensate for the lower volumes purchased by TeleProvider, thus resulting in the downsizing of both firms.

## Service innovation on the project level

TeleProvider's model for service innovation involves what is known as a marketing and sales process and a service development process. The service development process will be highlighted since it centers on individual innovation, while the marketing and sales process has more of an innovation portfolio perspective and little contact with the outsourced units.

The service development process could be described as a project model that has a number of milestones and tollgates. The upstream tasks include requirements regarding the service's functionality and performance and the general design of the realization of the service. These requirements have to be checked in relation to customer needs, trademarks, patents, security, legal aspects, etc, involving a large number of experts from different units at TeleProvider. The general design requires extensive knowledge of the different systems involved, together with a comprehensive understanding of how the systems interact and how this service may interact with the other services, i.e. architectural knowledge. Dialogs are conducted with various internal units and outside suppliers to ensure that the general design will work. ITDev is often involved since it has implemented many of TeleProvider's proprietary systems and a number of services that could be similar to the relevant innovation. Finally, the general design of the systems is discussed with and approved by two internal units at TeleProvider, IT architecture and operations. Specification of the service and the general design of the service systems form the basis for procuring the realization of the different parts, and for the testing of the service systems and service processes.

The midstream tasks consist of the various parts being realized by a number of different internal and external units. The scale and complexity of realization will depend on the character of the service innovation. A new type of basic access for telephony involves most types of systems, while a new price formula may only involve units working with the sales, marketing and billing systems. To facilitate coordination, the different parts are separated using specifications of the expected functionality and performance, i.e. modularized. Modularization

enables fixed-price contracts for the detailed design of the different systems required.

In the downstream tasks, the complete service is integrated and tested; first in a test environment and then in the operational environment. ITInt is responsible for testing all major services. ITInt and operations work closely together to arrange realistic test environments. Problems identified at this point may result in product management having to decide whether to delay the service introduction or reduce the functionality and performance. The work volume of ITInt's testing is largely dependent on the quality of both the components delivered by the different suppliers and the specifications of the systems and processes. It is thus difficult to work with fixed prices and most of these assignments are conducted against costs.

Once the service has been launched and is a part of normal operations, ITInt is used by operations when problems occur which are related to the service systems, since it has the knowledge to identify faults and test solutions to the problems.

## Service innovation with ITDev

Collaboration between TeleProvider and ITDev involved most types of telecom services and telecom service systems. Consultants from ITDev worked on the specification of service systems and detailed design. This involved new innovations as well as the refinement of existing innovations. Many of the systems used in different services had originally been developed by ITDev. Thus, it was seen as natural that ITDev would be involved in new services affecting these systems. When old systems were replaced, TeleProvider had a strategy of using standard systems instead of tailor-made proprietary systems. In these situations, the role of ITDev could vary from integrating and configuring the new systems to being completely replaced by third partly suppliers.

> "It could be seen as one IT consultant among all the others, but was distinguished by a long and wide-ranging relationship with us" VP of Network Services, TeleProvider

Established relations have existed between ITDev and the product management and IT systems functions for long time. Most projects involving ITDev were initiated by these two functions. The projects were tightly coordinated but with little interaction on the strategic/tactical level, despite ITDev's wish of tighter coordination.

> "There is no one at TeleProvider with whom I could have a strategic dialogue" CEO of ITDev

Notwithstanding the reluctance of TeleProvider of being tightly coordinated on the strategic/tactical level, it regarded ITDev's capabilities to be important.

They had unique expertise concerning many systems important to the development of service innovations.

The dialog on the strategic/tactical level was restricted to general pricing levels for the services provided by ITDev. This lack of a broader dialog inhibited discussion regarding the detailed consequences of a planned downsizing at ITDev. As a result, service innovation projects perceived to have sufficient resources were delayed when ITDev chose to close down its office in one city. The lack of certain R&D services temporarily led to an intensive dialog on the strategic/tactical level, although this disappeared once the problem ceased to be acute. Two and a half years after divestment, ITDev was sold by the venture cap firm to a major IT solution firm. This change of ownership has not involved any direct changes in the relationship between TeleProvider and ITDev.

## Service innovation with ITInt

ITInt focused on the testing and quality assurance of the systems and processes used for the service operation. For TeleProvider's suppliers, ITInt's tests were like passing through the eye of a needle. Testing the complete functionality of the services, service systems, and services processes had enabled ITInt to develop a broad knowledge of the different systems and processes that TeleProvider was using and how these interacted. Although they were mainly involved in the testing and quality assurance of services, they were also involved in projects for improving TeleProvider's quality models. Other assignments included supporting operations at TeleProvider as regards helping diagnosing, and simulating faults in services that were in operation.

Directly after divestment, the strategic/tactical level was loosely coordinated, focusing on negotiations concerning general prices, similar to the situation for ITDev. After some months, a more substantial interface was established on the strategic/tactical level with TeleProvider's operations. Product management provided ITInt with early information, both before and after the divestment, about when new services were planned to be launched so that ITInt would have resources available for testing at the right time.

The importance of ITInt for TeleProvider's operation was illustrated by the Vice President of Network Services who complained about the outsourcing, finding it more difficult to allocate these resources in the contingency plans for service breakdowns.

> "They are the only ones that could verify that a service would work on
> TeleProvider's network…their broad knowledge of network configurations
> makes it necessary to have them in our contingency plans" Senior Vice President
> Network services, TeleProvider

Three years after the outsourcing, ITInt was divided into two parts where the major part was sold back to TeleProvider and the smaller one was sold to a

major IT consulting firm. The justification for repurchasing and integrating ITInt was expressed as the need to acquire the competence to ensure service quality and the dialog with external service and systems suppliers.

> "It is logical that we secure access to the special and unique expertise that exists within ITInt's telecom section. This business has such a major impact on the quality of our services that it should be incorporated into our own business" Vice President Network and Production, TeleProvider, in a message on TeleProvider's intranet.

# ANALYSIS

## Coordination on the operational and strategic/tactical levels

The character of the coordination varies from task to task and from level to level in the cases. The upstream tasks in the projects on the operational level were tightly coordinated with ITDev, and even though the resources of different firms were used, they worked like one team using practically hierarchical coordination. The midstream tasks were more loosely coordinated and specifications seemed to be in use as an important coordination mechanism. For the downstream tasks together with ITInt, tight coordination was again put into practice when testing environments were established, or in the contingency plans using resources provided by both firms.

On the strategic/tactical level, ITDev was loosely coordinated while ITInt moved rather quickly from being initially loosely coordinated to tight coordination (see Table 1).

| | Upstream tasks, ITDev | Midstream tasks, ITDev | Downstream tasks, ITInt |
|---|---|---|---|
| | | Modular task | Integral task |
| **Coordination on strategic/tactical level** | Loose | Loose | Initially loose, gradually tighter, finally integrated |
| **Coordination on operational level** | Tight | Loose | Tight |

Table 1 Coordination in the service innovation process

Coordination on the operational level seems to have been rather unproblematic and in line with the predictions of established theory (Gerwin 2004), i.e.

coordination is contingent upon the character of the task, e.g. the degree of modularization (Sanchez and Mahoney 1996).

The degree of coordination varied from level to level (see Table 1) and it seems that the partners' assessments of the need for coordination on the strategic/tactical level differ. Only a thin interface existed in the initial design of the strategic/tactical level and even though both ITDev and ITInt expressed a wish for tighter coordination, it was ITInt which got this. It seems difficult to find the right degree of coordination from the start which could be a consequence of a lengthy joint history where coordination was previously achieved by means of hierarchy and informal personal networks, now requiring new forms of coordination which could be unfamiliar to the partners.

Whilst this joint history could be a reason for the difficulties finding the right level of coordination immediately after divestment, it could also provide some explanations for the difference in the degree of coordination between the two levels. Two extreme positions exist regarding the partners' interaction before the initiation of the alliance, i.e. an alliance between two independent firms and an outsourcing alliance created between the firm and its divested unit. The first position could be described as two independent firms moving from market-based coordination toward hybrid coordination, somewhere between market and hierarchy (Williamsson 1991; Lorange and Roos 1992). The second position could be described as one firm moving from hierarchical coordination toward hybrid coordination by divesting itself of internal units and establishing an alliance with these units. These two different historic paths of coordination between firms affect the role of the strategic/tactical level. Alliances add to the general role of strategic/tactical level of deciding goals, policies and programs, a role of support for the building of networks between people on an operational level (Linnarsson and Werr 2004). In an outsourcing alliance, many of the goals, policies, programs, and personal networks can be taken for granted since the alliance has previously existed, thus resulting in the perception that there is a lesser coordination need on the strategic/tactical level than in an alliance between two independent firms where less can be taken for granted.

The historic path of coordination between firms could be regarded as an important factor for coordination in alliances, a conclusion that is in line with Gulati's result (1995), i.e. that repeated interaction between the partners prior to an alliance being initiated impacts upon the choice of coordination mechanisms used in the alliance. Although he does not distinguish between different coordination levels, his conclusion is that a tightly coordinated alliance, e.g. a joint venture, is to be chosen when no previous relations exist, compared with more contractual alliances when the firms have collaborated before.

The historic path of alliance coordination only provides a part of the explanation for coordination on the strategic/tactical level, as the case of ITInt shows, where the initially thin interface grew thicker thus enabling tight

coordination on the strategic/tactical level. The role of knowledge during coordination will thus be discussed next.

## Knowledge characteristics and coordination

The knowledge contributed by the two outsourced firms during the service innovation process varies from task to task. In the upstream tasks, architectural knowledge was provided by internal units at TeleProvider, while ITDev's consultants provided component knowledge concerning the different systems or processes. The midstream tasks also seemed to involve component knowledge but of a more collective nature, e.g. ITDev as an organization delivered against specification. The downstream tasks involved architectural knowledge provided by ITInt in its testing of the organization-wide service processes and systems. When comparing the different knowledge types used with the coordination on the strategic/tactical level, there seems to be a linkage between architectural knowledge and tight coordination and component knowledge and loose coordination (see Table 2).

|  | Upstream | Midstream | Downstream |
|---|---|---|---|
| Cooperation on strategic/tactical level | Loose | Loose | Tight |
| Private/Public | Private | Private/Public | Private |
| Architectural/Component | Component | Component | Architectural |

Table 2 Character of the coordination and knowledge used by the outsourced firms for the different tasks

The difference in coordination on the strategic/tactical level between architectural knowledge and component knowledge could be linked to the different requirements for the creation and transfer of these knowledge types. The organization-wide nature of architectural knowledge requires contact with the whole organization during knowledge creation in order to understand the consequences of the different experiments. This continues to apply when architectural knowledge is outsourced and organization-wide tight coordination is required, i.e. coordination on a strategic/tactical level. Tight coordination on a strategic/tactical level is also a prerequisite for the outsourcing firm to be able to transfer or access the architectural knowledge. A thick interface between the partners is thus reasonable since it enables tight coordination as required.

Component knowledge does not need organization-wide contact for knowledge creation since it only focuses on one part of the firm's operations. The

same applies to the transfer of component knowledge which only involves a limited part of the organization. A thin interface on the strategic/tactical level is thus enough since only loose coordination is needed. There does not seem to be any linkage between the different degrees of coordination on the strategic/tactical level and whether the knowledge is public or private.

The architectural knowledge described in the cases seems to have most qualities of core competencies, e.g. having an impact on customer value and being embedded in the organization (Prahalad and Hamel 1990; Quinn and Hilmer 1994). It is recommended to let core competencies rest within the firm to make them controllable (Quinn and Hilmer 1994), which seems to be TeleProvider's justification for repurchasing ITInt.

The reason why knowledge of integration and testing could be seen as architectural, and even as a core competency, is probably a consequence of the technology-based services involved. The integrated character of the service, the service systems, and the service processes make it necessary for testing to possess comprehensive knowledge of the firm's operation, which is less necessary when testing products where there seems to be less overlap between innovation and operation (Johne and Storey 1998).

## CONCLUSIONS

Based on the study of two alliances created by the outsourcing of R&D related to service innovation, some tentative conclusions are proposed concerning the coordination needed by the alliances in relation to the coordination levels of the alliance and the knowledge involved. The validity of the conclusions is probably restricted to technology-based services such as telecom or financial services.

Firstly, the discussion regarding the coordination need of outsourcing alliances should distinguish between the operational and strategic/tactical levels since needs differ between these two levels. Most studies concerning the coordination need of alliances do not make this distinction.

Secondly, the coordination need on the strategic/tactical level seems to correspond to the type of knowledge involved, i.e. architectural or component knowledge, as well as the historic path of the coordination of the alliance, e.g. whether it started with two independent firms or outsourcing.

Thirdly, the testing of technology-based service innovations could involve architectural knowledge. Outsourcing of this type of knowledge requires particular caution.

The implications of these tentative conclusions for the practical management of outsourcing alliances lie in the importance of assessing the character of the knowledge required for each task in the service innovation process and designing the coordination on the strategic/tactical level in accordance with this. The

division between architectural and component knowledge seems central, while the distinction between private and public knowledge is less significant.

The coordination needed on the strategic level could be underestimated in an outsourcing alliance because of the perception that there is less need for coordination on the strategic/tactical level since the goals, policies, programs, and personal networks are taken for granted, instead of identifying new ways of coordinating since the hierarchical coordination no longer exists.

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# PAPER V

Outsourcing R&D for flexibility –
Experiences from the telecom industry

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2003

The 10th International Product Development
Management Conference, Brussels.

***A note to the reader***

The terminology used in this paper differs from the terminology used in the thesis in the sense that instead of using the term alliances, the paper uses the term inter-organizational relation, IOR.

# OUTSOURCING R&D FOR FLEXIBILITY – EXPERIENCES FROM THE TELECOM INDUSTRY

## ABSTRACT

Outsourcing is an important method of restructuring research and development (R&D). Based on a study of three cases in the telecommunications industry, a tentative framework is proposed for understanding the process of creating alliances by outsourcing R&D, through divesting internal R&D operations and creating alliances with the outsourced unit. Impacts on flexibility from the process, structure, and interface are identified. Understanding these impacts is critical to successful management of R&D outsourcing. How do firms retain and develop flexibility while moving from hierarchy towards a more mixed-mode relationship, with a greater degree of market influence? Impacts on flexibility from the process, structure and interface are identified. Understanding these impacts is critical to successful management of R&D outsourcing and divestiture.

## INTRODUCTION

Outsourcing of research and development (R&D) is one of the latest trends in management [1] and an increasingly common strategy for creating flexibility in product development [2]. The outsourcing process of replacing internal R&D with external R&D could be done through divestment of parts of the firm's internal R&D operations and creation of an alliance-like strategic inter-organizational relationship (IOR) with the divested unit in order to secure access to the R&D capability. One reason for this type of outsourcing is a desire for increased flexibility in an environment that is perceived as changing and difficult to predict. Other reasons for outsourcing are the strive for increased efficiency and focusing on core competencies. In this study, we focus the discussion on the search for increased flexibility.

Williamson [3, 4] in his seminar work on transaction-cost economics stress how hierarchy, i.e. internal organizing, enables flexibility, whereas market, i.e., external contractual relationships, incur significant transaction costs and contributes to rigidity and reduces flexibility. He later [5] augments his perspective by describing hybrid forms, in between market and hierarchy. Outsourcing and entering IORs should be seen as such a hybrid form, that creates a number of challenges concerning flexibility.

1

To increase firm flexibility, the firm faces two challenges. Flexibility is dependent on both management's control capabilities and the organization's ability to change [6]. Managers must be able to respond at the right time in the right way. The organization must react at the right time in the directed way. Flexibility is important since the main purpose of R&D is to develop new products, in an environment full of market and technology uncertainties [7]. A flexible and adaptive capability with respect to volume, scope and scheduling of R&D efforts is required to manage this uncertainty [8].

Divesting a critical capability like R&D often leads to the need to enter into a strategic IOR [9] – e.g. a strategic alliance, an informal partnership, a formalized joint venture – to secure the access to the capability. The R&D IOR theory normally rests on the assumption that the partners initially are two independent companies [10]. In the case of R&D IORs created through divestiture and outsourcing this assumption is not valid. On the contrary, the partners have business, historical and cultural ties from the start. It could be argued that these types of R&D IORs should be able to move from recurrent contracting to relational contracting [11] quickly, and not require as much formalization as traditional emerging R&D IORs. When managing these types of R&D IOR, structural issues are import [12].

Based on the above reflections we pose the following question: *How does the management of the outsourcing process in general, and the choice of structures and interfaces in particular, impact flexibility?* We investigate this question through a qualitative study of two pair wise comparisons between different cases of outsourcing R&D within the telecom industry. We limit the scope to outsourcing where internal activities are made external through divestiture creating an IOR. We take the perspective of the corporate level of the outsourcing firm.

In the next section of this article, we develop our conceptual framework. Based on this we conclude this section with a more elaborated research question. The method is described next prior to presenting our three cases. We then identify different subprocesses of the outsourcing process and how structure and interface impacts flexibility. We finally conclude and present some implications for managers involved in outsourcing of R&D.

## DEVELOPING A CONCEPTUAL FRAMEWORK FOR THE STUDY - THEORY AND LITERATURE

We start this review of the literature regarding outsourcing R&D with a discussion about the role of R&D. We then turn to the context with a special focus on business and organizational structures. The reasons for outsourcing are discussed and we elaborate on flexibility, which is a central concept in this article. We conclude this review by describing the process of outsourcing.

Research and Development, R&D, is an activity by which firms develop their products and processes and learn about new technologies and techniques [7]. R&D should therefore be seen in relation to the firm's products. We call these the end-products to distinguish them from different types of intermediate products, modules or sub-systems. Henderson and Clark [13] describe the end-product as composed of modules that are integrated. The firm could develop new end-products through replacing existing modules with new ones or by creating a new combination or architecture of existing modules. R&D could be focused either on the integration level, developing new combinations of modules, or on the module level, developing new or improved modules.

The firm is structured to support the development, manufacture and delivery of the end-product to the customer. Based on the product architecture, companies make decisions regarding make or buy R&D of the modules as well as integration of the end-product. The question is whether to only outsource the R&D activities per se, or to outsource the complete product or module responsibility. If the development activities are external but the responsibility internal, then we talk about buying R&D services, while if both responsibility and activities are external we talk about buying a product and use it as a module in the end-product. In mature industries such as the automotive industry, the development and production of modules is often external while the firm does the final integration of modules from different suppliers into the end-product. This trend has also moved into other industries, so that suppliers previously performing the activity module design as a service are now moving into taking the responsibility for module development. Externalizing both activities and responsibility for integration would mean withdrawing from product development, and possibly repositioning as a reseller of an end-product sourced from a supplier.

In the above description of R&D and firm structure, we see three critical dimensions: *relation to end-product* (integration or module); *place of responsibility* (internal or external) and *place of activities* (internal or external).

If the R&D activities are external but the responsibility internal, then the company needs to have a capability to both manage the relationship to the out-

sourced R&D as well as an absorptive capacity [14] to be able to learn from the external R&D unit.

The choice between internal and external sourcing is not only a matter for R&D, but also an integrated part of the overall firm strategy. There are often various reasons for and against external sourcing. In this article, we focus on the ubiquitous search for flexibility. Other reasons for externalizing product development often mentioned are efficiency, cost reductions, leveraging specialized competencies and time-to-market.

Organizational flexibility increases the firm's capacity to maneuver in situations with high uncertainty and low possibility for anticipating the future. Planning for flexibility has become an important ingredient in firm's strategies in turbulent environments. Volberda [6] describes three types of flexibility: operational, structural and strategic flexibility. *Operational flexibility* consists of routines based on existing structures or goals, and relates to the *volume of activities* rather than the kind of activities undertaken. Operational flexibility is sometimes also referred to as volume flexibility. *Structural flexibility* is about adapting to changes in the environment, by *doing things differently*: introducing multifunctional teams, changing managerial roles, changing control systems, changing suppliers or externalizing internal activities. *Strategic flexibility* is an ability to *do different things*, by changing strategies, applying new technologies, creating new product market combinations or controlling and changing the market through market power. In addition to these three types of flexibility, Volberda [6] identifies metaflexibility, which he describes as the ability to continuously adjust the composition of the flexibility mix in line the changes in the environment.

Outsourcing of both activities and responsibility for the R&D connected to a specific module requires well-specified interfaces to the module. If the interfaces cannot be specified in detail, at least the responsibility should stay internal to the firm, and the relationship should be deep with broad interfaces in order to minimize transaction costs [5]. The existence of a market for the type of R&D services in question, supports switching supplier. It can also be argued that divestitures and outsourcing in itself contribute to developing this market for R&D services [15]. The *possibility of specifying the interface* to the external activity and the *existence of a market for R&D services* for the particular module are two critical aspects when devising an outsourcing strategy.

Outsourcing both activities and responsibility leads to a market-based buyer-supplier relationship. Outsourcing only the R&D activity, retaining the responsibility to specify and manage, tends to lead to the creation of a strategic IOR. In the literature on R&D IORs a common assumption is that it starts with two independent companies. The IOR emerges as a result of a continuous process of execution--reevaluation--revised conditions [9, 10]. Initial conditions for the IOR have a large impact on the performance for IORs that focus exploitation of existing assets whereas the process is more critical if the focus is on explora-

tion of new opportunities. R&D is related to exploration, but in the case of an R&D IOR created as a result of outsourcing, it is likely that the initial conditions plays a more significant role, since the basic assumption about two independent companies is not valid. In order to manage the process of an R&D IOR, structure is identified as a key dimension to take into account [12].

Based on the discussion above we elaborate the purpose of this study and state is as: *How does the management of the outsourcing process in general, and the business and organizational structures and interface specifically, impact strategic, structural and operational flexibility?* A supporting question helping to answer the overall question is: *What are the different phases of the process of outsourcing R&D?*

We started this section with linking R&D to the product architecture. We continued connecting the product architecture to the structure of the firm and thereby linking R&D and firm structure. From this we got three important dimensions for describing R&D: *relation to end-product* (integration or module), *place of responsibility* (internal or external) and *place of activities* (internal or external). We continued with the reasons for outsourcing R&D and elaborated the concept of flexibility. The *existence of a well-specified interface* to the external activity and the *existence of a market for R&D services* were identified as critical factors when outsourcing. We concluded that the outsourcing of R&D could be divided into divestiture and IOR creation. Finally, we elaborated our research question based on the literature review.

## RESEARCH DESIGN AND METHODS

The population from which the cases have been selected are telecom R&D operations outsourced through divestiture and establishment of an interorganizational relationship (IOR). In telecom we include both suppliers and operators of telecom systems. From this population we focused on a subgroup with similar business and labor conditions. We therefore chose cases were the divestiture was done during the years 2001 and 2002 when the telecom market was in a recession. The labor conditions were similar since in all cases a large part of the divested units were northern European. Finally, we picked two pairs of cases that were as similar as possible, except for one differentiating dimension for each pair. We differentiate between R&D focusing on the final integration of the end-product and R&D focusing on developing modules to be integrated into the end-product. We also differentiate based on the thickness of the interface between the firm and the divested unit.

We recognize that outsourcing of R&D is a large change process with a high degree of context dependencies such as history, experience, corporate cultures, personalities and informal relations which together with the small sample limit the generalizations that can and should be made. However, in line with, e.g.,

Eisenhardt's [16] argument, we believe that a thorough empirical understanding of a phenomenon may be a suitable starting point for theorizing about it [see also 17] and making propositions for future research.

Since we regard outsourcing as a change process we have adopted a contextualist approach [18] making interviews with managers at different organizational levels, at both the firm and the divested unit. A number of the people interviewed were mainly involved in the organizational preparation and divestiture of the units while others were responsible for the ongoing relationship between the outsourcing firm and the divested unit. The interviews ranged from 40 to 120 minutes in duration and were recorded and transcribed. Some informants were interviewed several times. The interviews have been complemented with both internal material such as tenders, contract, etc., and public material such as press releases, etc. The data was collected from November 2002 to April 2003. The studies could be regarded as retrospective in relation to the period before the divestiture and longitudinal for important parts of the period after the divestiture.

Each of the authors had from prior to this study an existing extensive network within and knowledge of one of the two outsourcing firms. This enabled extensive, deep and wide access to information and informants. In order to guarantee a critical review of tentative findings, both authors have reviewed and critically discussed the findings from the interviews performed by the other author, and later both authors have critically reviewed the results and interpretations with an independent researcher.

For the purpose of protecting our sources we have chosen to change the names of the organizations studied.

In the next section, we describe our three cases longitudinally from a firm level and from a unit level.

## OUTSOURCING IN TWO TELECOMMUNICATIONS FIRMS

TeleHard and TeleSoft are both multinational firms in the telecommunications business, the first with a focus on telecommunications infrastructure products and the latter with a focus on telecommunication services. Both firms have more than 20 000 employees. TeleHard has a larger share of its operations distributed worldwide, whereas TeleSoft has the dominant part of its operations in it's country of origin.

From these two firms we have chosen three cases that together will make it possible to make two pair-wise comparisons. TeleIntegration and TeleModule are similar in most contextual variables, but differ in their position relative to the firm's end-product. TeleIntegration does R&D related to the integration of the end-product, whereas TeleModule and TeleComponent do R&D related to

modules in the end-product. TeleComponent had a rich organizational interface with the outsourcing firm, whereas TeleModule had a thin organizational interface. All three cases are in the size of 500 to 2000 employees.

Both TeleHard and TeleSoft during the period of this study were in the aftermath of the golden years of the late 1990-ies moving into an almost recessionary period for the telecommunications industry. Both firms reacted by focusing on their core business and downsized. R&D was one of the areas subject to strategic and radical change during this period.

## TeleHard: renewing R&D – concentration and downsizing

TeleHard had extensive and geographically distributed R&D related to module development as well as to integration of modules into different product lines. The R&D organization had evolved over time, resulting in many products and modules having R&D in multiple locations, as well as many R&D sites working on many different end-products and modules. This resulted in a web of links between different R&D units in which all were necessary to develop a product.

Since several years, a strategy to make R&D more efficient had been developed. R&D sites should be much fewer, but larger, and focused on one or a few end-products or modules. All end-products and all modules should be developed primarily in one location. This was expected to create a clear accountability in the R&D organization. However, during the boom years of the telecom industry, the strategy was not easily implemented. The strategy was not implemented until the market turned down and the need for radical change became obvious throughout the organization. A new structure was established, starting in executive management, with organizational structures mapping the product structure, which supported clear lines-of-command and thereto related clear accountability.

Decisions on concentrating and downsizing internal R&D were taken in a small group of executives, meeting each week in what was called the Helsinki-meetings. These meetings resulted in concentrating responsibilities, closure of some units, outsourcing of some units, and volume reduction in some units.

By divesting and outsourcing R&D TeleHard wanted to contribute to creating a market for R&D services related to development of telecommunication products. The existence of such a market, and the contracting out of R&D to such suppliers, was perceived as a way of creating an R&D organization that could more easily scale up and down to adjust to changing market and business needs.

## TeleComponent

Early on in the R&D restructuring process TeleComponent, a wholly owned subsidiary to TeleHard, was given the complete responsibility for a certain class of telecommunications software, developing and supplying this software module for integration into the infrastructure products from TeleHard.

After a decision was taken in the Helsinki-meetings to outsource TeleComponent, the task was given to a senior staff member to manage the divestiture. During negotiations with potential investors, there were little or no contacts between the dealmaker and the operational units. This later on led to frustration and surprises within the operational units when they realized the structure and contents of the agreement, and in particular of the volume purchase agreement (VPA), in which TeleHard committed to buying certain volumes of services per month for several years. Committed volumes exceeded what the operational units were then planning to and had budgets to order from TeleComponent. They also then realized the need to implement operational interfaces to the outsourced unit as specified in the contract.

The contract included a significant cash payment to TeleHard by the acquirer, which was an established northern European technical consultancy company. After the signing of the agreement, the locus of activities shifted from the central staff functions out to the operational R&D organization.

After the outsourcing was completed, there was an increased demand for the services from TeleComponent, over and above the volumes specified in the contract, and exceeding the capacity of TeleComponent. TeleHard was forced to both ask TeleComponent to subcontract to other suppliers, as well as to contract out some R&D directly to other suppliers.

A number of issues arose, trying to manage daily ongoing business, while at the same trying to interpret the agreement and put mechanisms in place to manage accordingly. Some of those incidents were of a nature such that several actors started having doubts about the correctness and value of the outsourcing.

## TeleSoft outsourcing: focusing on core business

TeleSoft had since several years an ambition to take an active role in the anticipated consolidation among telecom operators. To enable an option for additional financing TeleSoft had to be seen as efficient and be able to show that they were at least on par with the competition with respect to turnover per employee and similar key measures. For these reasons, TeleSoft quickly restructured and downsized the operations by outsourcing all non-core activities. The divestiture strategy was to sell larger packages of units since this was assumed to be faster than selling unit by unit.

The first public signs of the plans to divest and outsource were that some activities, i.e. some subsidiaries, were organized as a separate business unit that

internally became known as Miscellaneous. Two outsourcing cases from this unit are described, TeleIntegration and TeleModule.

### TeleIntegration

TeleIntegration was a wholly owned subsidiary to TeleSoft, integrating different telecommunication system modules into the end-product.

TeleIntegration was bundled with a handful of other subsidiaries including TeleModule, into a holding company where a majority stake was sold to a venture capital company. The contracts governing the divestiture included a right and a commitment for TeleSoft to continue to procure services from the divested units but lacked any further elaboration about interfaces between TeleSoft and the outsourced units after the divestiture.

The intention was to support the creation of a market for integration services, enabling TeleSoft to procure these services on the market and TeleIntegration to market these services to multiple customers. The downturn and emerging recession in the telecommunications industry seems to have made this very difficult though. Still two years after the divestiture TeleSoft procured a larger volume of services than contractually committed from TeleIntegration although the volume had decreased slightly. TeleIntegration's sales to new customers were dismal.

Both TeleSoft and TeleIntegration recognized direct after the divestiture a need for a more formalized relation with specified dialogue arenas. For this reason later on a partnership was developed between TeleSoft and TeleIntegration.

### TeleModule

TeleModule was a wholly owned subsidiary to TeleSoft, and did development of new service modules, IT-systems for administration and management of the telecom network. This could be described as a number of important modules for the end-product.

TeleSoft had since several years concentrated their R&D activities for these special modules to TeleModule but retained the responsibility and a small absorptive capacity in-house. The price level for the R&D services was partly connected to the price-level that TeleSoft paid external companies when buying similar services to other type of modules. This created a type of a quasi buyer-supplier relation between TeleSoft and TeleModule.

TeleModule was bundled with TeleIntegration and a handful of other subsidiaries and divested as a package, as described above.

The divestiture contract did not specify how the buyer-suppler relation should be managed or which dialogue forums that should exist. There were a large number of operational level contacts about specific projects and specific modules with different individuals responsible for different end-products at

TeleSoft. There were no formal contacts on a corporate level between TeleSoft and TeleModule.

At TeleModule the divestiture was received positively, since the market was still good, bureaucracy was perceived as being reduced and TeleModule for the foreseeable future was guaranteed a substantial portion of existing revenues from TeleSoft. During that time, the plan was to build a complementary new customer base. The decline in the IT- and telecom markets later drastically changed the possibilities of building that complementary customer base. Tele-Soft only ordered the contractually committed amount of services, and at the now lower market prices, resulting in a severe financial crisis for TeleModule, resulting in significant downsizing. One division within TeleModule decided to entirely close down the operation at one site. As a consequence another division working with another component which was strategically important to TeleSoft closed down their activities at the same site. TeleSoft were taken by surprise. There was no communication about the overall relationship between the two partners, and thus no communication about the effects of downsizing part of the business on other parts of the business. The situation had created a structural inflexibility.

TeleModule perceived immediately following the divestiture that an improved strategic dialogue with TeleSoft would enable finding win-win solutions. They were unable to establish any strategic or centralized dialogue, since TeleSoft chose to keep the communication distributed and restricted to each individual assignment. Eventually TeleSoft realized the effects - such as the site closure - of isolated communication without coordination, and initiated a group that could maintain a strategic dialog with TeleModule to mutually address difficult situations and problems in the inter-organizational relationship.

## ANALYSIS

We start our analysis by identifying the process steps involved in divestiture and outsourcing, and continue by analyzing our cases based on these process steps.

Our three cases in two firms clearly show the role of the firm-internal context for divestiture and outsourcing. To understand the cases, the organizational context is important. In all cases we could see that central to initiation as well as decision-making regarding outsourcing, is the firm's overall strategy regarding business and organizational structures. This strategy evolves within a small group of executives, and later emerges into the open, becomes known to the employees, meets resistance as well as support, and emerges further based on the interactions and experience being developed. We also found that in order to make divestitures possible, a process of organizing the firm tended to precede

the actual divestiture and formation of IORs. We describe the process on the firm-level and on the unit level (figure 1).
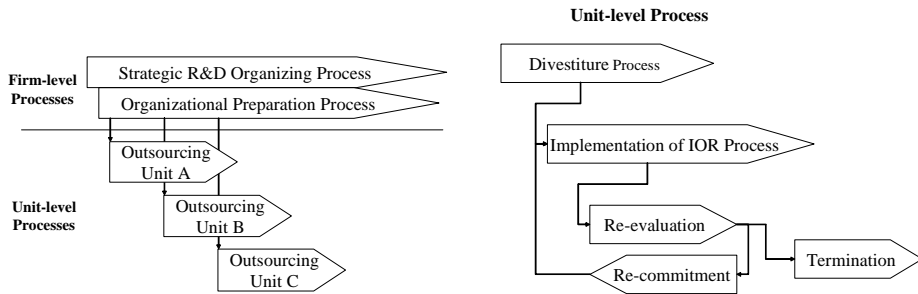
## Firm-level processes

From both TeleHard and TeleSoft cases we see that the R&D strategy is developed as part of the overall firm-level strategy, and is clearly linked with other firm-level strategies such as product, market and technology strategies. The decisions on business and organizational structure together with the R&D capacity form the framework for an organizational preparation process, as well as for the individual cases of outsourcing R&D units.

In TeleHard, the R&D concentration strategy had been developed since several years, but only when hard time hit, could it be implemented. In TeleSoft, the firm strategy was based around and driven by the need to downsize and streamline the organization to be better prepared for possible mergers and acquisitions. In both firms, this initiated firm-level processes changing the size and scope of the firm. The strategy process and the organizational preparation process run in parallel. The organizational preparation process creates options for divestiture. When a decision is made to divest a unit is made, a new process takes over, another set of actors become involved and focus on making the decided divestiture happen.

## Unit-level processes

The divestiture process starts when it has been decided to outsource a unit. Primarily in order to speed up the process, packages of units to be divested were constructed, although often these packages had to be modified during the negotiations with prospective buyers. In all cases, the divestiture contracts included volume purchase agreements (VPA), detailing commitments from and rights for the outsourcing firm to purchase a specified volume of R&D services from the divested units. In the TeleHard case, the contract also elaborated on interface structure and establishment of dialogue arenas for jointly discussing the relationship.

The implementation of an R&D IOR implies managing and reevaluating the relationship to the divested unit, now an external supplier rather than a part of the internal hierarchy. In the case of TeleComponent both formal and informal reevaluations have been done, leading to at least informal resolution of problems. In the TeleSoft cases, reevaluation was part of ad hoc meetings. The existence of more structure as well as dialogue forums in the TeleComponent case supported a joint problem solving while the absence of pre-defined arenas impeded joint problem-solving.

**Figure 1. Two process levels in divestiture and outsourcing: firm level and unit level.** The strategy of the firm evolves, and initiates an organizational preparation process. For each outsourcing case, there is first a divestiture process, followed by the implementation of the IOR. Reevaluation is a more or less a continuous process, leading through renegotiations to revised conditions or possibly to termination of the IOR.

## The strategic R&D organizing process

When companies outsource, one important reason is a need for flexibility, at least in the cases we have studied. In TeleHard's strategic re-organizing of R&D the main drivers were efficiency and accountability. Units and geographical sites were as far as possible focused on one module or integration of one product, each module was allocated to one unit and the integration of a particular product was allocated to one unit. This, although justified by the strive for efficiency and accountability, created a possibility for increasing structural flexibility by divesting units and possibly in the future switching to new suppliers. TeleHard also needed to be able to adapt R&D to changes in demand regarding volume and direction.

TeleSoft needed to downsize as well as be prepared to restructure the organization to re-align with another organization as a result of a future consolidation in the industry. TeleSoft therefore needed volume or operational flexibility as well as structural flexibility. In addition to this, due to the turbulence in the industry, and the difficulty in anticipating the future, calling for an ability to change direction in R&D, they needed structural flexibility.

## The organizational preparation process

The organizational preparation process often started long before the individual decisions to divest and outsource the different R&D units. This lead to shifting and concentrating responsibilities, and reducing interdependencies between different R&D units. When the decision to divest was taken, the organizational

preparation continued for the outsourcing firm, both in order to accommodate the new situation with outsourced R&D and to support further structural changes.

Looking at TeleModule, it is clear that semi-commercial interfaces were built many years before divestiture. Module design activities were moved from Tele-Soft to TeleModule, but a significant absorptive capacity was still maintained at TeleSoft. There was a complex mapping between the modules of TeleModule and different organizations responsible for different end-products in TeleSoft. TeleIntegration had a more straight forward mapping of it's organizational structure to the structure of TeleSoft.

## The divestiture process

In the divestiture process, the object to be divested was defined based on the units that were decided to be outsourced. What shall be included, and what shall be excluded? After deciding on these issues, the seller identified potential buyers, enticed their interest, choose a suitable buyer and initiated negotiations. This process set the initial conditions for the inter-organizational relationship between the outsourcing firm and the divested unit.

The divestiture contracts, in all three cases, contained volume purchasing commitments. What to buy was less well specified than how much to buy. In the case of TeleHard an elaborate post-divestiture interface was specified in the contract, creating arenas for strategic, structural as well as operational dialogue. In the cases of TeleModule and TeleIntegration, nothing was stipulated about the interface between the partners.

## The implementation process

The implementation of the relationship with the divested unit was done differently in the TeleHard and the TeleSoft cases.

In the case of TeleComponent the operational organization in TeleHard soon after the signing of the contract started to try to make sense of the contract, and understand the explicit and implicit implications. Interfaces and dialog arenas were implemented. Quite quickly it became apparent that the contracted volumes matched neither the capacity of TeleComponent nor the needs of TeleHard. The dialog arenas provided a forum for resolving these problems and other potential sources of conflict.

TeleModule identified a mismatch in structure as well as in the interface with TeleSoft, and therefore created an internal divisional structure to better map their own business structure. This new structure did not, however, match the geographical distribution of TeleModule. The communication between TeleSoft and TeleModule was always about specific modules and therefore with specific divisions of TeleModule. There was no communication about the overall

relationship between the two partners, and thus no communication about the effects of changes in area on other areas and divisions. The situation had created a structural inflexibility. Eventually this lead to the creation of a dialogue forum to jointly discuss general issues between the partners.

The implementation process for TeleIntegration took an entirely different path. Connections from the TeleSoft end-product responsible to TeleIntegration integration activities was much tighter than to the module development at TeleModule. Despite the absence of an interface description in the contract, both partners soon identified a need for tighter cooperation and a more elaborate partnership relation was established. A small unit within TeleIntegration worked with non-integration related activities. They had difficulties in finding relations with TeleSoft, resulting in low order intake and eventually the closure of that unit. The lack of a dialogue arena disabled communication with TeleSoft about the value of these services.

## SYNTHESIS

We synthesize our findings from the analysis, and try to extract conclusions about how structural issues impact flexibility.

### Strategic flexibility

The strategic flexibility, i.e. the ability to do different things, by changing strategies, applying new technologies or creating new product market combinations, has not been shown to change significantly as a result of outsourcing. One could argue that outsourcing integration would decrease the strategic flexibility due to its connection to the end-product, but we have not been able to observe this. However, the strategic flexibility seems to have increased as a result from the organizational preparation process. The reduction of interdependencies between different units and creation of an organization that is more modular and more in line with the product architecture create possibilities for developing new product and market combinations by new combinations of internal and external modules.

### Structural flexibility

Structural flexibility, i.e. dealing with changes in the environment by doing things differently, is affected by the outsourcing. When studying TeleComponent and TeleModule we see that the outsourcing firm, in both cases, have introduced alternative suppliers for the services provided by TeleComponent and TeleModule respectively.

The structural flexibility was in all cases created in the organizational preparation phase. By concentrating most R&D activities for each module to one site, and by introducing clear interfaces, management created options for divestiture and outsourcing. This structuring of the organization in line with the product architecture creates structural flexibility. As we see from the cases, the divestiture was done along the lines of the existing organizational structure, using the existing structural flexibility rather than creating new structural options. In the TeleModule case, the internal organizational structure had not been modularized before divestiture and outsourcing. Internal modularity increases transaction costs, increases rigidity and reduces operational flexibility, while increasing structural flexibility. Comparing the cases of TeleModule and TeleIntegration, outsourcing module R&D contributes to increase structural flexibility, whereas outsourcing of integration does not.

## Operational flexibility

Operational flexibility, i.e. an ability to increase and decrease volumes, seems to increase with outsourcing, but with clear limitations. Studying TeleModule and TeleComponent we see that small changes in volume can be accommodated. The dialogue arenas in the TeleComponent case seems to support the mutual adjustment while the lack of dialogue forums may be an explanation why Tele-Soft were surprised when TeleModule announced that a critical service would disappear as a result of downsizing. This incident also illustrates the need to align organizational and product structure, in order to maintain and develop operational flexibility.

When comparing TeleModule and TeleIntegration, we see that interfaces develop over time although starting from the low formal level defined in the contract. In the case of TeleIntegration the interfaces evolved rather rapidly from initially thin to gradually thicker and more extensive. In the case of TeleModule the interfaces remained sparse until TeleModule closed one site hurting vital services used by TeleSoft. The initial conditions with respect to the interface between the parties are quickly changed if both parties see a reason for this, which is in accordance with R&D IOR theory [9, 10].

Summarizing, we can categorize our cases and the impact of structure on flexibility along two dimensions (Table 1). First, we differentiate between R&D focusing on the final integration of the end-product versus R&D focusing on the development of one or several modules to be integrated into the end-product. Second, we differentiate between thick (extensive) and thin (sparse) interfaces between the outsourcing firm and the divested unit.

| Initial IOR Interface | Relation to the firm's end product | |
| --- | --- | --- |
| | R&D related to integration of end-product | R&D related to module in the end-product |
| Thick IOR Interface | | **TeleComponent** Structural flexibility increased Operational flexibility increased |
| Thin IOR Interface | **TeleIntegration** Structural flexibility unchanged Operational flexibility increases | **TeleModule** Structural flexibility increased Operational flexibility decreased to some extent, increased to some extent |

Table 1. Structural issues impact on flexibility

## CONCLUSIONS AND IMPLICATIONS

Based on our study of three R&D outsourcing cases in two firms in the telecommunications industry, we propose some tentative conclusions about the influence of process, interface and structure on flexibility of the outsourcing firm. In order to test the applicability of these propositions in other contexts, further research is required.

First, the organizational development before divestiture is critical in enabling new interfaces and structures to support divestiture and outsourcing, thus creating flexibility. Aligning the organizational structure with the product architecture creates flexibility and supports both divestiture and outsourcing.

Second, outsourcing of R&D related to development of product modules enables structural flexibility for the outsourcing firm. The structural flexibility implies an ability to change the supplier if needed. Outsourcing of integration activities did not exhibit the same increase in structural flexibility.

Third and final, a rich interface and a forum for dialogue between the outsourcing firm and the divested unit increases the flexibility in all dimensions. Such an interface can help resolve the operational issues, can reduce the risk for

structural negative surprises as well as support joint strategy development to support a continuously evolving inter-organizational relationship.

This article attempts to contribute to understanding outsourcing of R&D through divesting internal R&D operations, and in doing so proposes some tentative conclusions. Further research is required to see the applicability of these results. Specifically we propose comparisons with other industries such as the automotive, so identify commonalities and differences. Following outsourcing cases over a longer period of time would allow going beyond identifying the generated flexibility options to actually seeing them exercised. Did they hold true on their promises? Finally, this study was performed during the recessionary period of the telecom industry. What effects did the downsizing and outsourcing have long-term on the industry and the firms involved? Further research on the long-term effects is needed.

These findings, has a number of implications for practical management of R&D organizations. It is imperative to make clear where in the organization there is a need for structural flexibility, as well as why. Streamlining the organization with the product architecture creates options for outsourcing and divestiture that may be exercised in the future.

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