Strategic Alliances for Innovation

Exploiting and Exploring in Turbulent Times

Master Thesis Strategic Management

By Josse Dorleijn

TILBURG UNIVERSITY

Strategic Development Group
Management consultants

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Subject	Master Thesis
Name	Josse Dorleijn
Student number	863932
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Supervisor Tilburg University	prof. dr. G.M. Duijsters
Supervisor internship	D.P.M. Maessen MMC, CMC
Reader	drs. S.H.J. van den Hoogen

PREFACE

This thesis is the final assignment for my master 'Strategic Management' at Tilburg University. After 6 months of work, it is finally done. It has been a difficult and sometimes stressful process, however, a very educational and satisfying way to end my wonderful time as a student in Tilburg.

The topic 'alliances for innovation' was chosen because innovative products have always fascinated me. Especially the way that existing technologies from distant industries can sometimes be combined rather easily and still generate a fabulous new product. Famous examples of this on the Dutch market are the Senseo, which was developed by an alliance between electronics company Philips and coffeemaker DE, and the BeerTender which was developed by Heineken and Krups. These products were so successful that similar alliances for innovative product development are also referred to as 'The Senseo Effect' (Griffioen, 2008).

I would like to use this opportunity to thank a few people that helped and supported me with writing this thesis. First, I would like to thank my colleagues at SDG for providing an exceptional stimulating and comfortable working environment and for introducing me to the business consultancy world by filling me in on all sorts of strategic business projects. Especially I would like to thank Denis Maessen for supervising my work and allowing me to make use of the network of associates of SDG. I would like to thank all the participants of the interviews for telling me all about their company's strategy. Also my dad needs be thanked for being there as a discussion partner and for reviewing my work. In addition, I want to thank Kirkman Company for providing me with a management traineeship even before this thesis was finished. Whom I cannot forget are all my friends from TSVV Merlijn, ESN and 'Het Konijnenhok' who were always there when I needed some distraction. Last but not least, I want to thank prof. dr. Duijsters for inspiring and supervising me to the final product that is in front of you. I hope you enjoy reading it!

Josse Dorleijn

Tilburg, March 2010

MANAGEMENT SUMMARY

Strategic alliances are increasingly seen as the future of innovation strategy. No matter how large companies are, they show a tendency to develop a major part of innovations outside the company walls. While on one hand the world needs to be explored for brilliant innovations, at the same time, businesses are struggling to keep their heads above water. This study integrates these two issues by combining strategic alliances with '*ambidextrous innovation strategy*': the simultaneous pursuit of *exploitative* and *exploratory* innovation. The following research question was formulated: *What are the key dynamics of 'ambidextrous innovation' and how can strategic alliances be used in this innovation strategy?* To answer this question a theoretical model is created and empirically cases were examined.

A theoretical model is built, beginning with the identification of three business environmental forces: technological change, competition intensity and institutional uncertainty. Organizations need to adapt to the business environment by pursuing both exploitative *and* exploratory innovation, also called 'ambidextrous innovation'. In a *stable* environment a major focus should be on *exploitative* innovation while in a highly *turbulent* environment a major focus needs to be on *exploratory* innovation. This way, the environmental forces determine to what extent these innovation types need to be pursued. However, innovation can be developed by 'make, buy or ally' strategies. While the majority of organizations used to develop all their innovation in-house, organizations increasingly develop innovations through forming strategic alliances. This 'ally' strategy is proposed to outweigh 'make' or 'buy' strategies. The research examines how different types of strategic alliances are able to complement internal innovation strategies.

In order to empirically validate the proposed theoretical model, nine case studies were performed. The cases provide all different and interesting perspectives on how alliances can be used for the purpose of innovation. The most important findings were that even though there is wide support for organizations pursuing a *focus strategy,* it is found that organizations pursuing *both exploitative and exploratory innovation* perform better, as long as the firm is organized appropriately. In addition, the business environment should not be seen as either *stable* or *turbulent*. Instead, environmental forces need to be treated separately. Organizations should adapt to *high technological change* by pursuing mainly *exploratory innovation*, while they should adapt to *high competition intensity* by pursuing mainly *exploitative innovation*. This way, innovation strategy needs to be determined according to company specific environmental forces. Besides, the value of strategic alliances for developing innovation is confirmed by the research. The companies preferred alliances over 'make' or 'buy' strategies. The main reason for this is that alliances can be used to complement internal innovation strategies that are incomplete. Even though alliances were expected to be used as a tool to integrate mainly *exploratory innovation*, a remarkable finding was that mostly *exploitative innovation* is pursued in alliances. Furthermore, it was expected that alliances would have a focus strategy on either integrating extra marketing/production activities or integrating extra R&D activities. However, the experience was that in the ideal alliance, both types of activities are pursued.

While many studies stop after providing theoretical solutions, this study wants to make sure that the theoretical model can be applied effectively by business managers. Therefore, practical and comprehensive recommendations have been formed which integrate the most successful alliance strategies that were found during this research.

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CHAPTER 1 INTRODUCTION

Innovation in turbulent times

A notable trend in today's business world is the increasing turbulence of markets (Kotler & Caslione, 2009; Jansen, Van den Bosch & Volberda, 2005; Dess & Beard, 1984). With the rise of information technology (Dodgson, Gann & Salter, 2006; Henderson & Venkatraman, 1993), organizations are able to communicate easily and at a greater speed than ever before. Consequently, organizations all over the world are doing business with each other, and the business environment has become highly complex. However, organizations are experiencing increasing difficulties in regards to managing the influencing environmental forces (Lawless & Finch, 1989). On one hand, the ever increasing rate of environmental change has given organizations many new opportunities[1] (Chesbrough, 2003; Post & Altma, 1994), but on the other hand, this development can also be seen as a threat when firms cannot keep up with it.

Traditional businesses cannot be sure anymore of whether they can continue their activities as they have done for decades. Even large companies that have had strong positions in the market for years run the risk of losing their market power due to radical innovations introduced by competitive organizations. These innovations typically involve enhanced technology that significantly improves existing products. This process is called '*creative destruction*' (Tidd, Bessant & Pavitt, 2005; Schumpeter, 1942) and is especially applicable to the history of the music storage business. LPs were replaced by cassette tapes, which later were replaced by CDs, and eventually CDs were replaced by MP3 players. These disruptive innovations such as MP3 players destruct the market value of the old product, the CDs. Thereby, the market power of incumbents in the music storage market is destructed, which in turn creates room for new organizations that develop MP3 players. This example of *creative destruction* and *disruptive innovation* illustrates that organizations actively need to protect their market position in order to survive. They need to integrate a certain flexibility to be the first in developing new technology. In addition to *creative destruction theory* (Schumpeter, 1942), many other theories try to explain these market developments and come up with strategies to deal with them in the most efficient way (Tidd, Bessant & Pavitt, 2005).

Innovation explained

This study draws in particular on ideas from *strategic management, organization theory*, and *learning literature*. The basic idea is taken from the '*resource-based view*', a perspective within strategic management literature that receives increasing support of scholars (Barney & Hesterly, 2005). The *resource-based view* revolves around the idea that resources and capabilities are the most important asset to a firm because they can provide competitive advantage. However, they must be unique to the firm by being Valuable, Rare, *In*imitable and Organized (VRIO framework). If the capabilities are not unique, they will be imitated by competitors. This means the firm will lose its competitive advantage, and will not survive competition. Keeping the firm's capabilities as unique as possible is therefore an important goal (Barney & Hesterly, 2005).

In today's world, environmental demands change over time so capabilities may lose their value if they are not constantly renewed. As the environment changes, organizations need to adapt (O'Reilly & Tushman, 2008; Lewin, Long and Carrol, 1999; Anderson & Tushman, 1990) by changing their strategy,

[1] Think of new open innovation methods such as 'crowd sourcing'. By this innovation method, tasks, which are normally done by companies, are outsourced to a community, which is asked for contributions. This way, mass collaboration is enabled through the use of web 2.0 technology (Industria Congres, 2009). In addition, think of new organizational forms such as the 'flat world company' (Davids & Hendriks, 2008). Flat world companies are characterized by outsourcing almost all business activities through the organization of global collaborations.

their structure and thereby also their capabilities. As Lewin et al. (1999) have pointed out; organizations and their environment co-evolve over time. Environmental conditions determine organizational forms and simultaneously organizations try to mold the environment.

In strategic management literature the concept of '*dynamic capabilities*' (Teece, Pisano & Shuen, 1997) has been used to point out that organizations need to "integrate, build, and reconfigure competencies to address rapidly changing environments". This *dynamic capabilities* concept is rather similar to the way knowledge development is pursued through '*exploitation and exploration*' (organizational learning theory, March, 1991). *Exploitation* relates to learning by making new combinations of existing knowledge, while *exploration* relates to learning by searching for and experimentation with new knowledge. Thus, in a similar way to the *dynamic capabilities* concept, existing capabilities are being *exploited* while at the same time new capabilities are being *explored* to assure the development of new knowledge and products (Taylor & Helfat, 2009; O'Reilly & Tushman, 2008; Venkatraman, Lee & IYer, 2007). The combination of exploitation activities and exploration activities is therefore able to deal with both stable and changing environmental demands. This way, a *sustaining competitive advantage* (Porter, 1985) is achieved for the long term survival of firms.

According to '*technological change theory*' (Anderson & Tushman, 1990), the technological environmental demands change through long periods of *incremental change*, punctuated by periods of *discontinuous change*. Therefore, today's fast moving business environment requires organizations to exploit its current capabilities to assure short term profits, while in the meantime organizations need to come up with an innovation strategy that meets the changing environmental demands. Organizations should pursue incremental innovation during periods of incremental change. During periods of discontinuous change; however, organizations should change their innovation strategy to pursuing radical innovation. Innovation strategy should be adapted to changing environmental demands, in order to create a sustainable competitive advantage. Based on *technological innovation theory* (Benner & Tushman, 2003), incremental technological innovations and innovations designed to meet the needs of existing customers or markets are *exploitative* and build upon existing organizational knowledge. In contrast, radical innovations or those for emergent customers or markets are *exploratory*, since they require new knowledge or departures from existing skills (Levinthal & March, 1993; March, 1991).

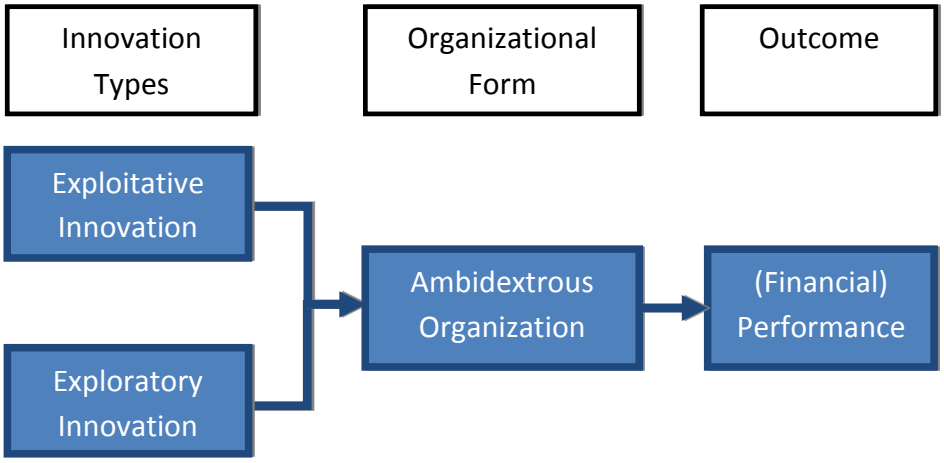
Concluded can be that innovation is seen to be critical to long term firm survival. However, the problem with innovation is that it can be very difficult to manage; it is a creative concept in which no fixed rules apply (Sundbo & Gallouj, 2000). For example, the best innovative products may be found with very little effort, while firms that spend all their resources on innovation may not succeed in their search for new and valuable products. In conclusion, there are no absolute terms for managing innovation. However, the probability to come up with innovative products can be increased significantly by having an appropriate innovation strategy.

Ambidextrous innovation

An innovation strategy that has been getting increased attention in literature is '*ambidextrous innovation*' (Raisch, Birkinshaw, Probst & Tushman, 2009; Raisch & Birkinshaw 2008; O'Reilly & Tushman, 2008; Jansen, 2005). An ambidextrous strategy promotes the simultaneous pursuit of exploitative innovation and exploratory innovation. The distinguishing feature of an ambidextrous organization is that it breaks with the widely supported argument of Porter (1985) that firms should pursue a focus strategy. Porter says that firms need to focus on either a cost strategy, or a differentiation strategy. If organizations try to do both, they need to compromise between conflicting demands and will 'get stuck in the middle'. When pursuing both strategies, organizations cannot be

efficient and will not survive competition. On the contrary, the ambidexterity thesis argues that organizations need to pursue two conflicting strategies at the same time. This is a remarkable change in the line of reasoning in strategy literature. Ambidexterity theory does recognize the difficulties in managing two conflicting demands (Andriopoulos & Lewis, 2009; Duncan, 1976), but argues that organizations are able to create dual organizational structures by which both conflicting demands can be pursued efficiently. This would mean that if organizations are able to implement the ambidexterity strategy in an appropriate way, they are able to have a 'best of both worlds' approach. The considerable different ambidextrous strategy thinking is found to lead to higher financial performance for organizations (Gibson & Birkinshaw, 2004; He & Wong, 2004, Tushman & O'Reilly, 1996, see figure 1). This interesting ambidexterity concept leads to the first challenge of this study: to examine the key dynamics between exploitative and exploratory innovation strategy within the ambidextrous organization.

Figure 1 - The ambidextrous organization argument



Based on Duncan (1976), Jansen (2005), Gibson & Birkinshaw (2004), He & Wong (2004)

Collaborating for innovation

The ambidextrous innovation strategy is not the only trend that can be observed in the literature. A second upcoming trend involves an increasing group of scholars that is recognizing the importance of collaboration between firms for innovation purposes (De Man & Duysters, 2005; Chesbrough, 2003; Narula & Hagedoorn, 1999). Two of the reasons for the rise of inter-firm collaboration are the intensification of competition in globalized markets (Narula, 2001) and the continuously increasing technological change (Lambe & Spekman, 1997). As markets become more and more globally accessible (Levitt, 1983), multinational enterprises (MNEs) are able to grow at an increased rate and global competition becomes more and more intense. Because of this, survival for Small to Medium Enterprises (SMEs) is becoming increasingly difficult (Narula, 2001). The role of globalization has increased the use of external resources for several reasons. For example, innovation development lead times as well as the costs and risks can be reduced, and flexibility is increased (Hagedoorn 1993). Considering the different collaboration forms, the mostly used form is strategic alliances (Narula & Hagedoorn, 1999). Strategic Alliances are defined as "co-operative agreements between two or more organizations, which team up to share their inputs while maintaining their own corporate identity" (De Man & Duysters, 2005).

Strategic alliances

By enabling organizations to integrate external sources, strategic alliances positively influence the innovation performance of organizations (Faems, Looy & Debackere, 2005; Park, Chen & Challagher, 2002). Joint ventures, joint development programs and various types of technology sharing agreements have replaced traditional internal innovation practices. For example, large R&D investments can be shared by forming alliances (Tidd, Bessant & Pavitt, 2005). Two factors are causing that R&D alliances (Koza & Lewin, 1998) will lead to more exploratory innovation for the organization (Rothaermel & Deeds, 2004). First of all, more R&D can be done by splitting the costs and risks, and secondly, alliances can serve as a radar function which can spot new innovations in the market (De Man & Duysters, 2005). Next to R&D alliances, alliance literature has identified marketing and production alliances (Koza & Lewin, 1998). In contrast, these alliances are aimed at marketing products and exploiting the organizations' existing capabilities. Accordingly, marketing and production alliances have a positive effect on exploitative innovation in the organization (Rothaermel & Deeds, 2004). Strategic alliances can also have the advantage of direct inter-firm learning (Lane & Lubatkin, 1998). In this case, the partner firm should be chosen on the basis of having valuable complementary knowledge.

Overall, strategic alliances may have different effects on exploitative and exploratory innovation. This means that strategic alliances are able to play a role in configuring the amount of exploitation and exploration within the ambidextrous organization (Vurro & Russo, 2008; Lin, Yang & Demirkan, 2007). What this exact role is however, has still not received sufficient attention in the literature.

Main research question

This study proposes that, if the advantages of the ambidextrous organization are combined with the advantages of strategic alliances, firms might be able to achieve even higher innovation performance. To find out more about this, first the key dynamics in exploitative and exploratory innovation should be examined. When these dynamics are clear, the role of strategic alliances can be explored. This leads to the following main research question.

What are the key dynamics of 'ambidextrous innovation' and how can strategic alliances be used in this innovation strategy?

The problem statement will be answered by studying five different research sub-questions.

Research sub-questions

First all, organizations have to deal with changing environmental forces. In order to survive, they need to first identify which environmental forces they are dealing with and secondly place how fast these forces are changing. This leads to the first research sub-question.

1. *What environmental forces do organizations have to deal with? and what is the rate of change of these forces?*

Strategic management literatures are consistent about the fact that innovation can help organizations in adapting to the environment. This issue is discussed in innovation literature (March, 1991) which suggests that *exploitative and explorative innovation* should be used in adaptation processes. However, it is not clear in the literature *how* and *when* organizations should adapt to these different environmental forces. This issue will be addressed by the following research sub-question.

How can exploitative and exploratory innovation help in adapting to changing environmental forces?

In order to pursue innovation, organizations need to develop and manage their knowledge processes. Some scholars state that different types of innovation are pursued by having a focus on different parts of the knowledge sourcing process. To find out how knowledge should be absorbed for pursuing exploitative and exploratory innovation, the next question is posed.

2. *How does the knowledge sourcing process work for exploitative and exploratory innovation?*

When the knowledge sourcing process is identified, organizations should make the choice of *where* the innovation practices need to take place. Is the organization able to develop new knowledge and products in-house (a 'make' strategy)? Is it more beneficial considering the circumstances to license new technologies on the market (a 'buy' strategy) or is it more valuable to team up with partner firms (an 'ally' strategy)?

3. *Considering innovation: should firms choose to 'make, buy or ally'?*

Several scholars have identified the growing interest of firms of using strategic alliances for the development of innovation. What is not clear however, is what kind of alliances should be used for exploitative and exploratory innovation, and secondly how these alliances can become valuable in the search for innovation. This leads to the last research sub-question.

4. *How can strategic alliances be used for exploitative and exploratory innovation?*

Structure of this report

Chapter 2 will begin with building the theoretical framework and addressing the different sub-questions one by one. Starting from research question 2, each sub-question will add one part to the theoretical framework. After research question 5 is discussed, the model will be complete and will be ready for empirical investigation. The research method will be discussed in the chapter 3 and after that, the results of the empirical research will be discussed in chapter 4. Chapter 5 will be the final chapter of this report and will contain a discussion and conclusions. The main research question will be answered by drawing conclusions of the research. In this section the contributions of this study will also be discussed. Finally, the last section will examine the limitations of this study and the opportunities for future research.

CHAPTER 2 THEORETICAL FRAMEWORK

Environmental Forces

What environmental forces do organizations have to deal with?

In stable environments organizations can shape their products to meet customer preferences by exploiting its unique capabilities. As long as nothing changes in the environment, the customer preferences will not change very much and the firm can cope by refining its existing products (Van den Bosch, Volberda & De Boer, 1999). When the environment does change, however, a firm's products can become obsolete. At this stage the firm will need to adapt to changing customer preferences by developing new capabilities and products (Tushman & O'Reilly, 2008). *When* and *how* the organization needs to adapt depends on the following environmental forces: technological change, competitive dynamics and institutional uncertainties (Lewin, Long & Carrol, 1999). Both the rate of change and the unpredictability of these forces determine the extent to which organizations need to change their strategy. Accordingly, the more the environment changes, the more organizations will try to reduce the uncertainties that accompany these changes. This can be done by preparing for the future through innovation. In order to get a better understanding to what extent firms need to prepare for the future, the different environmental settings need to be examined further.

Technological change is the first force that is shaping the environment. According to Anderson & Tushman (1990) and Tushman & O'Reilly (1996), technological progress is an evolutionary system that is characterized by long periods of incremental change that is punctuated by discontinuous change. Since technological breakthroughs are very rare, the periods of incremental change will be very long and will contain many improvements of the existing technology's dominant design. This existing technology will be enhanced, extended and produced on large scale such that production becomes very efficient. This will be done as long as no significant advanced technology is presented. When the next generation of technology is developed however, the old technologies will be abandoned and the newer technologies take over the market (Tushman & Anderson, 1986). This description of the technological progress needs to be considered alongside the competitive dynamics in the market place and institutional forces since they can all have an effect on customer preferences.

The second environmental force is the competitive dynamics that organizations have to deal with (Jansen, Van den Bosch & Volberda, 2005; Grant, 1996a). The influence on organizations comes first of all from the number of competitive firms and the intensity of competition between those firms. For example, organizations would have to take more effort in monitoring customers, suppliers and competitors when the environment is highly competitive. Secondly, the complexity (Lawless & Finch, 1989) of the competitive environment makes it harder for firms to anticipate changes. The variety of organizational activities makes it difficult for a firm to tell if competitors are making changes that have serious consequences for the organization.

While on one hand the rate of competition influences the rate of environmental change, on the other the complexity of the competition influences the unpredictability of this change. This distinction between the rate of change and the unpredictability of change (Miles, Snow & Pfeffer, 1974; Jurkovich 1974) is important for the way organizations are able to organize and prepare for it. Unpredictability is by nature impossible to measure and is thus harder to account for than predictable changes.

The third force, the institutional environment, involves the national political climate including regulations, policies and governance of the country (Lewin, Long & Carrol 1999). Changes in the

institutional environment can have a major impact on organizations. Especially the uncertainty of unexpected policy changes adds to the unpredictability of the environment (Delios & Henisz, 2002). Examples of this are corruption in unstable countries or political leaders that abuse their power by acting out of self-interest. Organizations therefore have a preference for politically stable, often Western, countries (Delios & Henisz, 2002).

What can be concluded from the above discussion is that organizations have to deal with technological, competitive and institutional forces that might be changing rapidly and unpredictable. Organizations are all subject to these changing environmental forces in their own way, since they operate in different parts of the world and in different industries. Once the different environmental forces are identified as well as the power of these forces that influence the focal organization, the question that arises is: how should organizations deal with them exactly? In the literature, a widely recognized method is innovation (Lewin, Long & Carrol, 1999). However, in the innovation literature there is ambiguity about *how*, *why* and *to what extent* organizations should adapt their innovation strategy to environmental forces. This problem should be investigated further.

Innovation

How can innovation be used to adapt to changing environmental forces?

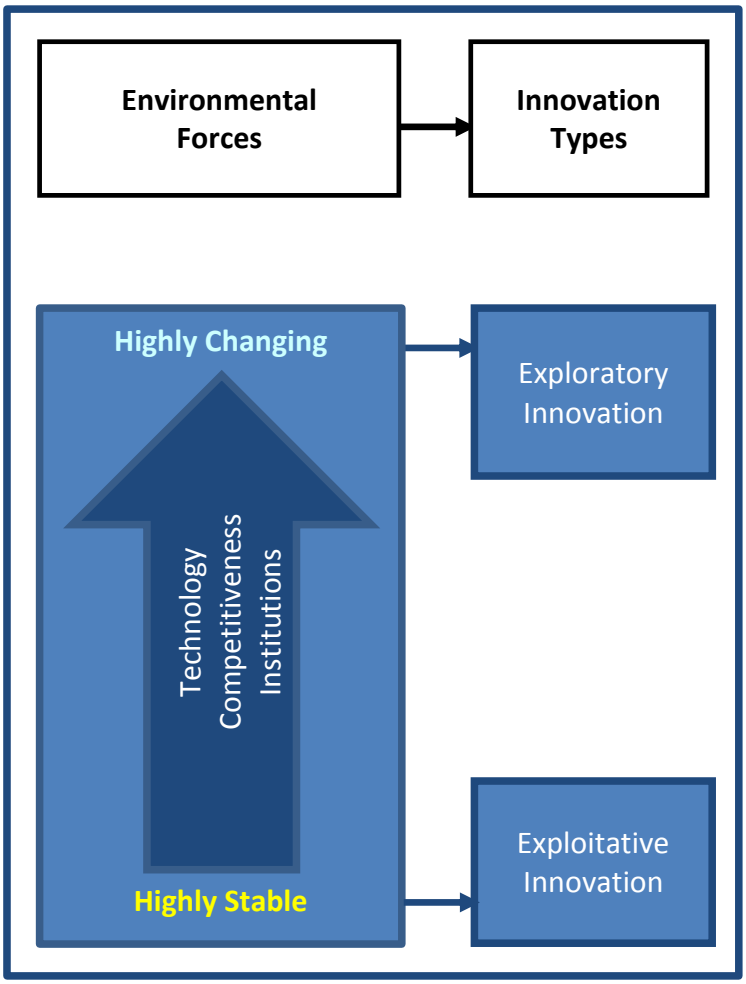
Benner & Tusman (2003) classified innovation in such a way that it is able to deal with the technology force and the competitive dynamics force. They call this the technology dimension and the customer/market dimension of innovation.

The technology dimension looks at the degree of radicalness of innovation. Building upon technological change theory, they state that incremental innovation should be used during periods of incremental change and that organizations should switch to radical innovation during periods of discontinuous change. Incremental innovation is characterized by relatively small changes to a firm's existing technological capabilities, while radical innovation, in contrast, represents fundamental changes to the technological trajectory and the associated competences (Dosi, 1982; Green, Gavin, & Smith 1985). This way, organizations are able to gradually improve the existing dominant designs and also to initiate major technological breakthroughs. This ability can give firms major advantages over rivals (Jansen, 2005).

The customer/market dimension is classified by whether innovations address the needs of existing customers or are designed for new or emergent markets (Christensen & Bower, 1996). Products designed for new customers are often organizationally disruptive and require significant departure from existing activities (Benner & Tushman, 2003). As explained in the introduction of this report, incremental technological innovations and innovations designed to meet the needs of existing customers or markets are *exploitative* and build upon existing organizational knowledge. In contrast, radical innovations or those for emergent customers or markets are *exploratory*, since they require new knowledge or departures from existing skills (Levinthal & March, 1993; March, 1991).

The classification of exploitative and exploratory innovation (Benner & Tushman, 2003) has incorporated ways for organizations to adapt to technological forces and competitive dynamics forces. When these environmental forces are highly stable and changes are predictable, organizations can cope by pursuing exploitative innovation. On the contrary, when the environmental forces are highly variable and unpredictable, organizations will not be able to cope by pursuing exploitative innovation. At this stage organizations will have to start with exploratory innovation (Benner & Tushman, 2003). The degree of environmental change thus determines the degree to which organizations should pursue exploitative and exploratory innovation. This leads to the following theoretical model (see next page).

Figure 2 - Theoretical model part 1/4



Based on Lewin, Long & Carrol (1999), Anderson & Tushman (1990) and Benner & Tushman (2003)

In this theoretical model the assumption is made that the extent to which organizations should pursue exploitative and exploratory innovation can be deduced from the rate of change in environmental forces. Since the pursuit of these two kinds of innovation is believed to lead to major competitive advantages over rivals, this idea needs to be examined further.

Exploitative and exploratory innovation

Exploitation and exploration originally come from organizational learning theory (March, 1991). Learning thus forms the basis for exploitation and exploration. Levitt and March (1988) explain how the learning process works. First, organizations learn through different experiences, and then, these experiences are interpreted into frameworks and paradigms such that it can be passed on to other organizational members. This way organizational learning can be recorded into an organizational code of routines whereby the learning keeps adding up even though employees are coming and going. When studying organizational learning and adaptive processes of organizations, March (1991) investigated the relation between the exploitation of old certainties and the exploration of new possibilities. He explains the characteristics of exploitation and exploration in the following way:

"*Exploitation* includes such things as refinement, choice, production, efficiency, selection, implementation, execution. *Exploration*, on the other hand, includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation".

Organizations are therefore able to adapt to the environment when they actively pursue exploitation and exploration activities. What March found was that problems arise when organizations do not have the right balance between exploitation and exploration activities. By nature, organizations have a preference for exploitation activities since the returns are more certain, closer in time and closer in space than the returns of exploration activities (Levinthal & March, 1993; March 1991). As organizations gain more experience in exploiting their existing products and technologies, they will become highly specialized. This will enhance the short term performance, but on the long term, this will result in a competence trap since they will not be able to adapt to large environmental changes (Levinthal & March).

When focusing on exploration activities and no exploitation activities are pursued, firms will experience a new set of problems. Because organizations will continually try to extend or renew the knowledge stock, they will suffer the costs of experimentation, but they will not gain many of the benefits from exploitation. Organizations will develop too many new ideas and not enough distinctive competence. Consequently, too much emphasis on exploration will result in a failure trap (Levinthal & March 1993).

Long term survival will therefore depend on the right balance between exploitation and exploration. Firms should "engage in enough exploitation to ensure the firm's current viability, while also engaging in enough exploration to ensure the firm's future viability" (Levinthal & March, 1993). The problem with doing both exploitation and exploratory activities, however, is that they are two incompatible concepts (Tushman & O'reilly, 1996) with conflicting characteristics. An overview of these characteristics of exploitative and exploratory innovation is given in the following table.

Table 1 Overview of exploitative and exploratory innovation (O'reilly & Tushman, 2004, p.80)

Alignment of	Exploitative innovation	Exploratory innovation
Strategic intent	cost, profit	innovation, growth
Critical tasks	operations, efficiency, incremental innovation	adaptability, new products, radical innovation
Competencies	operational	entrepreneurial
Structure	formal, mechanistic	adaptive, organic
Controls, rewards	margins, productivity	milestones, growth
Culture	efficiency, low risk, quality, customers	risk taking, flexibility, experimentation
Leadership role	authoritative, top-down	visionary, involved

Even though these characteristics are incompatible, a growing amount of scholars believe that organizations should pursue both types of innovation (Andriopoulos & Lewis, 2009; Gibson & Birkinshaw, 2004; He & Wong, 2004; Levinthal and March, 1993).

The ambidextrous organization

Organizations that pursue both exploitative and exploratory innovation are called 'ambidextrous organizations' (Duncan, 1976). Duncan introduced the term 'ambidexterity'[2] in the seventies and defined the concept in the following way:

"managing today's demands while also being adaptable to changes in the environment".

He points out that ambidextrous organizations incorporate two conflicting strategies within the organization by designing dual structures that facilitate the initiation and implementation stages of innovation (Duncan, 1976). The fact that organizations have problems implementing these dual structures follows from the fact that it took almost 30 years before empirical evidence was found that ambidexterity leads to higher performance (Gibson & Birkinshaw, 2004; He & Wong, 2004). Some scholars believe that organizations need to make a trade-off between exploitative and exploratory innovations because firms have limited resources (Liu, 2006). Other scholars have recognized that for larger firms, resources are not a limiting factor (Cao, Gedajlovic & Zhang, 2009; Gibson & Birkinshaw, 2004). Therefore, several scholars moved to a paradoxical view (Duncan, 1976; Gibson & Birkinshaw, 2004). These scholars believe that organizations must be able to pursue both exploitative and exploratory innovations when they are separated by organizational structure (Duncan, 1976) or context (Gibson & Birkinshaw, 2004).

Dual organizational structures can differ in the fact that they separate exploitative and exploratory innovations by time or space. For example, in choosing temporal separation, organizations can decide to pursue an exploitative innovation strategy during incremental change periods while switching to exploratory innovation during discontinuous change (Benner & Tushman, 2003). However, in the case of spatial separation, organizations may decide to separate exploitative and exploratory innovation in different business units (cf. Jansen, Tempelaar, van den Bosch & Volberda, 2009). This way, exploitative and exploratory demands can operate efficiently without being in conflict all the time. Because exploitative innovation (focusing more on operations) and exploratory innovation (focuses more on radical innovation) are such opposing logics, they need different organizational structures (Galbraith, 1982). Exploitative business units should use a mechanistic structure which keeps tight control over all activities while exploratory business units need an organic organizational structure that is more flexible and open to change (Burns & Stalker, 1961).

Spatial separation can also be accomplished by using different management levels to pursue exploitative and exploratory innovation. For example, lower management can experiment with new products (pursuing explorative innovation), such that middle management can evaluate the value of new products and top level management can decide which new products are going to be exploited (pursuing exploitative innovation; Jansen, 2005).

Apart from structural separation of exploitation and exploratory innovation, Gibson and Birkinshaw (2004) found that organizations can separate the two conflicting innovation strategies by context. They believe that employees can handle both exploitative and explorative innovation simultaneously if they are trained to switch back and forth between the two sorts of innovation strategies, depending on the

[2] To understand where the term 'ambidexterity' comes from, the definition of the dictionary can be used: "being able to use both hands equally well". Several examples of ambidexterity come from the context of daily life, where the use of both hands (or both feet) simultaneously is encouraged: type-writing, juggling, piano playing, surgery, and sports such as baseball or football.

context. Contextual ambidexterity needs to be implemented through complex organizational mechanisms (Gibson & Birkinshaw, 2004).

In conclusion, the environmental forces that organizations have to deal with are identified as technologies, competitiveness and institutions. The theory discussed illustrates that organizations use innovation to adapt to changes in these environmental forces. Exploitative innovation is used when the environment is stable and exploratory innovation should deal with changing environmental forces. Hence the level of exploitative and exploratory innovation should be determined according to the level of environmental change. When these relations were identified, the concepts of exploitative and exploratory innovation as well as the ambidextrous organization were clarified further to give a deeper understanding of its dynamics. The next factor that needs to be considered as a key dynamic of innovation is the knowledge sourcing process. Knowledge and learning form the basis for innovation and maybe even the whole firm (Grant, 1996), but how does this knowledge sourcing process work? And can the knowledge sourcing process be managed in a way that fits exploitative and exploratory innovation? This process is important in identifying how exploitative and exploratory innovation should be pursued in an appropriate manner.

Knowledge sourcing process

The reason why the knowledge sourcing process needs to be considered for pursuing innovation is explained by Bierly III, Damanpour & Santoro (2009). They state that the ability of firms to apply knowledge to the innovation process can be a critical source of competitive advantage. However, the way knowledge is sourced should be appropriate for the innovation type that is being pursued. Therefore, the knowledge sourcing process needs to be investigated further. Knowledge sourcing is distinguished in knowledge *transfer* and the *application* of knowledge (Zahra & George, 2002). On one hand, knowledge transfer relates to knowledge that is transferred from an external source to the organization. On the other hand, this transferred knowledge needs to be applied to the development or refinement of products (Bierly III, Damanpour & Santoro, 2009). The sourcing of knowledge is valuable for the innovation process for several reasons. First, the transfer and use of knowledge from external sources expands an organization's knowledge base. Thereby, access is provided to new ideas which can be used for the development of new products and technology. These new products and technologies in turn increase an organization's ability to generate profits. Together, these factors explain why sourcing external knowledge and using it for the development of innovative products is critical for success (Bierly III, Damanpour & Santoro, 2009). Cohen and Levinthal (1990) captured the described knowledge sourcing processes by the concept of 'absorptive capacity'. This concept needs to be investigated further since it is widely recognized by scholars and organizations (Bierly III, Damanpour & Santoro, 2009; Santoro & Gopalakrishnan, 2000; Van den Bosch, Volberda & De Boer, 1999)[3].

Absorptive capacity

Absorptive capacity theory posits that organizations need to source their knowledge according to four steps (Cohen & Levinthal, 1990 and Jansen, 2005):

1. Organizations need to *recognize* new, valuable, and relevant knowledge,
2. they need to *assimilate* it into their processes,
3. and they need to *apply* it commercially by both *transforming* the knowledge into usable frameworks or products
4. and by *exploiting* it on the market.

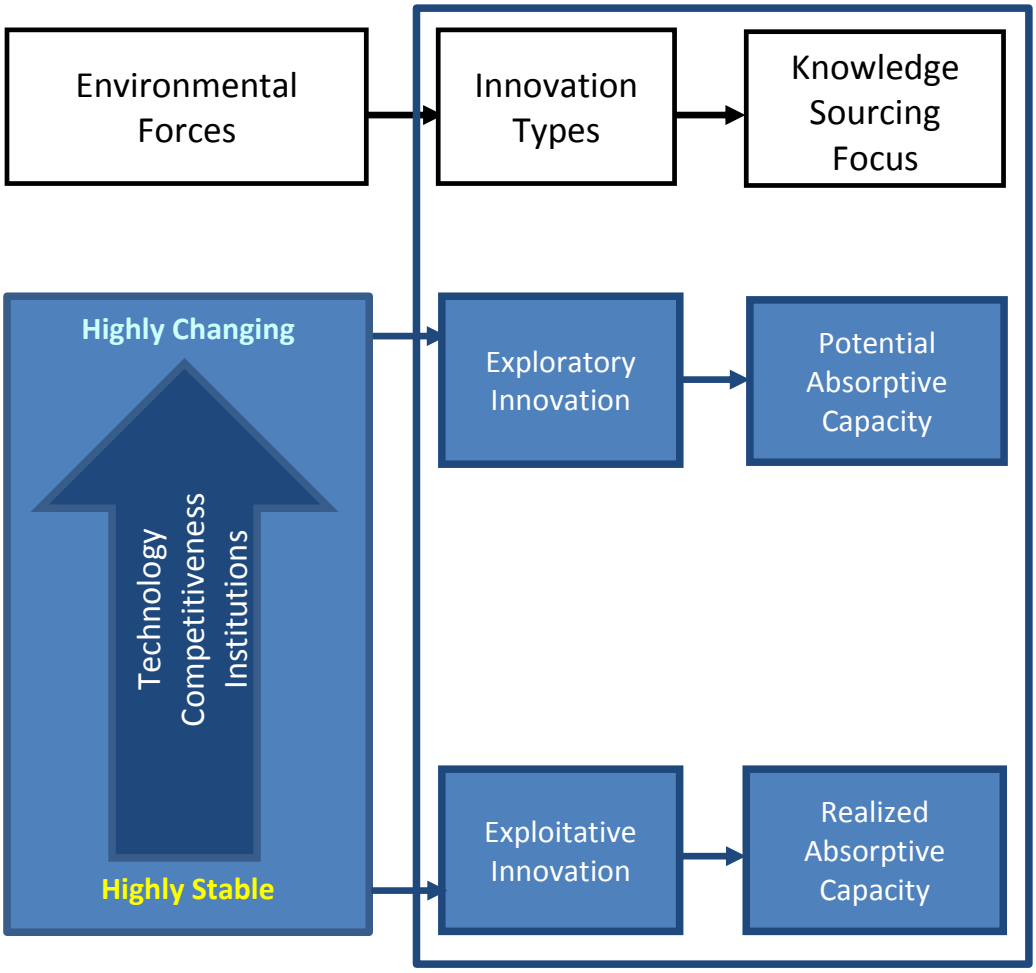
The first 2 steps involve knowledge that has the *potential* to become valuable for the organization once it is used in an appropriate way. Step 3 and 4, on the other hand, focus on the stage where knowledge has *realized* its value because it is been applied. Because of this difference in focus between the first and the last 2 steps, absorptive capacity can be divided into two different forms of absorptive capacity. '*Potential absorptive capacity*' relates to recognition and assimilation of new knowledge and '*Realized absorptive capacity',* which relates to commercial application of knowledge by transformation and exploitation (Zahra and George, 2002).

Cohen & Levinthal (1989) state that the (realized) absorptive capacity of organizations is increased when organizations develop related knowledge internally. Externally attracted knowledge can be applied more effectively because the organization has related knowledge in-house. Accordingly, organizations should pursue a decent level of exploratory innovation internally such that they become better at absorbing externally attracted related knowledge. This theory should be considered when managing the knowledge sourcing process. Concluding, organizations need to consciously manage their knowledge

[3] While many scholars were using R&D intensity as a measure for innovation (Tsai, 2001), more and more scholars have started to use the absorptive capacity concept because it is seen as a richer concept (Jansen, 2005). In contrast to R&D intensity, absorptive capacity also captures exploitation activities, and it can be viewed from different perspectives of the organization such as business unit level, firm level and inter-firm level (Jansen, 2005)

sourcing activities such that the absorptive capacity is as large as possible. The management of the knowledge sourcing process begins by having a focus that is appropriate for the pursued innovation strategy. Accordingly, organizations that are pursuing *exploratory* innovation need to focus on their *potential* absorptive capacity. On the other hand, organizations that are pursuing *exploitative* innovation need to focus on their *realized* absorptive capacity. The following step can be made in the theoretical model (see figure 3).

Figure 3 - Theoretical model part 2/4



Based on Zahra and George (2002) and Jansen (2005)

To summarize, after organizations have identified the extent to which exploitative and exploratory innovation should be pursued in order to cope with environmental forces, the focus in the knowledge sourcing process should be identified. *Potential* absorptive capacity is related to *exploratory* innovation and *realized* absorptive capacity is related to *exploitative* innovation. However, the competitive advantage is not only gained in sourcing the right type of knowledge. Just as important is choosing *where* to source this knowledge. Organizations need to choose whether to develop the needed knowledge internally, to purchase new knowledge on the market or to engage in strategic alliances for new knowledge development. This choice is also known as the 'make, buy or ally' (Davids & Hendriks, 2008) decision.

Make, buy or ally?

Make

The traditional innovation strategy of large multinational enterprises was to create large internal research and development departments, such that all new technologies and products could be developed in-house (Pisano, 1990, Huston & Sakab, 2006). Huston and Sakab call this 'the invention model'. Many MNEs invested heavily in these R&D labs and tried to develop all innovations themselves. This was especially the case in markets that are dominated by few large competitors such as the pharmaceutical industry (Veugelers, 1997). An advantage of doing it all yourself is that once the R&D department becomes successful, all the returns can stay within the organization instead of having to be shared with potential partners (Hennart, 1991). In addition, the R&D activities can be strategically directed because the activities are under full control and new knowledge remains inside the firm (Tidd, Bessant & Pavitt, 2005: 376). A disadvantage of doing all the exploration internally is that organizations depend on the limited amount of technologies that are developed in-house (Hennart, 1991). On top of that, organizations need to make large investments and commitments for R&D departments with the accompanying risk of having no guarantee for success (Tidd, Bessant & Pavitt, 2005: 376). Another option that organizations have for the acquisition of technologies is through acquiring other companies that own the required knowledge (Duysters & De Man, 2005). By using this method, fast access and control is gained over new knowledge. However, the organization may not be able to absorb the knowledge of the acquired company. Both discussed options have their advantages but can be a very costly as well (Tidd, Bessant & Pavitt, 2005: 376). Alternatives to developing technology in-house, are either to license existing technologies on the market, or to engage in strategic alliances with other organizations (Robertson & Gatignon, 1998; Davids & Hendriks, 2008).

Buy

When licensing technology on the market, fast access can be gained to external knowledge sources and organizations do not have to make investments in R&D themselves (Tidd, Bessant & Pavitt, 2005: 376). The low investment commitment is a great advantage of licensing technologies over developing them in-house. Firms are able to choose from a large amount of technologies on the market which have already proven to be a success (Hennart, 1991). The downside of buying technology, however, is that it can be very costly and it involves a lack of learning for the buying organization. In addition, difficulties can occur when organizations do not have enough knowledge about the technology they are buying. Selling organizations often need to maintain some level of secrecy in regards to their technology to prevent imitation by competitors (Tidd, Bessant & Pavitt, 2005: 153). This secrecy also means that selling organizations are able to overvalue their technology. This risk should be taken into account by buying organizations. While technology licensing thus has advantages in terms of easy access of knowledge and low investment commitment, a large disadvantage concerns that the technology is also freely available on the market for competitors. This means that the technology in question will not be able to provide a significant competitive advantage to the organization (Barney, 2001). The organization should therefore acquire technology in such a way that not every competitor is able to get them too. This is one of the reasons why organizations are increasingly engaging in strategic alliance (Robertson & Gatignon, 1998).

Ally

Strategic alliances are able to provide competitive advantage largely because they enable organizations to address complex problems (Tidd, Bessant & Pavitt, 2005: 376) by providing firms with additional resources that cannot be purchased on the market (Yasuda 2005). Partner firms can combine complementary knowledge sets and develop unique products which cannot be easily imitated by

competitors (Tidd, Bessant & Pavitt, 2005: 376). At the same time, the large investments that are related to research and development, both technological and financial resources, can be shared with one or more partner firms (Hennart, 1991). The sharing of these costs, risks and technologies means that organizations can afford to pursue more R&D. In strategic alliances, knowledge can thus be acquired by jointly developing knowledge, but also by learning from the partner firm (Holmqvist, 2004; Lane & Lubatkin, 1998; Lane, Salk & Lyles, 2001). This type of learning typically takes place in joint ventures, where the parent firms are acting as teachers of the newly formed venture (Lane, Salk & Lyles, 2001). Besides adding value through pursuing *joint R&D*, strategic alliances can be used to add production capacity to the organization (Yasuda, 2005). In these *sourcing agreements*, firms exchange manufacturing resources for financial compensation, which is cheaper than investing in new facility construction, equipment and materials for developing more production capacity in-house (Yasuda, 2005). While one firm might have a shortage of production capacity, partner firms might have more than enough production capacity, and can be willing to collaborate. While all the discussed factors involve the value that strategic alliances can bring to organizations, there are also disadvantages of strategic alliances that need to be considered.

One of the disadvantages of strategic alliances is that partnerships might not be working due to conflicts (Tidd, Bessant & Pavitt, 2005: 376). Conflicts can arise mainly because the partner's goals and expectations are not properly aligned by making clear contractual agreements. For example, the deliverables of both parties should be clear and also the way returns are going to be shared. Besides issues of making bad agreements, also differences in culture can cause misunderstandings and trust issues (Lyles & Salk, 1996).

The following table gives an overview of critical factors when choosing to 'make, buy, or ally'.

Table 2 Developing innovation through 'make, buy or ally'

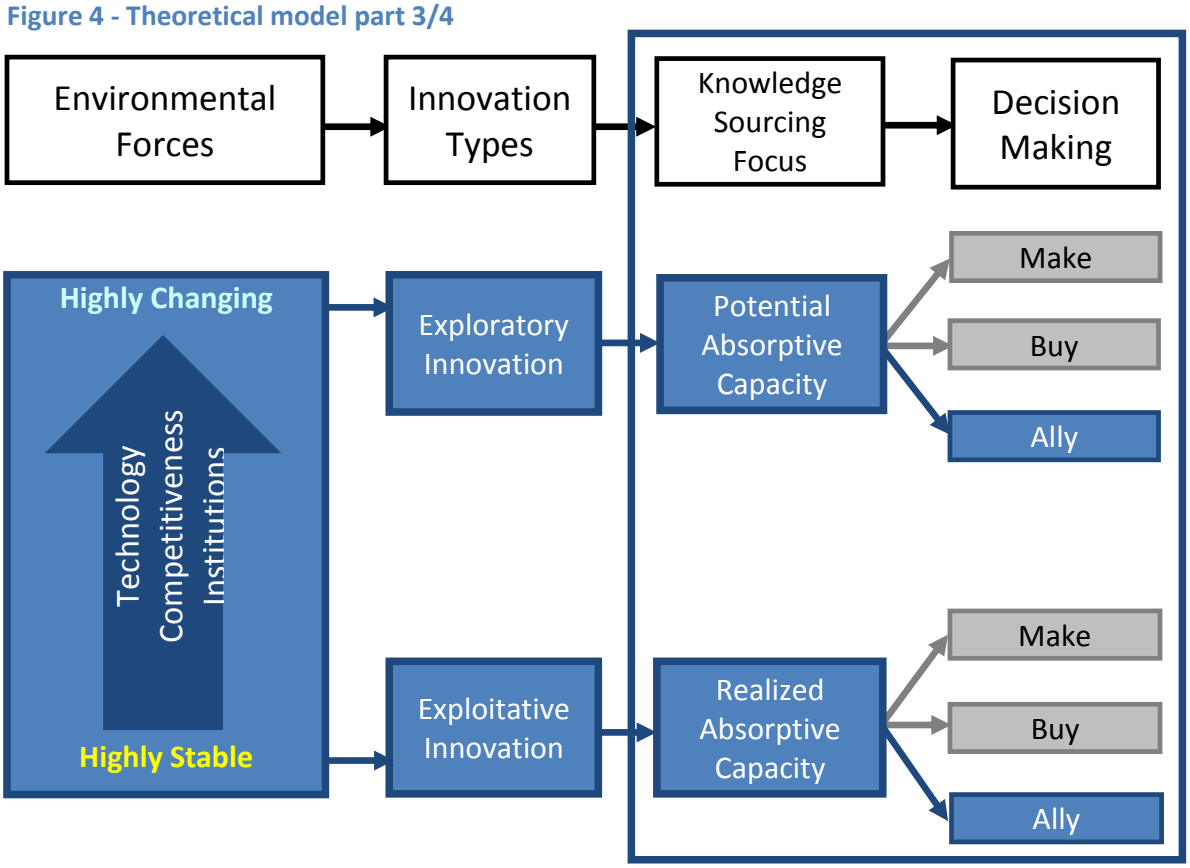
	Buy	Ally	Make
Value chain function, technology development	- Purchase goods - Technology licensing	- Jointly develop technology - Source production capacity	- Develop technologies in-house - Acquire another firm that owns technology
Main drawback	Technologies also available for competitors	Conflicts can arise between partners	High commitment is needed
Technology search	Fast and easy access to many technologies	Available technology dependent on availability of partners	Long development lead times, limited technologies to choose from
Learning	Lack of learning	Potential learning	High learning
Resource investment	Low	Shared	High
Risk	Low	Shared	High
Control on technology outcome	Close control	Shared control	Loose control
Strategic control	Low	Shared	High
Contractual agreement	Market transaction	Contract based partnership Equity joint venture	Wholly owned business enterprise
Duration collaboration	One time transaction	Often short term collaborations	Long duration

Among others (see discussion), based on, Tidd, Bessant & Pavitt (2005) and Matzat & Snijders (2007)

When comparing the different advantages and disadvantages of 'make, buy or ally', it becomes evident that all three options have valuable advantages. However the value depends on each firm-specific situation, many organizations have experienced difficulties to keep up with competition when developing all knowledge internally (Huston & Sakab, 2006). These difficulties arise mainly due to a combination of increasing R&D costs (Huston & Sakab, 2006), the limited choice of technologies (Hennart, 2008) and the increasing rate of technological change (Dosi, 1982). Licensing technologies on the market, on the other hand, does have the advantage that organizations can choose between many successful technologies (Hennart, 2008) but involves the problem that these technologies are freely available on the market for competitors. This means that technology licensing can hardly provide a competitive advantage to the organization (Barney, 2001). This competitive advantage argument suggests that organizations should choose for the option that can make organizations unique: strategic alliances. Strategic alliances can gain competitive advantage by integrating external knowledge that is not freely available to competitors as well. This way, complex problems of organizations can be addressed. Besides, strategic alliances can serve as a radar function by spotting new technologies that are in development at partner organizations. (De Man & Duysters, 2005). This radar function means that the organization will not be unpleasantly surprised by competitors that suddenly introduce superior technologies in the market.

When weighing all the discussed factors concerning 'make, buy or ally', strategic alliances are believed to have the largest potential added value for an organization's innovation strategy. The following step in the theoretical model represents this preference for strategic alliances over 'make' or 'buy' strategies.

Figure 4 - Theoretical model part 3/4



Based on Davids and Hendriks (2008)

Concluding, the theoretical model showed in step 1 and 2 that when the amount of exploitative and exploratory innovation is determined by the contextual environmental forces, the focus within the knowledge sourcing process can be identified. The next step in the model concerns the strategic decision whether to 'make, buy or ally' because an appropriate sourcing strategy is able to provide the organization with a competitive advantage over competitors (Davids & Hendriks, 2008). Strategic alliances were found to have the highest potential to add value to the firm and will therefore be the focus of the next section. The value that strategic alliances can bring in pursuing exploitative and explorative innovation especially needs to be examined (cf. Vurro & Russo, 2008).

Strategic alliances

How can strategic alliances be used for exploitative and exploratory innovation?

In examining how strategic alliances can be used as a tool for exploitative and exploratory innovation, the earlier made distinction between sourcing agreements and R&D alliances will be helpful (Yasuda, 2005, see previous chapter). Similar to Yasuda's typology, Koza & Lewin (1998) distinguish between alliances that are based on marketing and production activities and alliances that are based on R&D activities[4]. Marketing/production alliances are mainly used by organizations to gain scale advantages by expanding production capacity and to combine existing knowledge and capabilities. For example, small to medium enterprises (SMEs) that have to deal with a dominant competitor may use marketing/production alliances to team-up such that a stronger competitive force is formed. This way, SMEs will have a stronger competitive position and will reduce the risk of being pushed off the market by large enterprises. R&D alliances, on the contrary, are mainly used to jointly develop new knowledge and to bring different specialist knowledge together. Examples of R&D alliances are typically found in high technology industries such as the pharmaceutical industry.

The different influences of marketing/production alliances and R&D alliances on exploitative and exploratory innovation are suggested by Lavie and Rosenkopf (2006). They describe marketing/production alliances as being 'exploitation alliances' and R&D alliances as being 'exploratory alliances'. What can be concluded from Lavie and Rosenkopf's typology is that marketing/production based alliances should be seen as a tool to pursue exploitative innovation, while R&D alliances should be seen as a tool to pursue exploratory innovation. According to Su, Tsang and Peng (2009) especially R&D based alliances with universities and research companies are able to generate value to the firm.

Now that the differences in value chain activities of alliances are explained, it is clear that alliances can be used by organizations to incorporate them in their 'ambidextrous' innovation strategy. However, to get an even better understanding of marketing/production and R&D alliances, also the differences in terms of network position, partner profile (Lavie & Rosenkopf, 2006) and inter-firm learning (Lane & Lubatkin, 1998) need to be considered. This will give a more complete picture of how innovation can be pursued within marketing/ production and R&D alliances (see table 3).

First of all, Lavie & Rosenkopf (2006) point out that the network position of the partner firm has influence on the extent of inter-firm learning. When a partner firm is chosen outside the existing network of the organization, the inter-firm learning is potentially higher because the partners have a different knowledge base. In R&D alliances organizations would prefer to choose its partner outside the existing network. The fact that this different knowledge base makes the communication among the partners a lot harder is taken for granted because learning and knowledge development is the main goal of an R&D alliance (Lavie & Rosenkopf, 2006).

For marketing/production alliances it is more important to find a partner that fits the organization such that they can work together in an efficient way. They will therefore rather choose a partner from the existing network that has a similar knowledge base and only has different specializations. This way, they can communicate efficiently and commercialize on the complementary knowledge from different specializations (Lavie & Rosenkopf, 2006).

Lane & Lubatkin (1998) describe the learning process among partner firms as the inter-firm perspective of absorptive capacity. They also recognize that the extent to which the partner firm is similar is the

[4] The alliance typology will be shortened to 'marketing/production alliance' and 'R&D alliance'.

critical factor in respect to inter-firm learning. If a firm has a really similar knowledge base, the learning process will be much quicker, but if the knowledge base is very different, the firms have a lot more to learn from each other. As a second factor that stimulates inter-firm learning, Lane and Lubatkin (1998) point out that the trust factor is very important. According to them, this trust factor increases when the similarity of the knowledge base is higher. The following table gives an overview of the differences between marketing/production and R&D alliances.

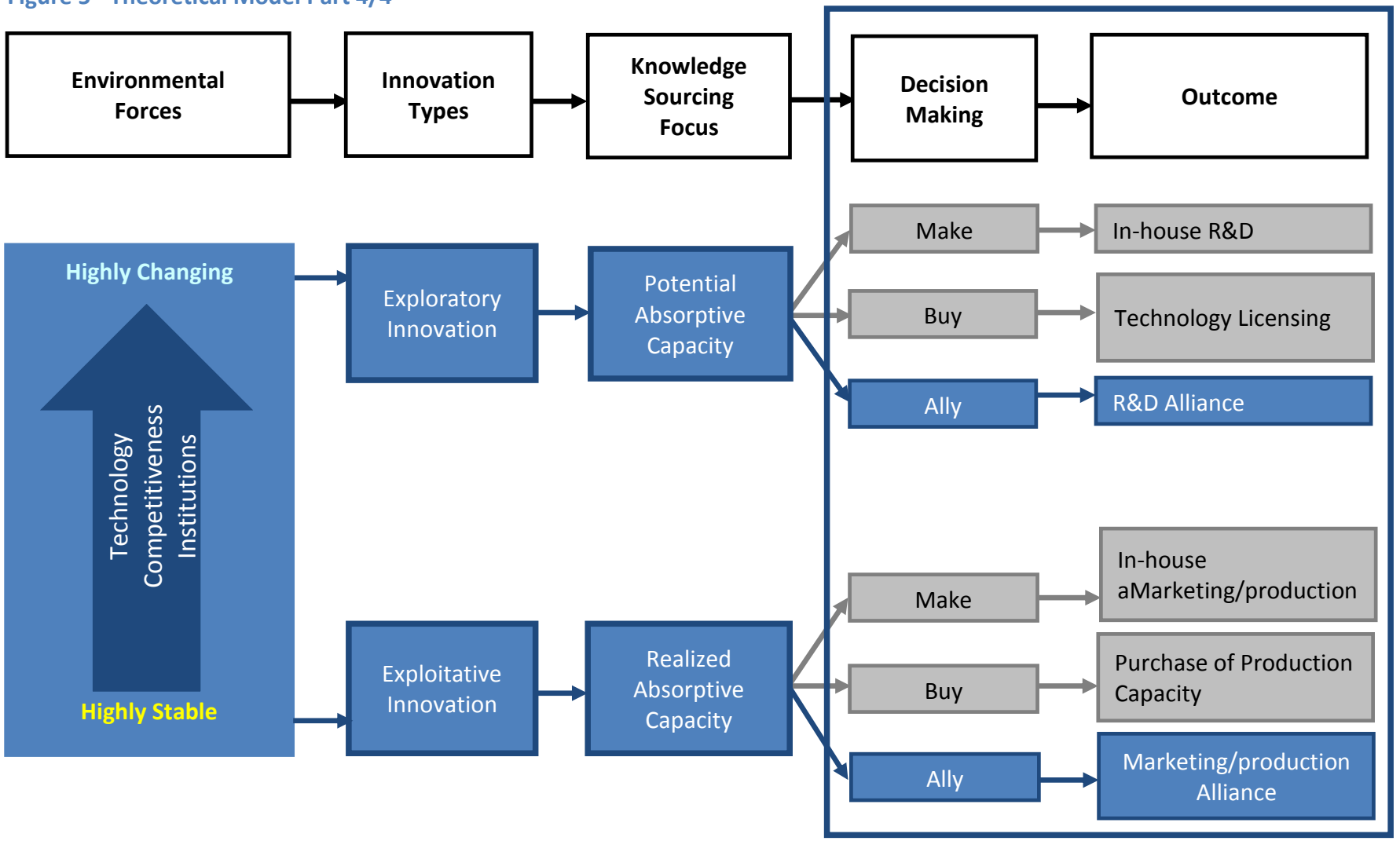
Table 3 Considerations for marketing/production alliances and R&D alliances

Factors	Marketing/production Alliance	R&D Alliance
Value of Alliance	combining existing knowledge scale advantages	generating knowledge
Network Position	existing Partner, Prior Ties	New Partner, No Prior Ties
Partner Profile	Similar Knowledge Base, Different Specialization, High Familiarity With Partner, Easy Communication	Different Knowledge Base, Different Specialization, Low Familiarity With Partner, Communication Problems
Inter- firm Trust	Higher	Lower
Inter-firm Learning	Complementary Knowledge	New Knowledge
Shared Knowledge Type	Explicit Knowledge	Tacit Knowledge

Based on Lavie & Rosenkopf (2006), Rothaermel & Deeds (2004), Lane & Lubatkin (1998)

Concluding, marketing/production and R&D alliances are distinguished, the different characteristics of are explained and a deeper understanding has been gained regarding the dynamics of inter-firm learning. Furthermore, the conclusion is made that marketing/production alliances should be should be used to pursue exploitative innovation, while R&D alliances should be used to pursue exploratory innovations. This conclusion leads to the last step in the theoretical model.

Figure 5 - Theoretical Model Part 4/4



Based on Lavie and Rosenkopf (2006), Rothaermel and Alexandre (2009)

This last step in the theoretical model shows the type of alliance that should be used when organizations are searching for either exploitative or exploratory innovation. When organizations thus aim to achieve the ideal balance between exploitative and exploratory innovation, they can complement and incomplete internal balance by forming either marketing/production or R&D alliances. This way, organizations do not only benefit from higher performance due to ambidexterity, they also benefit from the ability to integrate external sources by pursuing strategic alliances. This combination might lead to even higher innovation performance for organizations.

CHAPTER 3 RESEARCH METHOD

Now that the theoretical model has been completely explained, it needs to be empirically validated. This chapter will first explain the research method of this study, and secondly, the expected consequences of the chosen research method will be discussed. To begin with, the research is done in the form of a multi-case study. A panel of nine experts from different companies has been interviewed such that insight is gained into their experiences in the field of both ambidextrous innovation and strategic alliances. The panel is asked to share experiences of how their company pursues innovation strategy and how they use strategic alliances for the benefit of innovation strategy. The sampling technique that is used for selecting the expert panel is a non-probability convenience sampling method (Saunders, Lewis & Thornhill, 2007). The experts were drawn from the network of Strategic Development Group (SDG) and from a personal network. SDG is a Small to Medium Enterprise that is active in the business consultancy industry. Since business consultancy is pursued in all industries, SDG's network also consists of different companies across industries.

Companies that are used in the sample are selected on the basis of having strong innovation strategies. Accordingly, they should pursue a high level of innovation and have a clear innovation strategy. The companies were required to have strategic alliance experience. Since the value of gaining several different insights into innovation strategy was considered more important than having a sample of similar companies, the companies were drawn across different industries and are different sizes. The industries range from the consultancy industry, knowledge management, IT, ICT, electronics, waste management, construction, etc. A similar argument is also applied to the types of strategic alliances that were selected. The value of getting additional insights from different types of strategic alliances was considered higher than the value of having a homogeneous sample that can be compared more easily. Accordingly, not only strategic partnerships between two companies are considered, but also strategic partnerships between three or more companies, as well as two European research consortia and a joint venture. This selection strategy is pursued in order to generate a complete picture of different scenarios and, thereby, to increase the internal validity of the research. Besides, the limitations of this research had to be taken into account. In the first place, the companies needed to be willing to cooperate and secondly there were constraints of time and money.

Besides the selection criteria of the companies, there were also requirements for the functions and the function level of the experts. First, they needed to have personal experience with the innovation and alliances strategy. Secondly, they were required to have an executive or decision-making influence on the innovation and alliance strategy within their company. This criteria made sure that the experts had a good view on all the dynamics of the decision making process considering innovation and alliances. The following table will provide an overview of the selected companies and the expert panel.

Table 4 - Selected companies

Discussed Company	Expert panel	Function
TNO - Research company **Inpro** – R&D consortium project	**Rizal Sebastian**	Senior consultant Technical manager
Teesing - technical wholesaler and engineering company	**Leendert Nugteren**	Marketing and sales manager
PNA Group - knowledge based innovation and methods	**Serge Gouders**	Sales Manager Previously Business Development /Alliance manager

Trenary Holding - waste management	**Ruud van Riel**	CFO, partner, shareholder
Rijnconsult - business consultancy	**Denis Maessen**	Partner / consultant of business development at Allied Consultants Europe (ACE).
Maetis - occupational safety, health care and human resources	**Michael Pullens**	External consultant (Pullens & Associates BV)
InTraffic - software development, infrastructure industry	**Jan Koers**	Managing director
StreamIt - audio and video streaming	**Johan van der Stoel**	Founder and CEO
British Telecom - broadband internet, TV and phone business	**Rob van Basten Batenburg**	Head of business development

The expert panel is interviewed using a semi structured interview (see Appendix 1). The topics are structured in four parts based on the theoretical model. The first part considers the environmental forces in the industry that influence the company. The second part deals with two topics: innovation and knowledge sourcing. Accordingly, a question that was asked here is how innovation is used in order to adapt to the environmental forces. The knowledge sourcing process was examined by asking about the different steps in the knowledge sourcing process. The third topic considers the 'make', 'buy' or ally preferences for sourcing innovation and the last topic had a special focus since it is about the strategic alliance experiences and how they fit within ambidextrous innovation strategy. In order to make sure all the information is processed correctly, the interviews are recorded and summarized directly.

By analyzing the different field experiences, an attempt will be made to empirically validate the discussed theoretical model. Before starting with the research, however, the reliability and the validity of the research method need to be discussed since they are important for the quality of the research (Saunders, Lewis & Thornhill, 2007). The reliability of the data will be high if the following three statements are true. 1: the measure in this research yields the same result on other occasions; 2: the outcome will be similar when the same measure is done by another observer. 3: there is transparency in how conclusions were drawn from the raw data (Easterby-Smith, Thorpe & Lowe, 2002). These statements should be considered for this study. The fact that this research is a multi-case study means that the reliability is not as high as it would be if a large sample size had been used. Besides, the fact that the selected companies are from different industries and have a different size, forms a threat to the reliability of this research. On the other hand, this heterogeneity means that many different viewpoints are integrated into this study. This improves the validity of the research since it provides a more complete measure of the research question. Validity is distinguished in internal and external validity. The difference between these two should be explained.

The internal validity is high if 'the established evidence for causality between the dependent variable and the independent variables is actually caused by the independent variables and not due to other extraneous variables' (Malhotra & Naresh, 1999). Thus, the internal validity relates to whether the research actually measures what it says it is measuring. To assure the internal validity of this research, the interview questions have been checked by Maessen, a strategic business consultant and second supervisor of this study. Considering the external validity, this relates to the generalizability of the research results. In other words, it considers whether the findings may be equally applicable to other research settings, such as other organizations (Saunders, Lewis & Thornhill, 2007). The generalizability of this study is high because many different viewpoints have been integrated. This study is of interest for all organizations that pursue innovation strategy and alliance strategy.

The sample selection method in this study has several consequences for the expected outcome of this study. These expectations need to be discussed shortly to get a better idea of the impact of the actual case study results. Companies like British Telecom, Streamit, InTraffic and PNA Group are expected to be in a highly turbulent environment because they are related to the ICT, IT and knowledge industry. These industries are known as high-tech industries. The other companies, TNO/Inpro, Teesing, Trenary, Rijnconsult and Maetis are expected to be in a more stable environment because they are related to construction, manufacturing, waste management and consultancy industries. These industries are expected to be less high-tech. Moving on to the innovation strategy, it is expected that companies which are in highly turbulent environments will pursue a higher level of exploratory innovation than companies that are in stable environments. Besides, exploitative innovation will probably be pursued in all companies, because it generates more certain returns, while exploratory innovation might not be needed in stable environments. Considering the 'make, buy or ally' choice, it is expected that most companies focus largely on developing innovation in-house, and complement their internal innovation strategy with innovation through strategic alliances. A 'buy' strategy is not expected to have a large focus in any of the cases. Trenary and InTraffic should be treated differently because in these cases the company is the result of an alliance (strategic partnership and joint venture respectively). The internal dimension is in these cases the same as the alliance dimension. Also the TNO case is not like the others, because not the whole company will be considered, but only TNO's role within the Inpro project. As a consequence of this, TNO will largely be focused on alliances for innovation. About the innovation strategy within the alliances, it is expected that the alliances will mostly be used to integrate exploratory innovation. This is expected because normally organizations have a tendency to focus on exploitation and will, therefore, probably have a lack of exploratory innovation in-house. Consequently, it is expected that a large share of activities within the strategic alliances will involve R&D.

Now the research method and expected outcomes have been discussed, the actual results of the research can be dealt with in the chapter four.

CHAPTER 4 RESULTS

Company cases

Since the interviews cannot be included totally within the text, summaries of the interviews can be found in appendix 1. In order to discuss the results, the key points of each interview will be graphically shown in graph 6 to 14. Each case will be discussed in brief by giving a short introduction of the company's activities and continuing with a discussion of the findings and what they mean for the theoretical model.

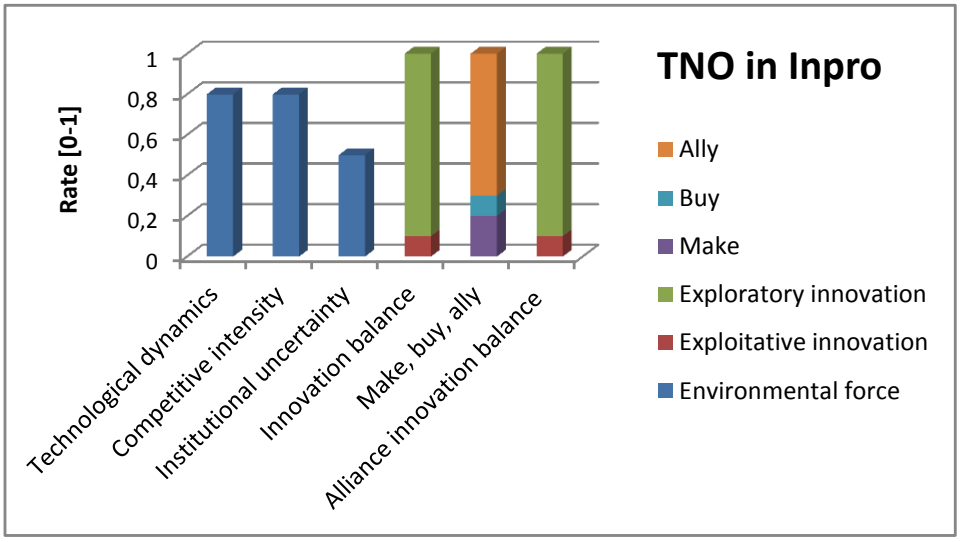
TNO / Inpro

The first case that will be discussed, considers TNO. TNO's role within the Inpro project will be specifically focused upon. A short description of both TNO and the Inpro project needs be given. TNO is a Research and Development (R&D) company that offers its services to companies in 25 different industries. Consequently, their research themes include a wide range of subject matter. This case will focus upon TNO's Built Environment and Geoscience department, which is active in the construction industry. TNO leads a European research consortium that is part of the 6th Framework Program of the European Commission. Inpro, as the consortium is called, includes an alliance between 18 different organizations across all parts of the construction value chain. It is a combination of research companies, universities, contractors, a principal, software, and design companies from nine different European countries. The goal of Inpro is to radically enhance the design phase of the building process by (further) developing a software based model (BIM). BIM integrates information of the whole construction value chain in such a way that the architect can account for all the consequences of his choices for other players later on in the building process.

Now that the activities of TNO within Inpro have been explained, the findings on their environmental forces and innovation strategy will be discussed. In the graph below (see figure 6) first the three environmental forces are showed that influence TNO / Inpro in the construction industry. Next to the environmental forces, TNO's innovation strategy (considering Inpro) is shown by distinguishing between exploitative and exploratory innovation[5]. To summarize the environmental forces, the technological change as well as the competition intensity is considered high in the construction industry. Institutions have a moderate influence as well. This means that the environmental forces can be considered as high for TNO / Inpro. TNO copes with this highly versatile environment by pursuing a high level of innovation. The innovation strategy consists of around 90% exploratory innovation and 10% exploitative innovation. This high focus on exploratory innovation is due to the fact that TNO is a research company by nature. However, the theoretical model also proposed that a highly changing environment should be dealt with by pursuing exploratory innovation.

[5] Note that innovation is not so much about the amount of R&D spending, but about how the innovation is pursued (Jaruzelski & Dehoff, 2009). Therefore, the term 'innovation balance' is used to refer to the share of exploitative versus exploratory innovation. Not to be mistaken with the share of innovation versus regular business activities. The share of innovation (measured in the % R&D spending of total business activities spending) is on average only 1% in the global top 1000 companies (Jaruzelski & Dehoff, 2009).

Figure 6 – Findings of TNO in the Inpro project



Next, the choices in the 'make, buy or ally' decision are treated. The three options are given a percentage according to how much they are pursued by TNO within the Inpro project. Together these percentages add up to 100% (in the graph, these percentages are converted to a rate between 0-1). Around 20% of innovation is developed within TNO since a lot of research is done by TNO internally. Secondly, 10% of technology is bought on the market since licenses need to be bought in order to be able to use BIM technology. Lastly, 70% of innovation is sourced through forming alliances. This large focus on alliances for innovation was expected since Inpro is a very innovative research consortium. Their goal is to stimulate collaboration in the construction industry. When considering Inpro's innovation strategy in terms of exploitative and exploratory innovation, this balance is rather similar to TNO's strategy. 90% of Inpro's innovation can be categorized as exploratory innovation and 10% is exploitative innovation. This strategy is in accordance with the goal of Inpro to develop radically new innovations for the design of the building process. Since TNO's innovation strategy is mainly focused at exploratory innovation, they indicate a focus on step one and two of the knowledge sourcing process[6]. These steps involve the identification of new knowledge and the assimilation of new knowledge.

Concluding, TNO /Inpro adapts to a highly dynamic environment by pursuing exploratory innovation. Furthermore, they recognize the considerable value of alliances for innovation. Both these conclusions support the theoretical model.

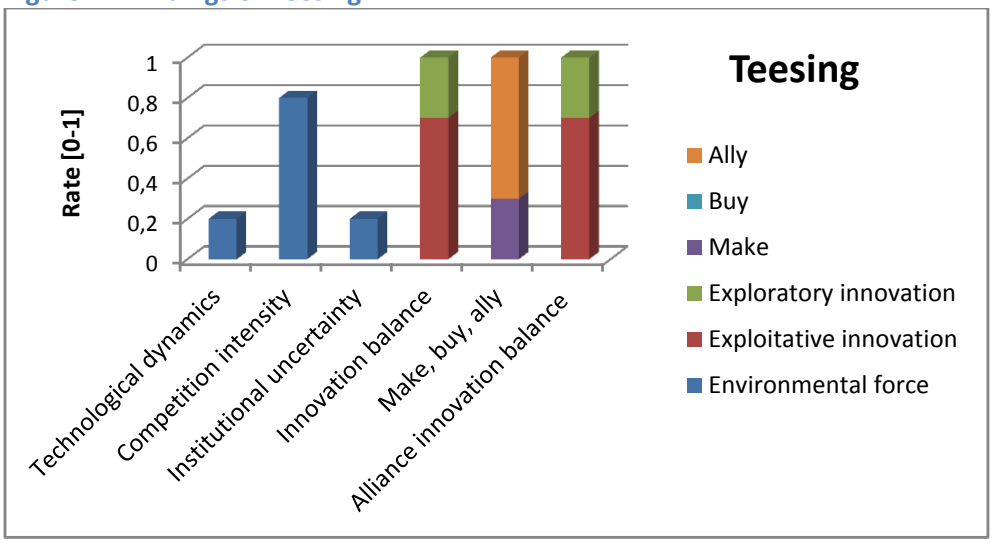
[6] Recall that the knowledge sourcing process consists of: 1) the identification of new knowledge, 2) the assimilation of new knowledge, 3) the transformation into usable frameworks or products and 4) the exploitation of products (see chapter 2.3).

Teesing

The second case that will be discussed is about Teesing, a technical wholesaler and engineering company with an interesting innovation strategy. Teesing supplies products such as fittings, valves, tubing, systems and assemblies for industrial applications that are offered in four sectors: pneumatics, hydraulics, instrumentation and transport of media. Next to serving the Dutch market, Teesing also serves the American and the Chinese market. The company structure gives a good view of how the business is organized. Three autonomous business units were created which each serve different product categories. These product categories are industrial applications, alternative energy and submicron technologies. Teesing often gets technical orders for new product applications from clients like ASML. New product applications are often developed through engaging in strategic alliances with partners. An interesting alliance that will be focused on in this case, involves a Chinese Gas company and a Chinese university. The alliance was pursued, in the first place, for the development of products related to gas transport and gas storage under high pressure, and secondly, for serving the Chinese market.

Since the activities of Teesing are clarified, succeeding the findings of the environmental forces and innovation strategy of Teesing will be discussed (see figure 7). To summarize, the technologies in the industry are rather traditional. Technological progress is mostly made by the development of new product applications. The competition in the industry, however, is highly competitive. Besides giving some subsidies for pursuing innovation, institutions do not have a large impact on the industry. Teesing copes with these environmental forces by pursuing 70% exploitative innovation and 30% exploratory innovation. This large focus on exploitative innovation is in accordance with the theory since the technological change is not very high. The intense competition means that Teesing cannot pursue too much exploratory innovation since it can be very costly. However, Teesing still pursues 30% exploratory innovation in order to develop the complicated applications of its products. Considering the 'make buy or ally' strategy, the development of new product applications is done for 30% in-house and for 70% by teaming up with partner firms. Teesing thus pursues more innovation through forming strategic alliances than by developing it in-house. The balance between exploitative and exploratory innovation is in both cases comparable. Teesing's focus in the knowledge sourcing process is mainly on step two, three and four. These steps include the assimilation of knowledge, the transformation into usable products and the exploitation of products.

Figure 7 – Findings of Teesing



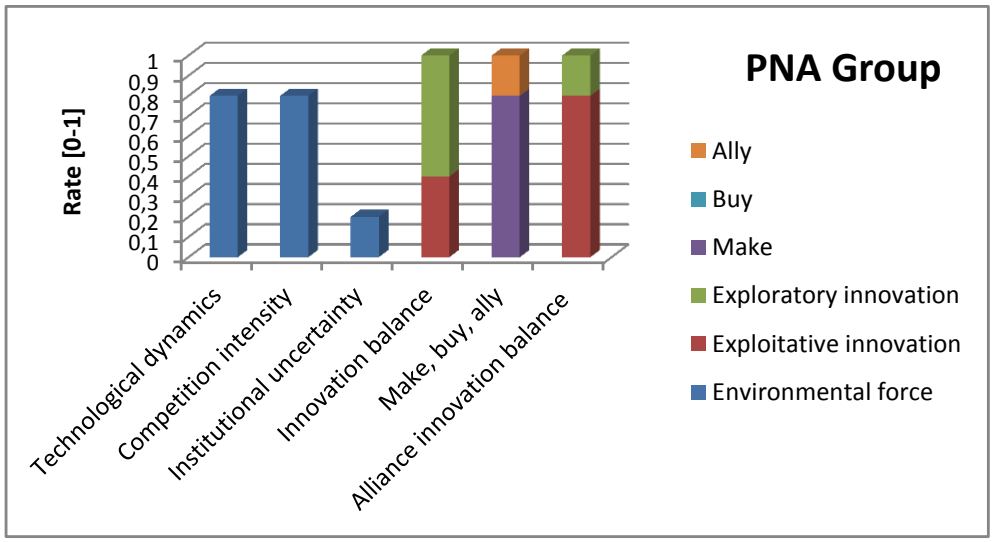
Concluding, Teesing confirms the theoretical model by focusing largely on exploitative innovation for the adaptation to a low changing technological environment. Teesing pursues a high level of innovation in order to fight the intense competition. Also, like the theoretical model suggests, Teesing shows a preference for strategic alliances over 'make' or 'buy' for sourcing innovation.

PNA Group

The third case is about PNA Group, a company specialized in knowledge based innovation and methods which are based on world standards. Their knowledge management methods are about structuring knowledge and information. This way, no knowledge can get lost, it can be applied more quickly, more effectively and with more accuracy. The methods that PNA is using include CogNIAM (Cognition Enhanced Natural Information Analysis Method, a knowledge science) which is developed in-house. This method has been highly valued internationally and used in the development of the world knowledge standard SVBR (Semantics of Business Vocabulary & Business Rules). This method ensures that employees are not using different interpretations of definitions when similar facts or requirements are involved. They have to interpret these definitions according to certain business rules. The communication within organizations is optimized this way and distortion is prevented. PNA thus lays a foundation of structured knowledge that can be used as valuable input for knowledge management software. This software is developed by PNA itself, however, input is received from critical market trends and consortia such as the European Framework OntoRule.

The following table illustrates that the knowledge management industry is highly competitive including knowledge management technologies that are rapidly changing. Institutions do not have a large impact on the organization in a restricting or enabling way. PNA adapts to these highly changing environmental forces by pursuing around 60% exploratory innovation. They have developed a whole new knowledge management standard in-house (CogNIAM). Since the methods have become mature, PNA is shifting its focus to exploitative innovation (40%) in order to market its innovations. Since PNA Group thus largely focuses on both exploitative and exploratory innovation, they pursue all four steps of the knowledge sourcing process (for these steps see chapter 2.3).

Figure 8 – Findings of PNA Group



As PNA developed CogNIAM in-house, they have chosen a 'make' strategy (80% of total innovation) for exploring new products. In some cases they are focusing on an alliance strategy (20% of total innovation) such that their knowledge structuring technology can be eventually combined with other software systems. Together with companies such as TLO, an innovation methods company, a much more valuable services can be offered to the customer. Since the alliances with other knowledge companies are more focused on offering a complete service package to the customer, these alliances consists largely of exploitative innovation. 80% of the alliance innovation balance consists of exploitative innovation versus 20% of exploratory innovation. PNA is therefore a good example of a company that configures the internal innovation balance, which is more focused on exploratory innovation, while pursuing a large share of exploitative innovation through forming alliances.

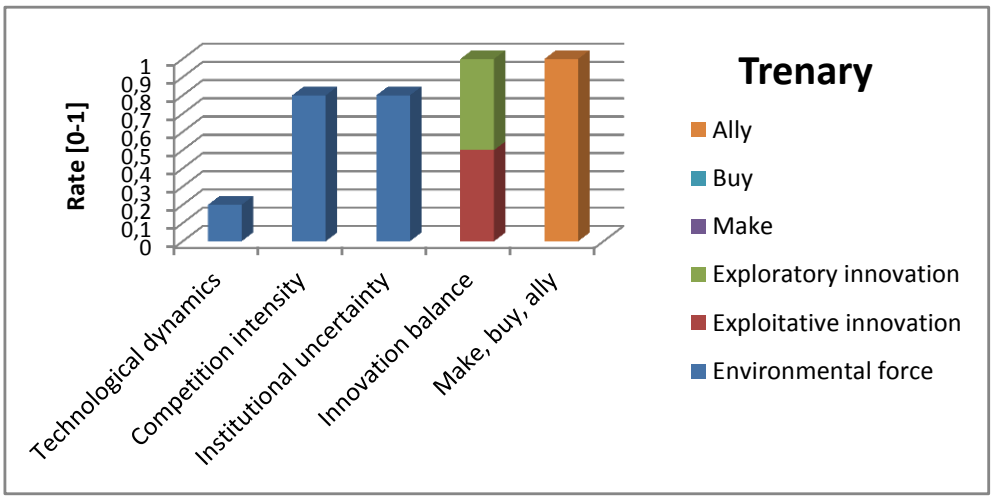
The PNA Group case confirms the theoretical model by pursuing a balance of both exploitative and exploratory innovation in order to cope with the highly changing environment. Moreover, the large internal focus on exploratory innovation confirms the way organizations deal with highly changing environments. PNA Group also confirms the value of strategic alliances in developing mainly exploitative innovation.

Trenary Holding

The fourth case involves Trenary, a company formed by strategic alliances in the waste management industry. Trenary has developed highly innovative products that are able to provide radical efficiencies in processing waste. Two technologies that are normally used in distant industries were found to be applicable for the waste industry. First, autoclave technology is normally used in the airplane industry for developing airplane wings. This turned out to be very efficient in processing waste as well. Moreover, it is even radically more efficient than traditional technologies. The waste does not have to be separated at the source (households, etc.) and the technology is able to recycle waste material back to the material elements that can be used for recycling. The second technology comes from an Indian oil company that developed methods to recycle oil waste back to petrol. This technology is able to recycle plastics back to petrol and can thus be used as a radical innovative waste management method. The companies providing the technologies, however, had no idea how to bring their technologies to the market. Therefore, Trenary is formed that owns the required market knowledge. They adapted the technologies in such a way that they can be applied to the waste management market. Moreover, Trenary has the market knowledge that is needed to commercialize the innovations. Trenary Holding consists of Vulcanes Ireland Vulcanes Germany and Steps India. Together, they operate as Trenary Holding in Oisterwijk, the Netherlands.

Considering the environmental forces (see figure 9), first the technological change has always been slow in the waste management industry. The market is served by many large players on a global market which makes competition very intense. However, the market is largely influenced by national institutions that decide on waste management policies. This governmental influence restricts the free market system which Trenary needs for exploiting their superior technologies. Political parties do not want to change to superior waste management methods, because incumbents in the market have a strong political lobby and also because political parties do not want to admit having chosen wrong waste management methods in the past. According to the theory, Trenary should be able to deal with the low technological change and high competition intensity by pursuing mostly exploitative innovation. However, the strong governmental influence means that Trenary experiences difficulties, even though Trenary offers radically innovative products. Trenary's innovation balance is partly focused on exploratory innovation through the adoption of new technologies from distant industries (50%). Furthermore, they pursue a similar share of exploitative innovation (50%) since Trenary needs to bring the technologies to the market.

Figure 9 - Findings of Trenary



Considering the 'make, buy or ally' decision, Trenary develops its products totally by forming strategic alliances. This is evident in figure 9 by a 100% 'ally' strategy. When looking at the knowledge sourcing process, Trenary mentioned its focus is on step two and three: the assimilation of knowledge and the transformation of knowledge. This involves the interface between exploitative and exploratory innovation.

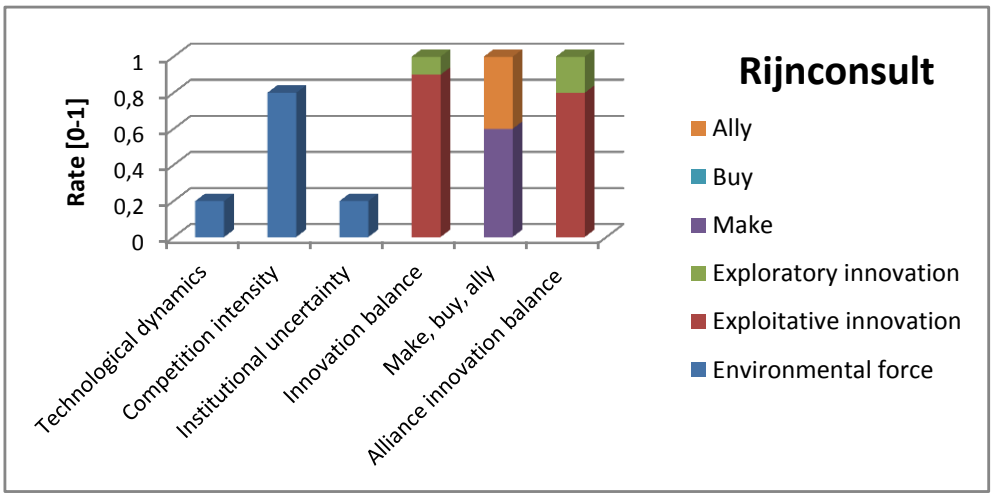
Concluding, the Trenary case supports the theoretical model through pursuing both exploitative and exploratory innovation for the adaption to high environmental forces. Moreover, Trenary confirms the value of strategic alliances for innovation.

Rijnconsult

The fifth company is Rijnconsult, a Dutch company that specializes in management consultancy, temporary management and staff development. In the 90s Rijnconsult started an international alliance named ACE which is a collaborative agreement between 7 European consultancy firms. The partners were selected from different European regions such that the total European market could be served. Having local partners was necessary for Rijnconsult since they could provide local market knowledge. Besides, ACE was seen as a marketing tool for getting large MNE clients. Rijnconsult expanded its market reach by means of this alliance. From a mere focus on the Dutch market, they increased their focus on the whole European market. This made them more interesting for larger, internationally operating clients.

For Rijnconsult, the environmental forces are strongest in the form of intense competition (see figure 10). The Dutch and the European consultancy markets consist of many large competitive players. Rijnconsult was able to deal with the European market however, since the Dutch consultancy market was further developed in their knowledge and consultancy methods. Except for local market knowledge, most relevant knowledge was thus spreading from the Dutch players towards international partners, instead of the other way around. The technologies in the consultancy market, in the form of consultancy knowledge and methods, were rather stable and traditional. Therefore, Rijnconsult was able to deal with this slow technological progress by largely focusing on exploitive innovation. Exploitative innovation made up around 90% of innovation activities compared to 10% exploratory innovation. Similar to the technological force, also the institutional uncertainty force was rather low. The Dutch or European governments were not restricting Rijnconsult in its activities. The only thing that was restricting Rijnconsult, was the lack of possibilities to go into Europe. These possibilities opened up however, by the rise of information technology and globalization.

Figure 10 – Findings of Rijnconsult



Considering the 'make, buy or ally' choice, Rijnconsult had a defenite preference for developing new knowledge internally because they were further advanced in their consultancy knowledge than most (international) competitors. This 'make' strategy involved 60% of total innovation. Rijnconsult developed new knowledge through their collaborations with European partners. This 'ally' strategy made up 40% of total innovation. Especially Northern European partners were chosen for the development of new knowledge since these partners were further developed in their consultancy methods than partners in other parts of Europe. Although the exploratory innovation share was larger within the alliances than internally (10% versus 20% of innovation), the main focus of innovation type was still on exploitative innovation (80% of total). This focus on exploitative innovation can also be seen in the knowledge sourcing focus, which is on step three and four: the transformation of knowledge into usable frameworks and the exploitation of products.

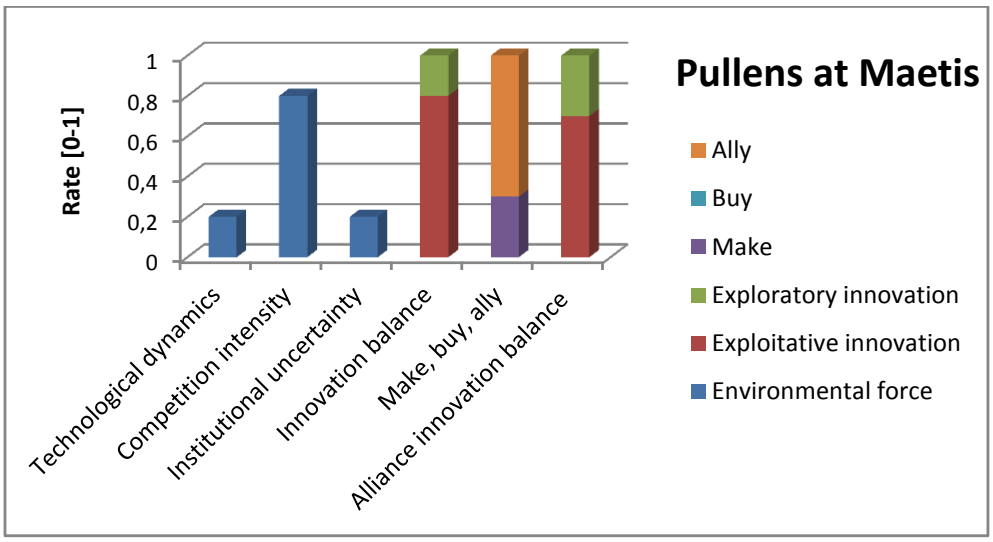
Concluding, Rijnconsult confirms the theoretical model since it is able to cope with a slow changing technological environment by focusing largely on exploitative innovation. Considering the alliance strategy, Rijnconsult recognizes the value of strategic alliances, however more for expanding into foreign markets than for the development of innovative products. New knowledge is mostly developed in-house.

Pullens as external consultant at Maetis arbo

The sixth case is about Maetis, an occupational safety, health care and human resources company (henceforth called an 'arbo' company). Maetis offers extensive opportunities for the counseling of absenteeism and reintegration. Besides, they offer opportunities for the prevention of absenteeism and disability claims of employees. Maetis started an alliance with an insurance company in order to provide a service package that better fits the client's needs. By integrating insurance services into Maetis' service package, clients avoid paying for both employee health care services *and* employee health insurance. Before, many employers were paying for both, even though they involve similar services.

The table below demonstrates that the technological environment of Maetis rather stable. The services of arbo companies are rather traditional. They mainly change through the integration of extra services into one package. Even though Maetis is one of the largest arbo companies on the Dutch market, the competition is very high. In order to differentiate from competitors, Maetis increasingly tries to provide added value to its clients businesses by integrating related services. Considering the influence of institutions, they are only noticed by the fact that the government enforces an arbo services law that says that all Dutch employers need to provide arbo services for their employees. Concluding, Meatis needs to cope mainly with a strong competitive environment. Meatis attempts to do this by pursuing an innovation balance of 80% exploitative innovation and 20% exploratory innovation. This large focus on exploitative innovation is expected because the technological change is rather low.

Figure 11 – Findings of Pullens job at Maetis



When considering the 'make, buy or ally' balance, 30% of innovation is developed internally and 70% is done by forming strategic alliances. The 'buy' strategy is considered too expensive. Maetis pursues its strategic alliances mainly with insurance companies since their health insurance services are closely related to arbo services. Within the considered alliance between Maetis and an insurance company, the share of exploratory innovation is higher than at Maetis internally (30% vs. 20%). This shows that strategic alliances are used in order to integrate more radical innovation. Considering all knowledge sourcing activities, Meatis mainly focuses on step two and three of the knowledge sourcing process. Recall that these include assimilation of new knowledge and the transformation of new knowledge into new products.

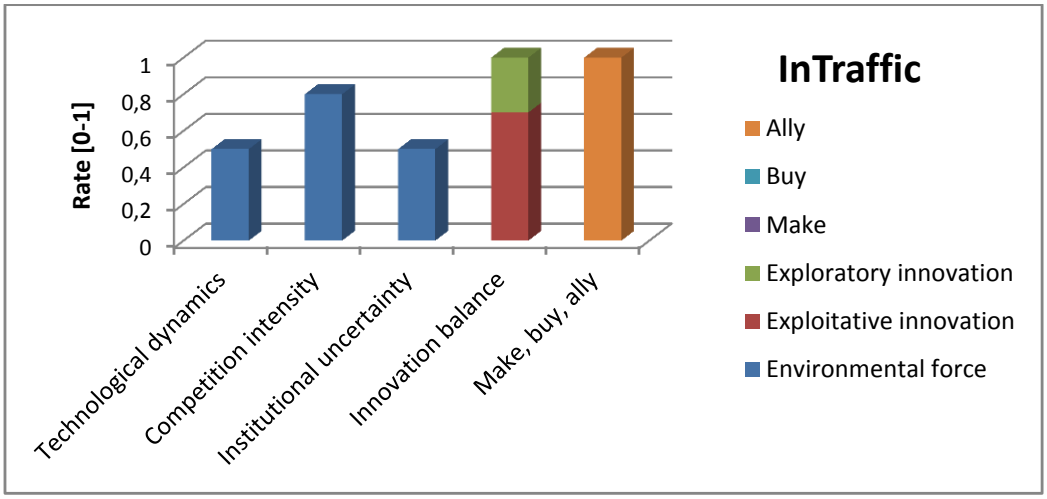
Concluding, Maetis shows a preference for exploitive innovation over exploratory innovation. This is in accordance with the suggested dynamics of the theoretical model. The competitive force might be high, but the technological change and institutional uncertainty are low. Especially the low technological change allows Maetis to adapt to the environment by primarily pursuing exploitative innovation. Maetis' case also supports the choice for strategic alliances over a 'make' or 'buy' strategy.

InTraffic

The seventh company of interest is InTraffic. InTraffic is a software development company that was formed by a joint venture between infrastructure consultancy Movares and IT specialist ICT. The joint venture was formed because Movares could not position itself in the market as an IT company. By creating a joint venture together with IT company ICT, the software development activities of Movares could be positioned appropriately in the market. Movares provided the engineering expertise and ICT provided scarce IT employees and complementary IT knowledge. This combination gives InTraffic a significant advantage over competitors. Most competitors come from the IT industry and do not have the required engineering expertise for InTraffic's infrastructure projects. The joint venture was formed in 2003 and currently exists of around 125 employees.

As can be seen in figure 12, technological progress influences InTraffic in a moderate way. New technologies are adopted in the industry in the form of GPS technology and PDA systems. However, in the infrastructure industry there exists a stronger focus on reliability than on technological progress. The competition for software applications in the infrastructure industry is very intense. They force InTraffic to stay focused on the advantages of having two specialized mother companies. Considering the institutional uncertainty, the government has a large influence on the infrastructure industry. This means that InTraffic's projects can be uncertain sometimes. For example they invested largely in electronic road pricing, a new tax system that is still being discussed in national politics. The majority of the time however, InTraffic is able to anticipate governmental policy changes well in advance. They are mostly related to cost cutting policies and economy stimulation. InTraffic thus has to adapt to a rather highly changing environment. Since InTraffic is a strategic alliance, the total innovation strategy can be considered part of the 'ally' strategy of their mother companies. Besides, when considering InTraffic itself, they prefer to engage in strategic alliances for innovation than 'inventing' all technologies in-house. Figure 12 shows only one innovation balance, since the company is the alliance by itself. The environmental forces are dealt with by an innovation strategy involving around 70% exploitative innovation and 30% exploratory innovation. Considering the rather highly changing environment, one would expect that InTraffic pursued a larger share of exploratory innovation. The focus in the knowledge sourcing process is on step two, three and four. This is in line with having an innovation balance that involves a small share of exploratory innovation and a larger share of exploitative innovation.

Figure 12 - Findings of Intraffic



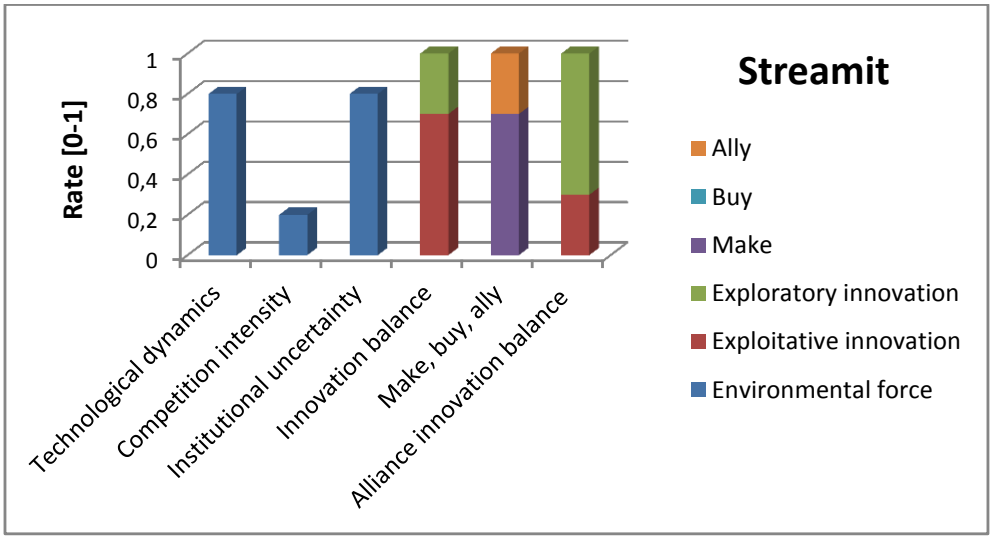
Concluding, InTraffic supports the dynamics of the theoretical model by the finding that they are adapting to a rather high changing environment by a combination of both exploitative and exploratory innovation. The theoretical model suggests that a highly changing environment needs to be handled by pursuing mostly exploratory innovation. InTraffic has the luxury position that they can focus internally on exploitative innovation and can largely rely on the exploratory innovation that is done by the mother companies. Regarding the make, buy or ally choice, InTraffic is a good example of the value of strategic alliances for exploitative innovation.

Streamit

The eighth case is about a company named Streamit, a small electronics and IT company which develops and sells audio and video streaming products. The products are mainly intended for following church services. Around 800 churches are using the services of Streamit and around 15000 receivers have been sold since the company was founded in 2003. The company constantly develops new products and is currently also active on the following markets: background music in shops, remote controls, internet radio and the market for radio broadcasting. Streamit engages in many alliances for the development of new products. An alliance with IT company Cervus is successfully started for the development of video streaming devices.

As the following graph shows, the technological change in the electronics and IT market is rapidly changing. This technological progress explains Streamit's relatively high level of innovation. Internally, 70% of innovation considers exploitative innovation versus 30% exploratory innovation. However, this level of exploratory innovation is not enough for the company. They configure their innovation balance by having a strong focus on exploratory innovation in their strategic alliances. Alliances are used since Streamit cannot afford to do all the exploration internally. Accordingly, they often form partnerships for new product development. The competition intensity is very low due to the fact that there is only one other supplier of church radios on the Dutch market. In other markets such as Germany, church radios are not even available. The third environmental force – institutional uncertainty – has a strong presence in the Streamit case. Selective economic stimulation policy of the government results in the fact that skilled IT developers can keep working at large research companies such as TNO. The consequence for smaller companies like Streamit is that they experience difficulties finding good employees. Streamit adapts to these limitations by pursuing 30% of total innovation through strategic alliances. Besides, the alliances are used as a tool to integrate more exploratory innovation. This confirms the theory that alliances are used in order to configure the innovation balance. Within the alliances, around 70% exploratory innovation is pursued, versus 30% exploitative innovation.

Figure 13 - Findings of Streamit



The next result considers the knowledge sourcing process. Streamit is unique since they adopt all four steps of the process. They identify new knowledge themselves, assimilate it into the knowledge base, transform it into usable products and lastly, they exploit it.

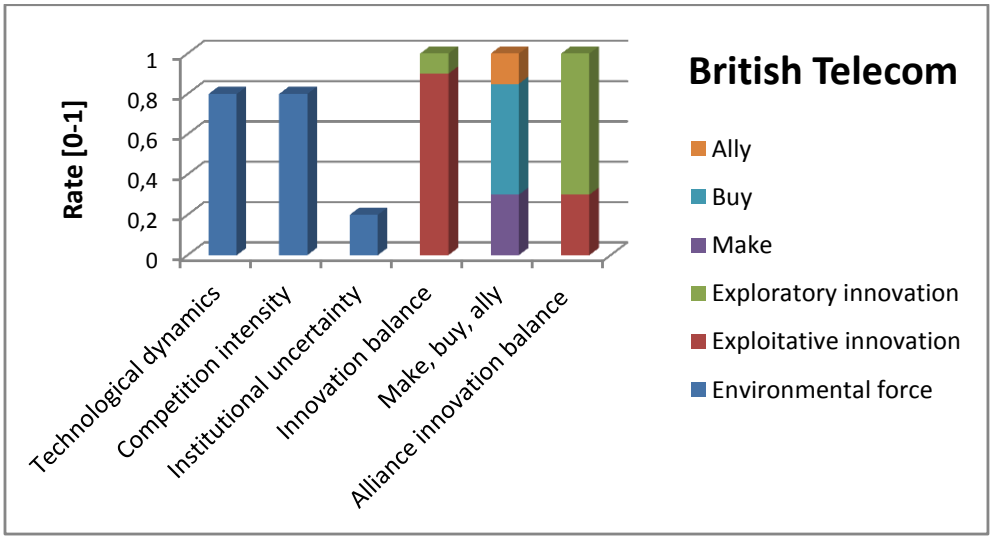
Concluding, although the competition for Streamit is not very intense, the technological change and institutional uncertainty means that Streamit needs to pursue a high level of innovation. Streamit is a good example of a firm that configures their balance of exploitative and exploratory innovation by pursuing strategic alliances. They complement the level of exploratory innovation that is afforded in-house by pursuing exploratory innovation within strategic alliances.

British Telecom

The last company of interest is British Telecom Group (BT). This company from the United Kingdom is active in broadband internet, TV and phone markets, targeting both consumers and businesses. Traditionally their main business is to develop internet and phone connections. However, BT has been diversifying and currently also implements IT services and solutions for internal processes of large organizations such as the British national health care system. Among many other alliances, BT has pursued two alliances with Philips. The first one was to develop the Set-top-box, a device that integrates internet, TV and phone and is meant to be placed in the living room. Philips was able to take care of the hardware and BT of the connections between the hardware and the source. The second alliance was made in order to develop a system that is able to automatically monitor patients in the hospital. Similar to the first alliance, Philips was able to provide its expertise in hardware (medical equipment) and BT provided its capabilities in connections.

BT is strongly influenced by highly changing technologies and intense competition (see figure 14). For example broadband technologies are constantly being improved in order to provide faster internet connections. BT is a very large player on both the British market and the global market but encounters strong competition from other network providers. BT deals with this highly changing market by focusing largely on exploitative innovation. Van Basten Batenburg did an extensive study about their innovation strategy (cf. Birkinshaw, Van Basten Batenburg & Murray, 2002). Considering the innovation pursued internally, 90% includes exploitative innovation and only 10% exploratory innovation. However, BT pursues a major share of innovation externally (70%) to configure this balance. While the internal innovation share involves only 30% of total innovation, this is complemented with a 'buy' strategy that involves 55 % and an 'ally' strategy that involves 15%. Having such a large focus on buying technologies on the market is possible for BT because they are a large company with enough funds. Besides seeing the value of a buying strategy, BT also recognizes the value of alliances, especially for combining different technologies and capabilities. BT is the second example of a company that complements their internal focus on exploitative innovation with a focus on exploratory innovation within their strategic alliances. Considering the knowledge sourcing process, BT mainly focuses on step two, three and four, which mainly involves exploitative innovation.

Figure 14 - Findings of British Telecom

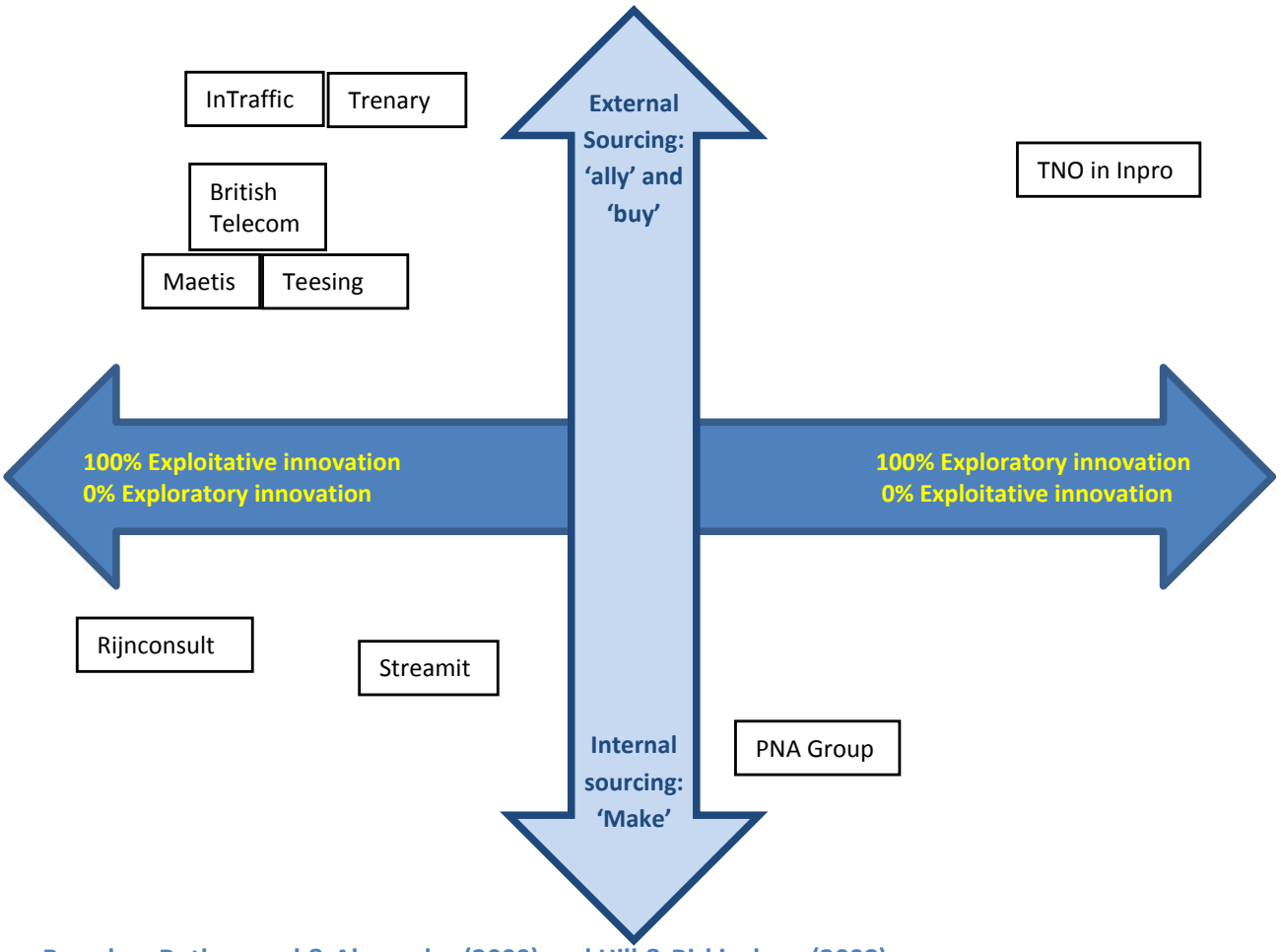


The BT case supports the theoretical model by the fact that they are coping with environmental pressures through pursuing both exploitative and explorative innovation. Besides, they complement the internal focus on exploitative innovation with an external focus (involving 'buy and ally') on exploratory innovation. Also, BT recognizes the value of the strategic alliances since their alliance portfolio has generated many successful innovations. The large resources of the company, however, enable BT to pursue an even larger share of 'buy' strategy.

Results compared

Now that the company cases have discussed the environmental forces and their different innovation and alliance strategies, they should be compared shortly to get an idea of the main differences (see appendix 3). The differences in innovation and alliance strategy can clearly be shown by graphically positioning each company according to its strategy. In figure 15, the horizontal axis shows an innovation continuum concerning the share of exploitative versus exploratory innovation. The left extreme means that innovation exists for 100% out of exploitative innovation and no exploratory innovation is pursued and the right extreme consists of a 100% exploratory innovation to the exclusion of exploitative innovation. Besides the balance between exploitative and exploratory innovation, organizations need to balance their innovation strategy according to their knowledge sourcing orientation ('make, buy or ally'). In order to place the companies on a sourcing continuum with only two extremes, a 'make' strategy is categorized as an *internal* sourcing strategy, while the 'buy' and 'ally' strategies are categorized as *external* sourcing strategies. This categorization makes it possible to place the companies on a balance from sourcing innovation totally internally to sourcing innovation totally externally (see vertical axis). What should be noted about the company positions in the graphical model, is that not just the internal innovation strategy has been taken to determine the balance between exploitative and exploratory innovation. The balance has been corrected for the level of innovation that is pursued externally, such that a complete picture is considered. When comparing the different innovation strategies by looking at the positioning model, it can be noted that seven out of nine companies locate more resources for exploitative innovation than for exploratory innovation. A possible explanation for this preference for exploitative innovation begins with the fact that, by nature, businesses are incented to make short term

Figure 15 - Positioning model of innovation strategy



Based on Rothaermel & Alexandre (2009) and Hill & Birkinshaw (2008)

profits in order to survive. Companies cannot afford to pursue too much exploratory innovation because it is not economically viable by itself. Exploratory innovation only becomes valuable once the newly developed products can be exploited. Although exploratory innovation enables organizations to be profitable on the long term, often organizations have too many incentives to focus on short term profits (e.g. shareholder interests). Thus, the exploitation activities[7] make it possible for organizations to fund innovation, while (exploratory) innovation makes it possible to pursue exploitative activities in the future. The large focus of TNO on exploratory innovation is an exception on this argument because R&D is their core business. For most companies, on the other hand, innovation is just a means in order to survive. Also PNA group has a major focus on exploratory innovation because it is a company in knowledge based innovation and methods, which means that innovation is close to their core business.

What can be noted from appendix 3.1 is that because all the companies are from very different industries, the environmental forces differ significantly from each other. Especially the rate of technological change differs among the cases. This was expected, however, because some industries are known as high-tech (ICT, IT and knowledge management) while others are not. Moving on, it can be noted that the competition is very intense in all industries, except for the competition in Streamit's industry because Streamit sells a unique product and has only one competitor. The intense competition can be explained by the fact that most companies are operating on free and open markets that are characterized as attractive markets with high demand. Besides, in industries like occupational health care (Meatis), a cost focus is intensifying the competitiveness. The institutional uncertainty, on the other hand, is for most companies low. This can also be explained by the free markets the companies are operating in. Companies that do have to cope with a high influence of the governmental policy are companies that are operating in areas that are political issues such as the waste management industry (Trenary) or infrastructure industry (InTraffic). Besides, for example Streamit has to cope with unequal treatment of companies because only the large research companies like TNO are supported that have the government as a large customer. Smaller companies like Streamit do not receive much governmental support (e.g. subsidies) and have difficulties finding skilled employees that are attracted by large research companies.

The next result concerns the knowledge sourcing focus (see appendix 3.1). What can be noted is that three out of nine companies pursue step one and two in the knowledge sourcing process, which are related to exploratory innovation. Two of these companies, PNA Group and Streamit, have confirmed that they are better at applying externally acquired knowledge because they are developing related knowledge internally. This way, they have the advantage of an increased absorptive capacity. Also companies like Teesing and British Telecom indicated to have an increased absorptive capacity because they pursue step two, the assimilation of new related knowledge, internally. Trenary and InTraffic just acquire their knowledge through strategic alliances, since they are the result of an alliance.

The results of the 'make, buy or ally' preferences of each company can easily be compared in figure 15 and appendix 3.2 What can be noted is that six out of nine companies have a larger focus on developing innovation externally than internally (figure 15). To be more specific, five out of nine companies had a larger focus on strategic alliances than on developing innovation in-house or on buying technology on the market (see appendix 3.2). Three out of nine companies (PNA Group, Rijnconsult and Streamit) preferred a 'make' strategy over 'buy' or 'ally' and only British Telecom showed a preference for a 'buy' strategy. BT was the only company that could afford to have a major focus on buying technology on the

[7] *'Exploitation activities'* refer to the daily business activities that organizations pursue. This is not part of the of organizations' innovation activities and should therefore not be mistaken for *exploitative innovation.*

market. These results mean that five out of nine companies confirm the proposition that organizations value strategic alliances higher than 'make' or 'buy' strategies in regard to development of innovation[8].

Appendix 3.3 shows how companies are using strategic alliances for innovation. What can be concluded from the table is in the first place that seven out of nine companies used strategic partnerships to develop innovation. Only TNO and PNA Group[9] were involved in a research consortium and InTraffic is a joint venture. Besides, five out of nine cases involve partnerships between two companies, while the other four cases involve alliances of more organizations (three, six, nine and eighteen). The next result concerns the innovation balance within alliances and shows a remarkable result. Six out of nine companies have a major focus on *exploitative* innovation, while it was expected that organizations would mainly use strategic alliances in order to integrate more *exploratory* innovation. Besides, the innovation balance shows that most alliances are not focusing totally on one type of innovation, but form a symbiosis of both exploitative and exploratory innovation. This result means that seven out of eleven alliances cannot be categorized into either *marketing/production alliances* or *R&D alliances* because they pursue a combination of both types of activities. The following results concerns partner selection criteria, success factors and pitfalls of strategic alliances (appendix 3.3). Because these results involve critical alliance strategy factors, they will be discussed more thoroughly in the next section. Since the case experiences provide such valuable lessons, the results have been integrated into an alliance strategy guide for managers. This guide will bridge the gap between the theoretical model and how the model should be used in practice.

[8] A threat to the reliability of this conclusion needs to be considered however, because the companies were selected on the basis of having strategic alliance experience. This selection criterion possibly raised the probability that firms prefer 'ally' over 'make or buy'.

[9] While in most cases just one alliance received a central focus, for PNA Group, the alliance with TLO had the major focus but also the European consortium framework OntoRule was considered next to it. Note that also in the BT case two alliances (both with Philips) were considered and that the total number of alliance add up to eleven for nine company case studies.

An alliance guide for managers

The success factors and pitfalls of strategic alliances have been examined in the interviews while considering whether the alliances were successful or not (see appendix 3.3). Although strategic alliances are seen as highly valuable for developing innovation, in practice companies seem to have difficulties with undertaking alliances. According to Duysters, Kok & Vaandrager (1999) around 50% to 60% of strategic alliances fail. However, the success rate can be improved from 50% to 70% when the organizations pursue an appropriate alliance strategy (Nooteboom, 2009). In order to investigate successful alliance strategies, the companies were asked to give their experiences concerning success factors and pitfalls of strategic alliances. The results are placed according to five different themes[10] that are important for alliance strategy.

First, the value chain function of alliances is dealt with (see table 5). The most important factor that was mentioned at seven out of eleven alliance cases is the synergies that are created within alliances. Synergies mean that the combined effect of two partners is greater than the sum of its parts. These synergies are mainly created by selecting a partner that owns complementary technology, expertise or capabilities. If these synergies are not present, the alliance will not bring added value to the organization. A succeeding conclusion that can be made from the research is that, while it was expected that alliances would pursue either marketing/production or R&D activities, it is believed that in the ideal situation alliances should pursue both type of activities. Thus, both exploitative *and* exploratory innovation are pursued within alliances. Together they are believed to generate higher performance. The fourth factor considering the value chain of alliances is the *radar function* (De Man & Duysters, 2005)[11]. Three companies mentioned that they used their international alliance to spot new technologies and new knowledge in the market: TNO's research consortium Inpro, PNA's research consortium called OntoRule and Rijnconsult's alliance called ACE.

Table 5 - Value chain

Success factors / pitfalls	Benefit / risk
Synergies: 1+1=3	Most important because the alliance needs to add value.
Both marketing/production activities and R&D activities	Both new products are developed *and* returns are gained
Exploitative *and* exploratory innovation	Results in higher performance
Radar function (De Man &Duysters, 2005)	Spots new technologies in the market

The second theme is the *partner selection strategy* (see table 6). As mentioned before, complementarities are seen as the most critical selection criteria (7 out of 9 companies). Next to that, other factors were mentioned that relate to the alignment of partners, but do not necessarily add value to the alliance. Similarities in philosophy, company size, services and leadership style, are able to enhance cooperation between companies (Rijnconsult). Besides, independence of partners is valued since it helps in avoiding that partners have a second agenda (Rijnconsult). In addition, the trust factor enhances the motivation for companies to cooperate optimally and to share knowledge where necessary (Rijnconsult). What should be avoided in partner selection strategies, is that partners are selected on the basis of familiarity, trust and similarities. These factors might enhance the cooperation between organizations, but do not provide the required synergies.

[10] The first 3 themes are based on Lavie & Rosenkopf (2005), theme 4 and 5 are based on Dorleijn (2008)

[11] The success factors / pitfalls are complemented with a success factor that is drawn from the literature and found to be applicable to the company cases.

Table 6 - Partner selection

Success factors / pitfalls	Benefit / risk
Complementary technology	Generates synergies
Complementary expertise and capabilities	Generates synergies
Similarity in philosophy, size, services, leadership styles	Enhances cooperation, but does not add value
Independent partner	No second agenda
Trust	Enhances motivation to cooperate and to share knowledge

The third theme involves the network position (Lavie & Rosenkopf, 2006; see table 7)[12]. Often companies select a partner they happen to know from their existing network. Obviously it is more convenient to start an alliance with a company that is familiar than with an unknown partner. This can be a pitfall however, since companies may lose sight of the goal of the alliance: to add value. The second point about the network position was found to apply to Trenary. They chose two partners from the airplane and oil industry in order to develop new technological applications for the waste management industry. Since the partners were from remote industries, Trenary was able to learn a lot because complete new technologies could be integrated into the company.

Table 7 - network position of partner

Success factors / pitfalls	Benefit / risk
Do not choose existing partner for convenience reasons (Lavie & Rosenkopf, 2006).	The partner needs to add value
Choose partner from remote industry if learning is the goal of the alliance (Lavie & Rosenkopf 2006, Lane & Lubatkin, 1998)	More learning takes place, technologies from other industries can be integrated

The fourth theme considers how alliances should be controlled and how motivation between partners stays aligned (see table 8). The two alliances of British Telecom with Philips reveal that disputes can arise easily when partners have an equal say in the alliance. Their first alliance had significant potential because different capabilities and technologies were combined to develop an innovative product (the set top box). Still, the alliance failed because partners could not agree about who could control the customer base. This issue had to be solved in the second alliance considering the development of medical equipment that monitors hospital patients. This time BT took the lead in the alliance and Philips just had to develop the hardware. This strategy worked out much better since BT could control the alliance. The second success factor considering control was raised by Pullens when managing the alliance of Maetis and an insurance company. A success factor in the alliance process was that each party had installed an alliance manager that took responsibility for the input and results of both parties. This strategy helped very well in the alignment of interests and the motivation of both companies to put an even share of resources into the alliance. The third factor was raised by Streamit that believes strategic alliances need to involve a win-win situation. Both parties need to gain equal returns from the alliance such that they stay motivated to make the alliance become a success. Teesing came up with a pitfall considering the motivation of alliance partners. Their experience was that it is very difficult to keep alliance partners motivated when success takes a little longer than planned. Most organizations have a short term view considering alliances, which should be accounted for. Especially since Teesing's

[12] This theme is extracted from Lavie & Rosenkopf (2006) because it was found to be applicable to the company cases. The experts however, did not mention this directly.

alliance partners are usually not very large companies, they cannot keep investing when the returns are not there.

Table 8 - Control and motivation

Success factors / pitfalls	Benefit / risk
Either one party should take the lead or very good agreements should be made	Avoids disputes, aligns expectations
Each party should install an alliance manager that is responsible for the input and results of both companies	Alignment of interests and motivation (no second agenda)
There should be a win-win situation	Alignment of interests
Account for short term view of partners	Partners may drop the alliance agreement when success takes longer

The last factors for successful alliance strategy, revolves around culture (see table 9). In international alliances the cultural differences are seen as a large problem. Rijnconsult for example mentioned that the cooperation between an English and an Italian consultancy company was very difficult. The main reason was that the partners had very different leadership styles and philosophy. Moreover, the foreign parties were only trusted in direct relationships and not in indirect ones. The parties had to know each other personally before trust was built. Besides, consultancy fees were very different among countries which made it difficult to hire a consultant from foreign partner firms. Next to national cultural differences, InTraffic mentioned that different company cultures can become a pitfall in alliances. Since InTraffic is a joint venture, employees have to deal with InTraffic's own company culture, but also with the company cultures of parent firms Movares and ICT. Since employees from the parent firms are often hired by InTraffic, the different backgrounds of employees cause identity problems in regard to relationships with clients.

Table 9 - Culture

Success factors / pitfalls	Benefit / risk
Watch for cultural differences in international alliances	Creates mistrust, miscommunication and unrealistic expectations about for instance salary
Account for different company cultures	Employees in the alliance have different company backgrounds which creates identity problems

Together, the 11 different alliance cases provided all different insights into successful alliance management. These different and complementing perspectives made it possible to form a complete alliance guide for managers, that discusses all the success factors and pitfalls that were experienced in the field. Managers can use this guide as a valuable take-away from this study.

CHAPTER 5 DISCUSSION AND CONCLUSIONS

Chapter 5 will first discuss the conclusions that can be drawn from this study. The conclusions will serve as a guide to how this study should be used. While discussing the conclusions, also the contributions of this study for the literature will be pointed out. Subsequently, the next section will point out the limitations of this study and opportunities for future research.

Discussion and conclusions

In order to draw conclusions from this study, first the main research question needs to be recalled:

What are the key dynamics of 'ambidextrous innovation' and how can strategic alliances be used in this innovation strategy?

When trying to answer this main research question, the first thing that needs to be explained is that ambidextrous innovation consists of the pursuit of two conflicting innovation strategies simultaneously, exploitative and exploratory innovation. This 'ambidextrous' strategy is contradictory to what most scholars believe to be effective. They believe that organizations need to pursue a focus strategy to avoid 'getting stuck in the middle' between two conflicting strategies. This concept of ambidexterity, however, does not explain all the dynamics of exploitative and exploratory innovation. In order to gain deeper insight into ambidextrous innovation, all the key dynamics had to be investigated. To begin with, ambidextrous innovation strategy is suggested to lead to higher performance, but then the question came up: how do the key dynamics in this process work? Recall that exploitative and exploratory innovation can be used to adapt to environmental change. These environmental forces are related to technological change, competitiveness and institutional uncertainty and together determine the rate of change of the environment. Although the theoretical model proposed that a *stable environment* needs to be dealt with by pursuing *exploitative innovation* and a *highly changing environment* needs to be dealt with by pursuing *exploratory innovation*, the research results showed that this process works slightly different. Instead of the suggestion by the theoretical model (see figure 5) that the environment should be treated as one large force that is either stable or highly changing, it was found that the different environmental forces need to be treated separately. *High competition intensity* needs to be dealt with by pursuing a large share of *exploitative innovation* since it generates more certain financial returns. *High technological change*, on the other hand, needs be dealt with by coming up with radically new products which can be developed by pursuing a large share of *exploratory innovation*. Organizations are thus dealing with company specific environmental forces which are often not all equally high. This conclusion means that the theoretical model should be read differently than originally intended. Depending on *separate* environmental forces, organizations are pursuing both the upper stream (exploitative innovation) and the lower stream (exploratory innovation) of the model. For example, seven out of nine companies simultaneously pursue exploitative and exploratory innovation because they have to adapt to different strong environmental forces (see figure 15, appendix 3.1).

The next key dynamic in ambidextrous innovation is the knowledge sourcing process. When pursuing exploitative and exploratory innovation, organizations need to have an appropriate focus in the knowledge sourcing process such that the absorptive capacity is enhanced. If exploratory innovation is pursued, firms are focusing more on the transfer of new and relevant external knowledge into the organization. This is related to *potential* absorptive capacity. When pursuing exploitative innovation on the other hand, organizations have a stronger focus on the application of knowledge which is related to *realized* absorptive capacity. What can be concluded is that the ability to absorb new external knowledge becomes higher when organizations are also internally active at the development of related knowledge. The absorptive capacity can thus be enhanced when the right knowledge sourcing focus is

pursued. Companies like Streamit and PNA Group have showed that they are better at applying externally acquired knowledge and products because they develop related knowledge internally. What can be concluded from this, is that also an appropriate balance should be found in the focus on potential and realized absorptive capacity. This balance is dependent on the level of exploitative and exploratory innovation that is pursued and determines the ability to absorb external knowledge into the organization.

After the absorptive capacity is considered, another key decision needs to be made about whether to 'make, buy or ally' in order to source innovation. While the three different options have many different advantages and disadvantages, the cases have confirmed that companies are valuing strategic alliances over 'make' or 'buy' strategies. In the past, companies used to focus on developing innovations in-house; however, because this can be very costly and generates uncertain outcomes, organizations increasingly prefer to engage in strategic alliances. Alliances have the advantage that complex problems can be addressed by combining complementing technologies and capabilities for new product development. This way, technologies that are owned by partner firms can be used and do not have to be invented in-house. An interesting result was that most interviewed companies complement the internal innovation strategy with engaging in strategic alliances. Although it is recognized that the companies were selected by having strategic alliance experience, it is remarkable that most companies had a stronger focus on developing innovations through forming alliances than on developing them in-house. Another remarkable finding is that British Telecom was the only company that has preference for buying technologies on the market. Smaller companies pointed out that a 'buy' strategy was simply too expensive. What can be concluded from this is that companies need large resources in order to pursue a 'buy' strategy.

Since strategic alliances are increasingly recognized as a valuable way to pursue innovation, they were integrated in this study to investigate how they could be used as a tool to complement the internal exploitative and exploratory innovation balance. The theoretical model proposed that marketing/production alliances can be used to increase the level of exploitative innovation and that R&D alliances can be used to increase the level of exploratory innovation. The research showed, however, that a majority of the alliances could not be categorized as either marketing/production or R&D alliance because a *combination* of both types of activities was pursued in the alliances. The expectation was that strategic alliances would mainly be used to complement a lack of internal exploratory innovation. On the contrary, the innovation balance within strategic alliances showed a large focus on exploitative innovation. Thus, besides that most alliances did not have a focus strategy on either exploitative or exploratory innovation but involved a combination of both, most alliances were more devoted to exploitative innovation than to exploratory innovation. Only Streamit and British Telecom use their strategic alliances to mainly integrate exploratory innovation, while they have an internal focus that is mainly on exploitative innovation. Similarly, InTraffic relies largely on their mother companies for exploratory innovation while concentrating internally on exploitative innovation. These cases are good examples of how companies optimize the innovation balance by pursuing exploratory innovation through strategic alliances.

When the companies were compared by positioning them against their innovation and alliance strategy, some more interesting results were found (see figure 15). It is striking to note that when the overall innovation balance is considered, thus including 'make, buy and ally' activities, seven out of nine companies show a stronger preference for exploitative innovation than for exploratory innovation. This phenomenon can be explained however by the fact that exploratory innovation is costly and only becomes valuable when newly developed products are exploited afterwards. A conclusion can be made that most organizations can only afford to pursue exploratory innovation to a certain level. Companies need to keep making profits in order to survive and are therefore inclined to pursue a higher level of exploitative innovation than exploratory innovation. A second thing that can be noticed from the

positioning model (figure 15) is that six out nine companies are more externally oriented than internally. This finding is in accordance with what was earlier concluded that most companies are more focused at sourcing innovation through engaging in strategic alliances or by buying technologies than on developing innovations in-house.

As indicated in the section about alliance strategy, organizations have many difficulties with making strategic alliances become successful. While the theoretical model indicates that organizations have to use strategic alliances for pursuing innovation, this study did not want to stop at just saying that. During the research of this study, the expert panel gave their experiences on the success factors and the pitfalls for strategic alliances. Together, these experiences have been integrated into practical recommendations on how alliance strategy should be pursued. Interesting conclusions are drawn from the strategic alliance cases are the following.

The most important aspect about strategic alliances is that they should create additional value by including synergies. In order to create these synergies, organizations need to have an appropriate *partner selection strategy*. Partners should be selected on the basis of owning complementary technologies, capabilities or expertise. These factors are able to add real value to alliances. Factors that can enhance the cooperation within alliances are similarities in size, philosophy, services, leadership style. A high level of trust and independence can add to this as well. What should be avoided is that partners are chosen just because they are familiar, trustable and from the existing network. The synergies should be clear *before* the partners are chosen instead of searching for synergies afterwards in a fruitless way. An important value chain function of alliances is that they can serve as a *radar function* for spotting new technologies in the market. For example in the Trenary case technologies were spotted from remote industries which could be applied to the waste management industry in a fabulous way that lead to radical innovations. The most experienced pitfalls regarding alliances are related to conflicts between partners. These conflicts might arise because organizations are not properly aligned in their goals and expectations of the alliance. Therefore, clear agreements should be made at all times and several practical recommendations should be taken into account regarding the division of alliance control, partner motivation and cultural differences.

Limitations and opportunities for future research

The research method of this study involves a sample of nine heterogeneous companies. This method was able to integrate many different cases that should be considered when pursuing innovation strategy and alliance strategy. Thereby, the different perspectives raised the validity of the research. These different perspectives were gained because the companies come from different industries, because they have different sizes, and because they are pursuing different kinds of alliances. This resulted in a very useful and complete guide for alliance strategy. However, the limitation of this heterogeneity is that companies are not very well comparable or specifiable to a certain kind of company. For example, companies using this study should still consider their company related environmental forces and innovation needs in order to apply the theoretical model. On the one hand, this research is thus more complete by integrating different situations into analysis, but on the other hand, the lack of homogeneity hurts the reliability of the research. The sample used generated conclusions about ambidextrous innovation strategy and alliance strategy that can be applicable to almost every company. This makes the research interesting for a larger audience. However, a limitation of this is that it is not possible to generalize conclusions about a certain kind of company or industry. Another limitation relates to selection criteria of the sample. The companies were selected by their experience with innovation and strategic alliances. The criteria of having alliance experience might have increased the probability that organizations have a preference for an ‘ally’ strategy over a ‘make’ or ‘buy’ strategy. This forms a threat to the reliability of conclusions about alliance preferences. However, it does not influence the innovation strategy of organizations and whether innovation is pursued within the alliances. In addition, companies have a tendency to only tell about successful innovations and alliances,

while hiding the failures because they are not proud of these stories. Considering alliance strategy however, a lot can be learned from the alliances that were not a success.

Opportunities for future research could involve a research method that contains a large sample size of all kinds of different companies and different alliances. This could integrate more perspectives into one study and generate an even more complete guideline for innovation and alliance strategy. If the study is pursued for a particular company however, the research could focus on one industry while controlling for a similar firm size as well. This method could specify the results towards the company of interest. Another option for future research would be to focus on only one kind of strategic alliance. For example, strategic partnerships could be investigated since they are the mostly used form of strategic alliances.

Future research should also concern the issue that it is still difficult to measure innovation. Because innovation cannot be measured in short term financial returns managers are not rewarded properly according to their innovation efforts. The result of this, is that managers are incented to focus on short term financial returns (shareholder interests, etc.) instead of building innovation capabilities for the future. Managers should be rewarded according to softer measures, for example by measuring the increase in absorptive capacity, which is a better indicator of a firm's innovation capability than R&D intensity (cf. Jansen, 2005). These softer measures of performance will avoid a new financial crisis that is caused by organizations that have a too narrow view and focus only on short term shareholder interests.

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APPENDICES

Appendix 1: Interview questions

Structureel Interview

Persoonlijke gegevens

Naam:.....

Bedrijf: .....

Functie:.....

Opleiding(en):.....

Introductie

Voorstellen, uitleg onderzoek, verloop interview

Omgevingsfactoren:

1. **Wat zijn de marktcondities en omgevingsfactoren waar uw bedrijf mee te maken heeft?**
- Technologie (o.a. levenscyclus)
- Concurrentie (intens – zwak)
- Instituties (o.a. overheid)
2. **En hoe veranderend zijn die?**

Innovatie types en kennis aantrekking:

3. **Speelt u in op omgevingsfactoren door middel van innovatie strategie? Wat is uw innovatie strategie?**
- Kunt u uw innovatie-organisatiestructuur tekenen?
- Houdt u productie activiteiten gescheiden van innovatie praktijken?
4. **Hoe loopt het proces van kennis aantrekking? Herkent u deze volgorde?**
    - Identificeren en verwerven van nieuwe kennis
    - Integreren van nieuwe en bestaande kennis
    - Omzetten naar bruikbare modellen
    - Exploiteren van ontwikkelde kennis en producten
5. **Welke stappen in dit proces komen het meest in uw bedrijf voor?**

Strategische allianties:

6. **Innovatie: Kiest u voor 'Make, buy or ally'?**
7. **Kunt u een voorbeeld van een strategische alliantie uit de praktijk van uw bedrijf noemen waarbij innovatie een doel was van de samenwerking?**
8. **Wat was het type van de alliantie?**
- Marketing / productie gebaseerde alliantie (schaalvergroting, samen sterk staan, het delen van kosten en risico's)
- R&D alliantie (samen nieuwe kennis en producten ontwikkelen)
9. **Hoe verliep de alliantie?**
- Hoe is de partner geslecteerd?
- Zijn de doelen behaald? (innovatie, nieuwe kennis, winst, betere marktpositie?)
- Wat waren de succesfactoren? (schaalvoordelen, complementaire kennis en competencies?)
- Wat waren de valkuilen? (contracten, verwachtingen, motieven)

Afsluiting

Appendix 2: Interview summaries

2.1 Interview - Rizal Sebastian – TNO

Company description	TNO is a Dutch organization for applied scientific research. TNO offers their services to companies in 25 different industries. Consequently, their research themes include a wide range of subject matter. This case will focus upon TNO's Built Environment and Geoscience department, which is active in the construction industry. www.tno.nl
Project description	The discussed project is called Inpro and is a R&D consortium between 18 different organizations in the construction industry. The consortium includes two research companies (including TNO), five contractors, three universities, a principal, software companies, and design companies from nine different European countries. The project has a budget of 13 million euro over four years and is subsidized by the European commission. www.inpro-project.eu
Function description	Sebastian is senior researcher / consultant building and systems at TNO. At Inpro he is the technical manager of the project.
Innovation strategy	The companies within the construction value chain have experienced planning problems which are often caused by inconsistent construction designs. The problem is that architects often have no idea what the consequences of their decisions are for processes later on in the construction value chain. Inpro uses a software based model (BIM) which incorporates information from all the different phases of the construction value chain. This software is used in the design phase and can automatically tell the consequences of different decisions of architects for other parties later in the building process. However, BIM requires input from actors of every phase in the value chain. Inpro's goal is to stimulate the use of BIM by organizations. Besides, they are refining the technology by developing add-on applications. The use of BIM can potentially gain revolutionary efficiencies and cost reductions in the building process. BIM can be categorized as a radical innovation.
Environmental forces	The technological environment in Inpro's case relates to software applications for the construction industry. Software is changing rapidly and has a short lifecycle according to Sebastian. The Building Information Model, however, is state-of-the-art technology and is far ahead of currently used software applications. Secondly, the competitiveness in the construction industry is very high. Considering the alliance internally, however, there is no high competitiveness between the partners because they serve different markets for the most part. Thirdly, the institutional forces are influencing the project through funding of the European commission. Besides, they have some basic requirements on which parties should be involved in the alliance
Absorptive capacity	Because TNO is a research company, they are mainly active in identifying, acquiring and assimilating knowledge (step one and two of the knowledge sourcing process). By doing this, TNO helps other companies with the transformation of knowledge into usable frameworks (step three). These companies are subsequently exploiting the products.
Make, buy or ally?	TNO uses 'make, buy and ally' strategies within Inpro. In the first place, new knowledge is developed within the company, for example, software application add-ons are developed for BIM. However, in order to use BIM, they need to buy a license. Inpro thus buys the license and develops the software further. However, alliances represent the biggest potential value for the Inpro project. All the parties in the construction process need to provide information in order to make BIM a success.
Alliances	The partners in the consortium are selected according to requirements of the European commission. They require for instance that several different countries are cooperating and that different kinds of organizations are part of the project. All the involved parties recognize that they will never be able to achieve such radical innovation without participating in the consortium. Most participants are member of a European platform for construction technology (ECTP) and have joined European projects before. Inpro has been considered a success because all participating organizations are very enthusiastic about the new technology (BIM). This is an important achievement because commitment of all parties in the value chain is of crucial importance for this new technology. A Success factor of the alliance is the potential value of collaboration for the new technology. The companies that can eventually start exploiting BIM will achieve an enormous competitive advantage. One of the pitfalls is the fact that there is not one real principal that has decided how the project should be done. The European commission only has some general requirement for the project. All the organizations of the consortium have different interests and try to shape the project in their advantage. This makes the decision making a slow process. Besides, the cultural differences are often experienced as a problem. Concluding, Inpro can be categorized as an R&D alliance whereby several parties are exploiting the developed products within their own organization.

2.2 Interview – Leendert Nugteren – Teesing

Company description	Teesing is a technical wholesaler and engineering company with offices in the Netherlands, USA (New Jersey) and China (Beijing). The company is divided in 3 autonomous business units: industrial applications, alternative energy and submicron technologies. www.teesing.com
Function description	Nugteren is business manager of the submicron technologies business unit and board member of Teesing Group.
Environmental forces	The technologies that are supplied by Teesing are the following: fittings, valves, tubing, systems and assemblies for industrial applications in 4 sectors: pneumatics, hydraulics, instrumentation and transport of media. These technologies have not been changing drastically in the last decade. However, the applications that need to be developed can become very complicated and lead to new products. The competition for Teesing's products is very strong, partly because it is difficult to differentiate on traditional technological products. This difficulty to differentiate puts pressure on product prices in the industry. Still, the product demand is always rather high since the products are needed all over the world. Institutions are cooperative towards Teesing's business. This is illustrated by the subsidies from the Dutch government. The subsidies are given for working hours that are spent on searching for innovation and for activities in the alternative energy business.
Innovation strategy	Teesing's main goal is the exploitation of product components for several connection problems in industrial applications. However, to exploit their products Teesing needs to develop innovative applications that are valuable to its clients. Often, Teesing co-develops these new applications by combining their technology with technologies that are provided by other companies. This way, they are able to provide products that exactly fit the needs of clients such as ASML. The search for innovation and new opportunities to collaborate is pursued by higher management of Teesing. They actively keep an eye on market trends. Teesing does not really separate the exploration activities from their everyday exploitation activities.
Absorptive capacity	Nugteren recognizes the steps in the knowledge sourcing process and is consciously working on assimilating, transformation and exploitation of knowledge (step two, three and four). The generation of ideas is a step that they need to run into, because they cannot be working on that constantly. That would be too expensive.
Make, buy or ally?	Teasing chooses to pursue innovation mostly by collaborating with other companies. The development of total new technologies in-house is considered too expensive looking at the size of the company. Therefore, they search for companies that are already far in the process of developing the required technology. However, applications of technologies that are already owned are often pursued in-house. Buying technologies is not considered an option because it would cost too much.
Alliances	The alliances that Teesing pursues can be categorized as mostly marketing/production alliances where existing technologies are combined in new ways. However, often some research needs to be done in order to investigate how products can be applied in new applications. One interesting alliance that Nugteren points out involves a Chinese gas company and a Chinese university. Teesing supplied materials for the storage of gas at high pressure and the transportation of gas from the source towards the gas stations. The Chinese university pursued R&D on how Teesing's technologies could by applied for dealing with gas. However, after some time, the R&D was not necessary anymore and the university stepped out of the alliance. The goals of the alliance have been reached because Teesing is currently gaining good profits of its business in China. The success of the alliance is the result of the combined complementary capabilities regarding gas (Chinese company), supplies (Teesing) and R&D (university) on transportation and storing of gas in an area where no underground transportation system for gas is present. Besides, the Chinese partner had the needed knowledge of the local market and Teesing got subsidized by the Dutch government for flying to China whenever it was needed. The pitfalls of Teesing's alliances were mostly that partners tend to drop out of the alliance if success takes a little longer as planned. Partners then have to invest a larger sum of money into the project or the whole project falls apart. Sometimes it also occurred that Teesing was not able to develop the needed application.

2.3 Interview – Serge Gouders – PNA Group

Company description	PNA Group is a company specialized in knowledge based innovation and methods. Their knowledge management methods help structuring knowledge and information in such a way that the application and use of knowledge can occur quicker. Moreover, the method PNA uses ensures that no misunderstandings occur in information analysis due to the use of business rules and the use of natural language. Their method also ensures that knowledge can be applied more effectively, more accurately, and it enhances communication. www.pna-group.nl
Function description	Gouders is sales manager at PNA Group. Before he started at PNA, he was a business development and alliance manager at Progress Software.
Environmental forces	First, knowledge management methods can be considered to be highly changing technology. Secondly, the competitiveness in PNA's branch can also be considered as high. Thirdly, institutions such as the governmental body SenterNovem influences PNA through various initiatives on the market. MKB and larger enterprises can be subsidized by making use of PNA's services because innovation is stimulated this way. PNA acts as an external party advising them on how to manage their knowledge in the right way for innovation.
Innovation strategy	PNA recognizes that many problems in organizations arise because knowledge is organized by having random spreadsheets with information spread around the organization. PNA advises companies on how they should manage their knowledge in a structured way. Using PNA's knowledge management systems no information can get lost and the knowledge can be applied more quickly and with more accuracy. The methods that PNA uses includes CogNIAM ((Cognition Enhanced Natural Information Analysis Method, a knowledge science) which is developed by prof. dr. Ing. Nijssen. This method has been highly valued and used in the development of the knowledge world standard SVBR (Semantics of Business Vocabulary & Business Rules). The methods make sure that employees are not using different interpretations of definitions; they have to interpret them according to certain business rules. This way the communication within organizations is optimized, and distortion is prevented. PNA's knowledge management method is far ahead of competitors. However, also PNA needs to continually look for new ideas and methods to use. PNA collects new business development initiatives from customer's suggestions. Because PNA's method has been used as a world knowledge management standard, they have been selected to join the European Framework Program OntoRule. OntoRule is a consortium which is subsidized by the European Commission and define and apply rules for automated knowledge management standards. For the main part PNA develops its knowledge internally and they share new ideas in the OntoRule alliance project. Their knowledge management method (CogNIAM) involves a different way of thinking than the methods of competitors and therefore provides PNA a major competitive advantage.
Absorptive capacity	PNA has focused on the development of a new knowledge management method. Consequently, they have a tendency to focus on exploration. However, now that the knowledge management method has been developed, they are focusing more and more on the exploitation of this method.
Make, buy or ally?	As Discussed before, PNA has chosen to develop the knowledge management method in-house. Prof. Dr. Ing. Nijssen has worked 30 years on the development of CogNIAM. Thereby he laid the foundation for PNA's services. When PNA tries to renew their products today, they have a tendency to do this still in-house because they have done this in the past and they are used to the scientific way of working with knowledge. The OntoRule project adds ideas to the already internally developed knowledge by acting as a radar function which spots new market trends. Buying technologies has not been seen as a valuable option. PNA mainly focuses on the options 'make' and 'ally'.
Alliances	Besides the OntoRule alliance, PNA engaged in an alliance with an innovation methods company in order to mutually exploit their services. While PNA makes sure that knowledge is stored and structured in the right way, TLO delivers the education for innovation standards mainly in the processing and production industry. By combining methodical innovation with the PNA approach of exploring, registering, distributing and evaluating knowledge, a good match exists in the alliance. Meanwhile, PNA Group develops software that integrates the knowledge from different software applications (such as word, excel, etc.). This way, the knowledge can be extracted from the system in an efficient and good looking way. Concluding, PNA and TLO together are able to bring more valuable services to the customer than could do on their own. This alliance can be categorized as a marketing/production alliance which is mainly pursued to bring together complementary capabilities. However, not only marketing/production activities are pursued in the alliance, also R&D was needed in order to integrate the different technologies.

2.4 Interview – Ruud van Riel – Trenary Holding

Company description	Trenary Holding is a company in waste management with their head office located in Oisterwijk, the Netherlands. The holding consists of Vulcanes Ireland, Vulcanes Germany and Steps India. www.vulcanes.com
Function description	Van Riel is CFO of Trenary, as well as partner and shareholder.
Environmental forces	To begin with the technological environment, traditionally the waste management industry has been slow in adopting new technologies. Even though it is not very eco-friendly, the most used technology for the disposal of waste is still landfill in many countries. The competitiveness is considered high. Traditional waste management companies are very dominant in markets which they have been serving for a long time. The institutional forces, in the form of national governments over the world, are not very receptive to new technologies in the waste management industry. This is partly because traditional waste management companies have a strong political lobby but also because political parties do not like to admit that they have been supporting inferior technologies in the past.
Innovation strategy	Trenary was founded because technologies in the airplane industry and oil industry were believed to have large potential value for the waste management industry as well. An Irish company normally uses autoclave technology for the development of airplane wings. However, they believed the technology could also be applied for the processing of waste. With this technology, waste does not have to be separated at the source (by households, etc.) but it can be processed within the autoclave. The waste is put under enormous amounts of steamed pressure and leaves only the very basic elements of the waste material. The outcome is sterilized and ready to be recycled. The autoclave is very valuable technology and radically more efficient than traditional processing techniques. The second technology that Trenary offers comes from Steps, an Indian oil company. Since they always had to deal with cleaning oil waste in their manufacturing plants, they developed a revolutionary technology that could reverse the traditional process of producing plastic from oil. This means that plastic can be recycled back into petrol. The two companies providing the technologies came to Trenary because they had no idea how to exploit it on the market, and Trenary could provide the market knowledge. The innovation strategy of Trenary is based on combining two revolutionary technologies together with traditional waste management techniques such as the collection and transport of waste. This combination is able to gain major efficiencies in the waste management industry. The exploration has largely been done by two companies in distant industries and Trenary mainly needs to take care of the exploitation, by bringing the technology to the market. As mentioned before, the institutional forces form a large problem for Trenary. Trenary only option is to try to create public pressure on political parties by showing the public how much more eco-friendly and efficient their technology is. However, to be able to show this to a large public, they will need to be able to build their first operating plant. This first plant can proof to other investors that the technologies are working as promised and it can put public pressure on political parties to start adopting Trenary's technologies. However, due to the accompanying risks, it is very difficult for Trenary to find investors that are willing to be a first mover in the market.
Absorptive capacity	The identification and assimilation of new knowledge has largely been done by Vulcanes Ireland and Steps India (step one and two of the sourcing process). Succeeding, Trenary transformed the technological knowledge into knowledge that is ready to be exploited on the market.
Make, buy or ally?	Making and buying technology is considered too expensive for Trenary. They want to create value by teaming up with different companies that each provide a significant added value to the firm by having complementary technologies.
Alliances	Trenary is an alliance with two companies from the airplane and oil industries. Trenary tries to find a new application for their technologies by applying it to waste management. The alliance can thus be considered a production/marketing alliance since it is based on the exploitation of existing technologies. However, also R&D was needed in order to apply the technologies in a different context.

2.5 Interview – Denis Maessen – Rijnconsult

Company description	Rijnconsult specializes in services like management consultancy, temporary management and staff development. Rijnconsult consisted of around 150 employees. www.rijnconsult.nl
Function description	Maessen's function as a partner and consultant is considered during the 1990s. Thereby he was active at Allied Consultants Europe (ACE) which is an international alliance between Rijnconsult and, at that time, six consultancy firms in Europe.
Environ-mental forces	The technology of consultancy services was rapidly changing according to Maessen. Especially ICT was rising these days, and needed to be adopted by consultancy companies. The rise of ICT meant for Rijnconsult that they got the chance to go into Europe and expand its market. The competitors saw the European market as an opportunity to expand as well, but organizations needed to figure out how ICT could be combined with the classical way of consulting. In the past, the environmental forces were preventing Rijnconsult from going into Europe, but the technological progress provided these possibilities. Considering, the institutional forces, they were not hindering the company in its activities. The competitive market, on the other hand, was changing very fast through the influence of ICT.
Innovation strategy	While Rijnconsult was always just serving the Dutch market, they tried to innovate by pursuing internationalization. First, they tried to place their own people abroad such that local market knowledge could be combined with local consultancy expertise. This was tried for a year, but turned out to be too difficult. Therefore, Rijnconsult decided to start a new European organization together with comparable consultancy firms. This organization called ACE was created in alliance with several partners throughout Europe. Partnerships were made in Stockholm, Lisbon, Rome, Paris, London and Munich such that Northern, Southern and Western regions of Europe could be served. The partners had to be independent, have a human oriented philosophy (not one method to cope with every problem), offer similar services, have similar leadership styles and had to fit in size. Considering the factor size, Rijnconsult had rather small partners of around 25 employees in London and they partnered with a firm of around 350 employees in Rome. The consulting expertise was more advanced in the Dutch and Northern markets, so knowledge transfer mostly occurred from that region to the rest of Europe. Rijnconsult, however, did acquire local market knowledge from their partners and added this to the existing knowledge stock. The innovation practices had to be done next to the regular tasks, and employees of Rijnconsult had to search for time to spend on innovation activities (a few hours a month). Doing this for two years however, this added up and grew to a proper innovation strategy. Every partner had a small team of two consultants and an intern student who worked on this. One of the difficulties was resistance against the internationalization among the employees of alliance partners. Especially older employees that held financial responsibilities didn't feel like cooperating with foreign people that speak different languages. Therefore, only a small group of the employees participated in the alliance activities, which made it difficult to find appropriate partners.
Absorptive capacity	Rijnconsult absorbed new knowledge from their network and organized readings for inspiration. Besides, they pursued small projects for exploring new areas. This way they tried to combine different expertise and tested it on a client case (in this case Nikon). Rijnconsult mostly searched for new combinations of existing knowledge. Furthermore, Maessen wrote programs together with partners to renew their products. This way, the expertise was combined and new products were generated which could be exploited on the market.
Make, buy or ally?	Going into Europe through the acquisition of other companies was considered way too expensive for Rijnconsult. They tried to start an office abroad in Germany for a year but found out how difficult this was. Therefore, Rijnconsult attempted to connect with local partners instead. Larger consultancy firms did have an acquisition strategy; they could do this because they had the resources. For Rijnconsult, however, alliances were a better strategy since a connection was made with the market and some freedom was maintained.
Alliances	ACE was for a major part driven by marketing goals. Rijnconsult had the consulting expertise and by teaming up with international partner firms, they became a competitor for larger consultancy firms. Due to ACE, Rijnconsult became a serious player that could serve the European market. Rijnconsult saw the alliance as an important marketing tool since they could not only serve the Dutch market now, but also the other European markets. This way, their services became interesting for larger MNEs. Looking back, Maessen does not consider the alliance as a big success, however. The ACE project did not create an additional profit or additional clients. Some existing clients did get more satisfied by the alliance and for some of the employees the alliance was valuable since they became part of a larger organization, which opened up opportunities. In terms of new knowledge absorption through the alliance, Maessen says that knowledge sharing was then not as easy as nowadays. One of the pitfalls was the cultural problem. For example an Italian partner did not want an English consultant for his client and this was the same other way around. The Italians had an alternative way of consulting, which did not go together with the Anglo Saxon style. It was very difficult to build this trust, especially in indirect relationships. Communication between companies from different countries is nowadays much easier, but the cultural problem is still present according to Maessen. Part of this cultural difference is the difference in service fees. A consultant could earn way more in England than the same consultant could earn in another European country. ACE always respected this by using local market prices.

2.6 Interview – Michael Pullens – Maetis

Company description	Meatis arbo is an occupational safety, health care and human resources company. They offer extensive opportunities for counseling of absenteeism and reintegration. Furthermore, they provide opportunities for the prevention of absenteeism and disability claims. www.maetis.nl
Personal function description	Pullens is an external consultant at Maetis, currently working his own (Pullens & Associates BV). He offers services in consultancy, interim management and marketing. In the case of Maetis, he advices them on an alliance with an insurance company.
Environmental forces	The occupational safety, health care and human resources services are rather traditional services like providing company doctors or shrinks to get employees back to work. Technology in this area is thus very stable and has a long life cycle. The competitiveness in the industry is high. This caused by the fact that the services are enforced by law and the clients attempt to meet the requirements of the law in the cheapest manner. Clients thus have a cost, which puts pressure on the prices in the industry. The industry consists of many large competitors; however, Maetis states that it is one of the largest companies. They represent 55.000 employers and 650.000 employees. The institutional force includes the Dutch government which influences Maetis only by enforcing the law that says organizations need to offer safety, health and welfare services to its employees.
Innovation strategy	The main service of Maetis arbo involves taking care employees stay healthy and motivated. Although these services are mandatory by Dutch law, clients are looking more and more for what addition value companies like Meatis arbo can bring to their company. Additional value can be brought in terms of higher production of employees, or by offering completer packages of services. Clients often point out like feel they are double paying for health care services because they pay for employees' health *insurance* and also for safety, health and human resource services themselves. This issue is addressed by Maetis through working together with different insurance companies. This way, Meatis can offer a more complete package of services including health insurance and the health services itself. Clients are thus not paying double anymore. Besides, Maetis makes agreements on quantifiable results like higher production levels of employees. Innovation is pursued at Meatis by a selection of people within higher management. They search the market for good ideas of new product combinations.
Absorptive capacity	The identification of good ideas happens through brainstorm sessions with external parties and consultants. They form a team and search for possibilities how different products can be combined such that new products can be developed. Considering the knowledge sourcing process, this team mainly focuses on step two and three: the assimilation of knowledge and the transformation of knowledge into usable frameworks. The ideas (step one) have to be generated in an ad hoc manner and the exploitation (step four) is done afterwards by lower management.
Make, buy or ally?	Developing technology in-house is often too expensive. Buying another company in order to integrate technology is an option, but is viewed as being too radical. The buying company often does not know exactly what it is buying, so companies are better off when they get to know each other first through forming alliances. The most important thing is that synergies are created between companies. If it turns out that this is the case, then still an acquisition of the company can take place. The strategy to create synergies is often planned better In alliances because in an acquisition companies think it will come by itself. However, in reality, this is not the case. Licensing a technology is not considered as a valuable option.
Alliances	The alliance between Meatis and an insurance company can be categorized as a marketing/production alliance, although also R&D activities are pursued in the alliance. Complementary technology is combined and new products are developed. Pullens thinks the ideal situation is when alliances have factors of both R&D and the exploitation in them. The alliance partner is selected on the basis of owning complementary technology. The goals of the alliance are definitely achieved, since very innovative products were developed. Furthermore, Meatis is now catching an even larger market share. The most critical success factor of the alliance is that there were significant synergies created between the partners. These synergies provided that Maetis was able to offer a much completer product that fits the customer demand. One of the pitfalls in the alliance process is that interests and expectations should be aligned. At both sides one person needs to be held responsible for the results of both parties. This is very important to prevent partners from pursuing double agendas and thinking 'what's in it for me' very soon. These alliance managers enhance the communication and make sure that it is clear to both parties which party takes care of which developments.

2.7 Interview – Jan Koers - InTraffic

Company description	InTraffic is a joint venture between infrastructural engineering company Movares and IT specialist ICT. The joint venture was formed in 2003 and by now exists of around 125 employees. InTraffic combines the knowledge of both mother companies in developing software for the infrastructure industry.
Function description	Jan Koers has been managing director of InTraffic for two years now.
Environmental forces	The technologies that InTraffic is using are for example the OV-chip card system, that has to replace traditional public transport tickets, PDA systems, for railway maintenance workers, and GPS systems, for the new traffic tax system that makes users pay per kilometer that is traveled. Koers considers the technological environment to be renewing but not highly changing. The infrastructure industry is mainly focused on reliability of for instance the railway system and does not want to take much risk by implementing new technologies. The competitiveness comes from the IT industry and is very high. Competitors like, for example, Atos have strong positions in the market. InTraffic needs to keep focusing on the uniqueness of combining IT and engineering expertise. The institutional force is also very influencing since the government is InTraffic's largest client. Most policy changes like stimulation of the economy or budget cuts can be anticipated, but some others, like the new traffic tax system, are very uncertain. InTraffic has made large investments in making a prospect, but it could still be cancelled by the political parties.
Innovation strategy	InTraffic's innovation strategy is based on using the expertise of both mother companies. InTraffic is mainly active in developing software, but the engineering expertise of Movares gives them an advantage for developing software in the infrastructure industry. A team of sales and consultancy people needs to work on innovation and gets a certain number of hours a month for this. The sales people are representing the commercial interests of customer preferences and the consultancy people are taking care of translating this into new ideas for product or knowledge development. The development of new ideas for innovation takes only 2% of the resources of InTraffic. However the remaining part of the company works on further developing the existing products all the time. InTraffic does not have a separate department for innovation but several employees of higher management (architects, consultants etc.) are pursuing this job next to their everyday activities.
Absorptive capacity	Considering the whole organization, InTraffic mainly focuses on step three and four of the knowledge sourcing process: the transformation of knowledge into new products and the exploitation of their existing products.
Make, buy or ally?	Developing radically new technologies in-house is considered too expensive for the company. InTraffic does develop many new software products internally but for radically new products and technology they look outside the company for the needed expertise. Buying technologies is not seen as a beneficial way of sourcing knowledge. InTraffic often sources new knowledge from the parent companies. Production capacity is hired from ICT and specialist engineering knowledge is acquired from Movares. If other technology is needed, InTraffic looks for alliances with companies that own the complementary technology. For example, for the new traffic tax system, InTraffic pursued an alliance with Alcatel, a telecom provider that uses GPS technology. Concluding, InTraffic has a preference for using alliances for the sourcing of technology and development of new products.
Alliances	The alliance that has the focus in this case, is the company itself, since it is the result of a joint venture between Movares and ICT. Movares had the problem that they were not recognized as an IT company in the market, while they were actually developing software for the infrastructure industry. Because of this lack of awareness, they weren't able to attract good IT employees. They had to hire these employees from other IT companies. To change this situation, Movares started the alliance with ICT. This way, InTraffic was born which could focus its IT activities on a niche market: the infrastructure industry. The alliance partner was chosen because of complementary technology. ICT could provide the IT expertise and Movares the engineering expertise. Together they were able to set a better product in the market in the form of a new company. According to Koers, the alliance can certainly be called a success. The company grew in 6 years' time to 125 employees and is planning to grow in the coming years to 200 employees. The most critical success factor is the complementary technology and expertise of both mother companies. InTraffic still has strong ties to Movares and ICT and profits from two kinds of expertise. A pitfall in the alliance is that InTraffic has to deal with 3 difference company cultures: from the two mother companies and from InTraffic itself. Often employees of the mother companies are hired which sometimes experience identity problems towards the clients. Since Movares and ICT made very clear alliance agreements, they never had clashes of interests.

2.8 Interview – Johan van der Stoel - Streamit

Company description	Streamit is an electronics and IT company founded in 2003 by Van der Stoel. He started with the development of a receiver for church radio on an internet streaming and telephone line basis. By now, around 15000 receivers have been sold and around 800 churches are using the services of Streamit while the market is still growing. The company is currently also active on the market for background music in shops and in the residential market where remote controls are sold that control several electronic devices. The internet radio market is now also being served as well as the market for radio broadcasting. Streamit consists of seven employees. www.streamit.eu
Function description	Van der Stoel is CEO and managing director of the company.
Environmental forces	In the 1920s people were already using telephones to get a connection with the church for listening to church services. When in 2003 people were still using telephones, Streamit came up with the idea to start developing church radios. The technology has thus always been very traditional but is now strongly changing. The competitiveness in the industry is very low since there is only one competitor in the Dutch market. And in fact this competitor actually has a different focus. Furthermore, in other countries like Germany the market for church radios does not even exist. The government has a large influence on Streamit according to Van der Stoel. Streamit gets WBSO subsidy from the government which means that several hours that employees been spent on innovation can be deducted from taxes. Besides, external consultants can be hired at the government's expense. Many organizations that Streamit deals with don't make use of this subsidy, which means that when Streamit wants to buy innovations, these organizations offer them at prices which are too high for Streamit. Therefore, Streamit rather innovates in-house. A large constraining influence of the government occurs because the government attempts to stimulate people which are really low or really high educated. This should keep them at work although there is an economic downturn. Because of this unequal government support, many skilled R&D workers are staying at large companies, instead of that Streamit can hire them. Streamit would not have had this problem if there would have been a totally free market situation.
Innovation strategy	Van der Stoel is very pragmatic in his innovation strategy. He gets his ideas from looking at market needs. He has spotted the need for church video streaming and has developed devices for it right away. Streamit expects a high demand for this church video market. Streamit also tries to internalize new knowledge by hiring good employees that have the needed expertise. Van der Stoel uses his personal network to find these employees. Also employees are trained by partner firms that offer relevant courses. Next to this, Streamit collaborates often with partner firms in order to develop new products. Considering the separation between every day activities and innovation activities, Van der Stoel says the first priority is always to serve the customer in the best way. The second priority is marketing activities (for him) and developing new products (for all the other employees). Most of the employees are thus constantly working on the development of new products (programming software etc.) and on searching for ways how new knowledge can be integrated into existing products. As much as 30% of the turnover of Streamit is spent on this product development.
Absorptive capacity	All four steps in the knowledge sourcing process are pursued by Streamit, but the main focus is on step two, three and four.
Make, buy or ally?	Streamit has a strong preference for developing new products and services in-house. Van der Stoel believes that they have a much stronger market position because they make the products themselves. They often go to information markets to promote their products. At these markets they get a lot of attention for newly developed products they are offering. This 'free promotion' would not have happened when products were developed externally. A 'buy' strategy is only used as a last option. Alliances were made for developing devices for background music in shops and for the development of video streaming devices. Making these kind of alliances are considered very valuable to the company.
Alliances	The partner in the discussed video streaming alliance was Cervus. Cervus has a lot of expertise in managing IT systems and product development using Linux software. They were prepared to develop the video streaming devices for Streamit on a 'no cure, no pay' basis, and thus only requiring a share of the profits. Cervus was selected out of the personal network, being one of the old church radio customers. The value of Cervus as a partner is illustrated by their complementary technologies that Streamit needed for product development. The alliance is considered a big success generated several products already. A success factor was that Cervus was prepared to take on much of the risk of product developments. One of the pitfalls was that agreements had to be made very carefully on beforehand. Other important pitfalls are that motivation of both parties needs to be aligned, there needs to be a win-win situation and synergies need to be present.

2.9 Interview – Rob van Basten-Batenburg – British Telecom Group

Company description	British Telecom Group (BT) is specialized in broadband (internet), TV and phone products for both the consumer and the business market. They are not only active in developing internet and phone connections, they also provide the implementation of IT services and solutions for internal processes of large organizations. Examples are banks, insurance companies, transport companies and the British national health care system with a database of 65 million patients. They are moving from the traditional offering of communication services to a broader offer based on media and amusement packages. These packages integrate different services such as internet, TV and phone products. www.bt.co.uk
Personal function description	Van Basten Batenburg was head of the business development department in 2006. In his department, most of the R&D of the company is pursued, which relates for example to the security of data streams, media products and internet connection networks.
Environmental forces	The technology has shifted from phones and phone connections to everything that is related to IT services. Because of the technology, the industry is considered one of the fastest changing industries. Also competitiveness is very high. The competition is not only based on the technology but also on how customer services are offered. For example parts of their broadband network are sold to other companies that offer their services in their own way and built up a customer base through their services, not through their outstanding technology. Institutional forces (this case Ofcom) are regulating BT's monopoly position in telephone network. They make sure that the network is shared in a rather fair way by regulating fares that BT and other players have to pay for making use of the network. BT is thus somewhat dependent on these regulating decisions, although BT gets to negotiate about them every year.
Innovation strategy	The innovation strategy is divided in three elements. The first is the R&D lab that does scientific research on new technologies for the next 5 years. Technologies and processes are radically improved here. Example is the development of a technique to blow glass fiber cables through the ground instead of having to dig everything open. The second element is focused on how the look and the feel of existing products can be enhanced. This is more focused on incremental innovation. The third element is about how existing products and services can be repackaged into an improved new kind of service. This is for instance done by integrating telephone, internet and TV into one service package. BT is structured in 4 different departments: *retail* services for the consumer, *wholesale* services that provide bulk access to the network, *global* services that target different industrial groups such as finance, energy or health care and a department that governs the telephone *network*. Each department gets a development budget which they have to assign to innovative projects. This process is not always coordinated very well; sometimes work is done twice, but on the whole this systems works well for BT. Innovation spending was around 4 % of total business spending (730 million out of 19.5 billion pounds).
Absorptive capacity	Van Basten-Batenburg says that the four knowledge sourcing steps are all done parallel to each other within BT. The R&D lab develops new ideas (step one, 0.5% of the business) in collaboration with universities (e.g. MIT) and partner companies (e.g. Samsung) The whole company works on step two and three: the integration of new knowledge and the transformation into new products. This involves a very complex process including product trials in the market. If they are not successful they need to be withdrawn from the market again, which causes a lot of complications (entails around 8% of the business). The exploitation of products is done by the major part of the company (step four, around 90% of company activities).
Make, buy or ally?	The R&D is done internally and together with research institutes and partner firms. 'Make' involves 30%; 'buy' involves 55% and 'ally' involves 15% of innovation activities. A lot of R&D is done in-house, however, especially a large number of companies are acquired to integrate technologies. Moreover, many technologies are licensed on the market, and a smaller percentage relates to alliances for innovation.
Alliances	BT has pursued many alliances. Two interesting alliances with Philips are on the entertainment side and in the health care sector. In the first alliance they developed the 'Set Top Box' which was a device for the living room that controls telephone, internet and TV services. In this case BT supplied the connections and Philips the hardware. This alliance was developed in a far stage until agreements had to be made about which party could control the customer base. The companies could not agree and a potentially valuable alliance failed. The customer base was so important because they could be influenced in favorable ways for example for selling complementary products. In the second alliance systems were developed that could automatically monitor patients in hospitals. Again BT took care of the connections and Philips of the medical hardware. This time, however, BT was the principal in the alliance and Philips only cooperated in supplying the hardware. This way, clashes of interests were avoided. The alliances were both started in order to combine complementary technologies.

Appendix 3: Interview results compared

3.1 Environmental forces, innovation strategy and knowledge sourcing focus

Company / project	Inpro (TNO)	Teesing	PNA Group	Trenary Group	Rijnconsult	Pullens @ Maetis	InTraffic	Streamit	British Telecom
Expert	**Rizal Sebastian**	**Leendert Nugteren**	**Serge Gouders**	**Ruud van Riel**	**Denis Maessen**	**Michael Pullens**	**Jan Koers**	**Johan van der Stoel**	**Rob van Basten-Batenburg**
Industry	Construction	Manufacturing	Knowledge management	Waste management	Business consultancy	Consultancy / Health care	IT / Railway	Electronics / IT	ICT
Product or service	service	Product	Service	Service	Service	Service	Product	Product	Product
Technological change (low/medium/high)	medium	Low	High	Low	Low	Low	Medium	High	High
Competitiveness (low/medium/high)	High	High	High	High	High	High	High	Low	High
Institutional uncertainty (low/medium/high)	low	Low	Low	High	Low	Low	Medium	High	Low
Explorative innovation (estimated % of total)	90%	30%	60%	30%	10%	20%	20%	30%	10%
Exploitative innovation (estimated % of total)	10%	70%	40%	70%	90%	80%	80%	70%	90%
Knowledge sourcing focus (step 1,2,3,4)	1 +2 (3)	2+3+4	1+2+3+4	(2) 3+4	3+4	2 +3	2+3+4	1+2+3+4	2+3+4

3.2 Technology sourcing: make, buy or ally

	Inpro (TNO)	Teesing	PNA Group	Trenary Group	Rijnconsult	Pullens @ Maetis	InTraffic	Streamit	British Telecom
Make (estimated % of total)	20%	30%	80%	0%	60%	30%	0%	70%	30%
Buy (estimated % of total)	10%	0%	0%	0%	0%	0%	0%	0%	55%
Ally (estimated % of total)	70%	70%	20%	100%	40%	70%	100%	30%	15%

3.3 Strategic Alliances

See next page.

	Inpro (TNO)	Teesing	PNA Group	Trenary Group	Rijnconsult	Pullens @ Maetis	InTraffic	Streamit	British Telecom
Alliance type	Consortium	Strategic partnership	Strategic partnership	Strategic partnership	Strategic partnership	Strategic partnership	Joint venture	Strategic partnership	Strategic partnership
Alliance partner(s)	Whole value chain	Chinese company and university	TLO (+ OntoRule partners)	Vulcanes Ireland + Steps India	6 European partner firms	Insurance company	Movares and ICT	Cervus	Philips (2x)
Exploration in Alliance (estimated % of total)	90	30	20	30	20	30	20	70	70
Exploitation in Alliance (estimated % of total)	10	70	80	70	80	70	80	30	30
R&D or Marketing/production alliance?	R&D	Combination	Marketing/ production	Combination	Marketing/ production	Combination	Marketing/ production	Combination	Combination
Partner selection criteria	different phases in the value chain + different EU countries	Complemen-tary technology	Complemen-tary technology	Complemen-tary technology and capabilities	Similar philosophy, size, services, leadership styles and independence	Complementary technology	Complemen-tary technology	Complementary technology	Complemen-tary technology
Alliance success (yes / no)	Yes	This case yes, most times yes	Yes	Not yet	No	yes	Yes	Yes	No + yes
Alliance success factors	Large added value of collabora-tion	Synergies of complementary technology / expertise	Synergies of complementary expertise	Synergies of complementary technology + capabilities	Scale enhancing + marketing tool	Synergies of complementary technology / expertise	Synergies of complemen-tary technology / expertise	complementary technology, willingness of partner to take risk	Complementa ry technology, one party taking the lead
Alliance pitfalls	Different interests, cultural differences	Short term view of partners, no patience for success	Bad alignment of interests, motives, agreements	Difficulties waiting for success	Cultural difference problems with trust, communicatio n and salary. No real synergies.	Alignment of interests, motivation and profits. At both parties an alliance manager needs to be responsible for the results of both companies	Identity problems of employees with 3 different company cultures to deal with.	Careful agreements need to be made, motivations need to be aligned: there needs to be a win-win situation.	Bad agreements on who could control the customer base. Both parties expected too much.