Increasing NPD performance through Fostering of Organizational NPD Creativity

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Management Summary

This research set out to take an extra step within organizational creativity research. Organizational creativity is the idea that through influencing organizational dimensions of a NPD department the creative behaviour of people within that department can be altered for the good. Most existing research on the subject have an approach where a selected group of innovative companies is examined and a common factor is put into a construct.

This research started with those constructs and devises a new model that can predict a part of the departments' performance through the measurement model of organizational creativity. The hypothesis this research project will prove is:

Increasing organizational creativity within an NPD function, which can be fostered through organizational dimensions of that function, will give better NPD performance

Organizational NPD creativity in this research will be defined as the combination of certain organizational configurations within the NPD department which can influence creative behaviour of its employees. The relevant dimensions making up the organizational creativity construct are the climate and structure of a NPD department.

NPD performance in this research is defined as the internal product concept effectiveness of a NPD department. The effectiveness is both in results as in the actual ways and manners of NPD activities. The internal product concept effectiveness has been chosen because of its expected relation with innovativeness. Now there is a construct of organizational creativity that should, if the hypothesis is true, give an idea about a company's innovativeness and another construct that according to literature will react upon changes in the innovativeness of a company.

Through a data analysis and clustering of results within both constructs a relation has been proven. 89% of companies that score respectively high or low on both organizational creativity dimensions also score respectively high or low on NPD performance. The strongest influencer is the climate dimension.

The practical implication of this result is that companies can now be grouped in one of four groups: Innovators, believers, supporters and stagnaters; each following group having a lower score on NPD performance and having a different ideal strategy when trying to improve their performance through organizational creativity.

Even though this is an exploratory research, the results indicate organizational creativity can be used to predict part of the department's performance. As a practical tool the model presented in this research will make decision making easier for companies thinking about increasing NPD performance. On the theoretical side however more data is needed before a definitive model can be presented. The indicative findings do certainly support other organizational creativity literature. Creativity is not only a human thing, organizational dimensions can hamper or foster it and help make the NPD function a more effective workplace.

Preface

This report is the result of my research into fostering organizational creativity. It has been done as my final assignment for my master degree in industrial engineering and management. I've enjoyed working on this project for the last 7 months and I hope you will enjoy it as much reading it. I'd like to thank Koos Krabbendam and Petra de Weerd-Nederhof for their comments and advice during this period. Finally I want to thank Shell for revising and mental support through all of this!

Acle, Norwich, 5 December 2006

Wouter Putman

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1 Introduction

Organizational creativity; the notion that creativity is not only an intangible idea but also a measurable quantity that can be influenced through the organizational environment. Over recent years the idea that creativity can, if not be directed, then at least be enhanced though the environment in which people work has been winning ground. More and more research suggests organizational factors can indeed influence the creative output of people. However all research so far starts with identifying a group of companies with high innovation records and then looking at the possible explanations for this. This research will attempt to use these explanations and built a model from them which can be used to not only measure the organizational creativity potential but also predict the tangible performance improvement of a NPD function.

To do this, first a methodological framework will be presented in chapter two giving the environment in which this research is set. A hypothesis will be constructed as to what can be expected when enhancing organizational creativity. A detailed approach will also be presented on what this research will explain and how this is to be accomplished.
After this chapter three will analyse the idea of organizational creativity, what is it, and how can it be measured according to literature.

Since this research goal is to make an organizational creativity model that can influence the performance of a NPD department chapter four will investigate existing performance models and give a construct that according to literature reacts on changes in organizational creativity. The proposed relations will then be verified by data analyses in chapter five. To conclude chapter six will discuss the results and give a model where companies can compare scores and get practical information on how to increase NPD performance in certain areas by influencing organizational dimensions.

2 Research Design

This chapter describes the goals, the focus and the structure of this project. It contains the project context (2.1) and research goals (2.2), the research questions (2.3), the research framework (2.4) and will conclude with a summary about the research methodology (2.5).

2.1 Project Context

Recently the research into creativity as an important organizational resource has gained increased interest (Andriopoulos, 2001). Being able to effectively structure a company, while still giving creativity and innovation opportunities to flourish, is essential for running a company in the present and avoiding stagnation in the future (Kanter, 1998; Van de Ven et al., 1999; Van Dijk and Van den Ende, 2002). The problem however is that most organizational creativity literature relies heavily on conceptual papers and surveys. Moreover, although several authors have concentrated on enhancing creativity at the individual level, there are relatively few reports on managing creativity in an organizational setting. There is therefore a clear lack of organizational studies providing holistic and functional perspectives (Andriopoulos, 2001). The measurement of creativity in most cases is done by perceptual measures and as such can't be used for more then one level of analysis (Bharadwaj and Menon, 2000; Haapasalo and Pekka, 2001).

It is clear that more research in this area is needed. In a world where even seemingly stable markets need to innovate to stay on top, organizing ones Research & Development (R&D) successfully is one of the most essential tasks for a company. Across a large number of different sectors the costs for R&D has been rising without any increase in significant breakthroughs (Gassmann and Reepmeyer, 2005). Knowing what stimulates or inhibits innovative performance within these functions would be critical for future success. This research will be on the subject of Organizational Creativity. Organizational creativity is the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system. It is, therefore, the commonly accepted definition of creative behaviour, or the products of such behaviour placed within an organizational context. The definition of organizational creativity is seen as a subset of the broader domain of innovation (Arieti, 1976; Barron, 1969; Golann, 1963; Woodman, 1995).

Research into organizational creativity is slowly becoming more recognized as an important area of research. This is the conclusion of a quick study into the available literature. Journals from Blackwell Synergy, JStor, Ingenta, EBSCO and Elsevier have been studied. The number of articles that has either Organizational Creativity or Organisational Creativity in the title is as follows:

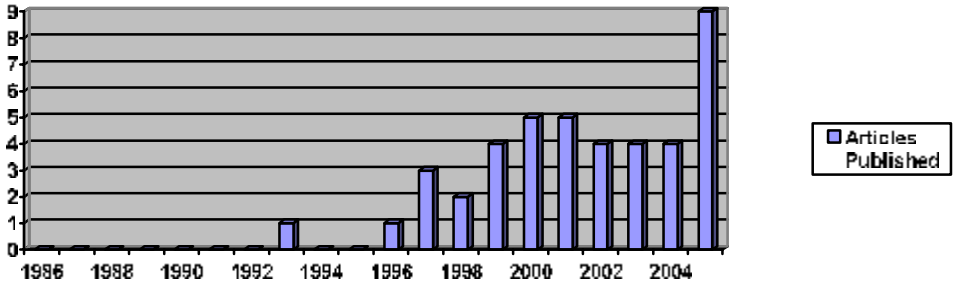

Figure 1: The rise of organizational creativity research

According to the OECD economic survey of The Netherlands as well as the CPB from The Netherlands, R&D investment isn't the best. On average Holland only spends less then 1.3% of their national GDP on R&D. This is less then the average of the other 25 EU countries. Clearly Holland is losing the battle for new R&D. The public R&D sector is quite decent in The Netherlands, but the connection with private business is the weak link. When businesses decide on where to do their research, Holland seems less attractive every year. The government acknowledged this problem and started a campaign to promote business R&D. It is still the governments plan to belong to the top R&D countries by the year 2010. Some argue the decline in technical scientist students for the universities is a major reason for the decline of R&D. According to another research by the CPB this is not true, over half of graduate technical scientists do not work in R&D departments. It is suggested that promoting these kinds of courses will not improve R&D on a national level. Promotion should be in the way of making new research cheaper, or doing fundamental research into R&D to discover success factors.

The research project 'Patterns in New Product Development: consistent NPD configurations for sustained innovation' is an emergent European research project aimed at developing knowledge in the new product development area, by describing, exploring and analyzing the organization of the innovation journey. The project focuses on the NPD purposes and activities, organization and situational factors. As part of this project a questionnaire has been developed for data gathering. Presently, the project involves Dutch, Finnish, Portuguese, Belgian, Spanish, German and UK researchers. The project is based on the assumption that an in-depth, holistic understanding of the relationships between NPD purposes and activities, organizational and situational factors, and its impact on performance, will contribute to the identification of consistent configurations in NPD. The project sets out to describe a large number and variety of NPD configurations (organizational forms) in relation to their environment and purposes (functions), and relate these to performance. It was suggested to continue research into partial areas of configurations within the NPD function (DeWeerd-Nederhof et al, 2005).

This research is done within the Patterns in NPD project domain. With the collected data from the project this research will look at what the relevance of certain organizational creativity factors are for the performance of R&D departments.

2.2 Research Goal

Up till now creativity has not been linked with performance of organizations, or part of organizations. The link between creativity and innovation has been proven in numerous research projects (Bharadwaj and Menon, 2000; Haapasalo and Pekka, 2001; Sundgren and Styhre, 2003). The problem is that this has almost always been done in reverse order. Most Research looks at companies who have a high innovativeness and then looks at the causes of this high innovativeness. This way the focus is always on only a few factors (Woodman et al, 1993). Now that there is a holistic research framework which looks at both the performance as well as the organizational configurations (climate, structure, processes etc) of an NPD function, it is possible to overcome these problems.

This research will come up with a framework where organizational NPD creativity will be linked to organizational NPD performance. Organizational NPD performance in this research will be seen as the measurable performance of a NPD function, which is highly affected by innovativeness of the same function. Both dimensions will be thoroughly defined in respectively chapter three and four.

From the literature a model will be developed where all factors that influence organizational NPD creativity will be represented. For each of these factors the framework will look at individual parts that inhibit or promote organizational creativity (e.g. Lapierre and Giroux, 2003; Ekvall, 1997). According to literature better organizational creativity should result in higher innovativeness. The goal is to find out which factors have more impact on organizational creativity then others so a ranking model can be given.

To come up with this ranking the effect on organizational NPD performance will be compared with all the individual factors. Since organizational creativity should have an effect on the performance of the department. comparing factors that influence organizational creativity with the performance of these departments will give a ranking in which factors influence organizational creativity the best. For this the database from the Patterns in NPD project will be used which holds information about both sides and as such can provide help in exploring the proposed relation and the strength of it.

When the relation is established it will be possible to look at the extent in which organizational NPD creativity can influence NPD performance. Furthermore it will also be possible to look at interrelations between the factors that influence organizational NPD creativity. This way the research can come up with a benchmark for NPD performance through manipulation of certain organizational configurations. To make sure the relation is not a coincidence of other situational factors, dimensions such as size, revenue or sector, these factors will be analysed separately and used as a control variable.

To conclude it can be said this research will verify the following hypothesis:

Increasing organizational creativity within an NPD function, which can be fostered through organizational dimensions of that function, will give better NPD performance

2.3 *Research Questions*

At this point in the research it is not possible to comply with the research goal because of a lack of knowledge. Therefore, the next phase in the research design is the identification of the knowledge that is needed, and useful, to achieve the research objective (Verschuren and Doorewaard, 2003).

The research questions for this dissertation are as follows:

1. How can organizational creativity be fostered and measured?
    - Which organizational dimensions significantly influence organizational creativity?
    - How can these dimensions be measured?
2. What part of NPD performance can be expected to react on the level of innovativeness of a company and how can this be measured?
    - What is expected to improve performance wise for companies with higher innovativeness?
    - How can these performance dimensions be measured?
3. How do companies behave when looking at organizational creativity and NPD performance?
    - To what extend do companies foster organizational creativity?
    - To what extend do companies NPD performance scores differ?
    - To what extend do companies with a higher score on fostering organizational creativity also display higher scores for NPD performance?
    - What are the differences between sectors or when divided into separate situational factors, when looking at the relation between the two constructs?
    - Is the questionnaire a good representation of the true organizational creativity and NPD performance found in companies?
4. What are the implications, both theoretical and practical, of fostering organizational creativity?
    - What organizational factors can best be increased to foster organizational creativity and as such influence NPD performance?
    - What kind of companies are there on average, when looking at organizational creativity and NPD performance?
    - How can these categories best influence their organizational factors for the better?
    - What is the significance of this research within all organizational creativity research?

The next section will discuss the framework that will be used to answer these questions.

2.4 Research Framework

As stated in the research goal and the research questions, a model is needed to analyze organizational NPD creativity as well as measure organizational NPD performance. This chapter will describe how this model will be constructed. First 2.4.1 shall describe the method used for finding literature, so it can be seen a full cross section of all relevant literature has been used. 2.4.2 will describe what steps will be taken in constructing a measurement model for organizational creativity and 2.4.3 will describe this for NPD performance. For strengthening this research as well as securing any weaknesses in the model a case study will be proposed in 2.4.4 which will be used to verify the data from the database.

2.4.1 Systematic Literature Study

To find relevant literature for both organizational NPD creativity as well as organizational NPD performance a systematic approach is necessary. A systematic literature review will make sure that through the use of keywords all the relevant articles in this area will be taken into account.

The following steps for the systematic literature study will be done:

1. Select the useful journals
2. Formulate inclusion and exclusion conditions
3. Define the key-words and free text words for the different inclusion conditions and databases
4. Search for literature in databases with defined key-words, decide if relevant based on title, abstract and exclusion conditions and give a selection of final articles

Journals

For the systematic literature study 17 useful journals have been identified. This has been done by looking at the Bristol Rankings. In these rankings one group of journals is labelled as creative. This has been the start. By looking at common references of useful articles in this area it became clear that the group of general management is of significant relevance when studying organisational creativity and its effects on performance. From this group all the journals with a top rating (and high citation value) have been selected. This way it is certain all articles of significance will be used.

Six creative journals:

- Journal of product innovation management
- Industry & innovation
- R&D management
- Technovation

- Creativity & innovation management
- International journal of innovation management

Eleven general management journals:

- Academy of Management Journal
- Academy of Management Review
- Administrative Science Quarterly
- British Journal of Management
- California Management Review
- Harvard Business Review
- Journal of Business
- Journal of Business Research
- Journal of Management
- Journal of Management Studies
- MIT Sloan Management Review

Inclusion conditions

For Organizational NPD Creativity

1. Articles containing a model that deals with creativity/innovation
2. Articles using organizational configurations

For Organizational NPD performance

1. Articles containing a model that deals with measuring performance
2. Articles looking at the innovativeness of companies

Exclusion conditions

1. Articles in other languages then Dutch or English
2. Articles not published in peer-reviewed journals or published as a full paper in conference proceedings

Key words and free text words used to search journals

For organizational NPD creativity

1. creativity, innovation, innovativeness, creative
2. organization, organizational, organisation, organisational, climate

For organizational NPD performance

1. measuring performance, performance measurement, performance
2. innovativeness, innovation

Besides these keywords an extra search will be done on the following free text words

For organizational NPD creativity: organizational creativity, organisational creativity

For organizational NPD performance: innovative performance, innovation performance

Literature search

When performing the abovementioned search 50 relevant articles were found. These articles are marked with an asterisk in the references list. The number of articles found after each keyword search and the number of relevant articles per category are listed in appendix 1.

2.4.2 A Model for Measuring Organizational NPD Creativity

This part will describe in detail the process that will be followed for constructing a model that can measure organizational NPD Creativity. This process will be used in chapter three where the actual model will be constructed.

First it is important that a clear definition of organizational NPD creativity will be given. For this all relevant existing definitions will be examined and combined into a definition that will suit the purpose of this research. This definition should hold both clues to what it influences as well as what it is influenced by.

The next step towards a measuring model will be combining all available literature on this subject. As said before all literature up so far focus on a small group of pre selected companies where a certain innovative value is high and then a similar cause is researched. Because of this each research comes up with its own model on what they think influences this concept of organizational creativity. The problem is that this is always based on only one observation within a number of companies and never done either over time or with companies that have different attributes. The reasoning this research will follow is that the common factors in most of these research projects must have more significance then singular objects. This way a number of organizational dimensions can be pointed out which influence a certain kind of organizational creativity in most projects. These organizational dimensions will be the basis of the measuring model. It can be said that this way not all relevant dimensions for measuring will be used, but it is also argued that even though not all, the most relevant will most certainly be taken into account this way, without much change on taking any irrelevant ones into account.

For each of the found organizational dimensions a detailed description will be given on what it is and what the reasoning is that the dimension will influence the innovativeness of companies.

The last step of the process in constructing a workable measuring model for organizational creativity will be devising a scoring system for each of the dimensions taking into account the available information this research has from the database from the patterns in NPD project. Both strength and weaknesses of the model will be discussed. Since this is a exploratory research the scoring will be done in the form of clustering and not numerical. By having clusters of high-low on each dimension a combination of highs and lows can be examined giving more insight into the hypothesis without having to tackle the problem of having to few observations. For future research

this model of clustering should be replaced by a numerical scoring system. A quick look at how that would work will be given in chapter three.

For the clustering into high and low a simple system will be used. For each dimension a number of indicators are used into determining the value of that dimension. Each of these indicators can be divided into scoring above or below average. The number of indicators a company scores above average will be summed up. Giving a score which will again be divided into above and below average. Scoring high on a dimension will mean that a company will on score above average on more indicators then the average company does. This means that company not only excels in one or two indicators but in more indicators than the average company. In other words this will give a clear picture about the strongest, and weakest, companies within each dimension.

2.4.3 A Model for Measuring Organizational NPD Performance

This part will describe in detail the process that will be followed for constructing a model for measuring organizational NPD Performance. The process will be used in chapter four, where the actual model will be constructed.

The construction of this model is less straight forward then for organizational creativity. This is because not just any model for measuring organizational performance will do. It has to be a model that is likely to act on changes within organizational creativity. Therefore two separate actions must be taken.

First it is important to learn about organizational performance measurement. For this a definition will be given about the subject again describing both the relation as well as the content of it. For this available literature will be studied. An overview of available performance measurement constructs will be given. It is argued that seeing this part of the research is to verify the hypothesis as well as give the individual relevance of singular dimensions within the organizational creativity construct, it should be based upon a proven construct for measuring performance.

The next step is to combine literature on organizational creativity with performance measurement. While this has not been done before, most organizational creativity research projects do have an expectation on how it could influence the performance of a company. The same method as for devising the relevant dimensions will be used, but now for coming up with a performance model that is likely to react on organizational creativity. After choosing a construct, or part of a construct, a detailed description will be given on what will be measured and how this part is measured.

2.4.4 Design of the In-Depth Case Study

As said before this research will use the Patterns in NPD questionnaire to gather data about the organizational creativity as well as the NPD Performance. This questionnaire however is filled out by the manager of the R&D function. Because of this it could be possible to get single respondent bias. It is not sure if the data collected actually resembles the truth. The second problem with using the questionnaire will be that certain factors will not be given the proper regard when measuring.

To overcome both problems two in-depth case studies will be performed. In this case study an interview with both the manager and the CEO should give more insight into the factors not addressed by the questionnaire. To overcome the single respondent bias the case study also entails a survey given to all employees of the NPD function with questions about the more important factors influencing organizational creativity. This way it becomes clear if the data collected reflects the real situation. This Case Study will use a proven protocol also used in different countries for the Patterns in NPD project (case protocol and survey in appendix 2). The results will be presented in chapter five.

2.5 Research Methodology Summary

It can be seen that this research will try to take an extra step within organizational creativity literature. Where existing research explains a certain condition within a pre selected group through the use of organizational creativity this research decided that has been done often enough. It is proven that certain conditions within certain groups can be explained through organizational creativity. It is now time to take the extra step and use organizational creativity as a prediction tool on how a number of companies score performance wise. Through the use of the existing organizational creativity literature a model will be created for measuring organizational performance. A model for measuring NPD performance will also be giving. Now a relation can be given and the strength of the model can be tested. The goal of this research is to prove that this relation exists within a group of companies sharing nothing but a focus on research and development and give a ranking of dimensions which influence the performance best. Through the use of this model a prediction can be given on whether or not a company is likely to do well performance wise and a strategy can be devised for companies wishing to enhance their performance through organizational creativity. The following picture gives a clear idea about all the parts of the research.

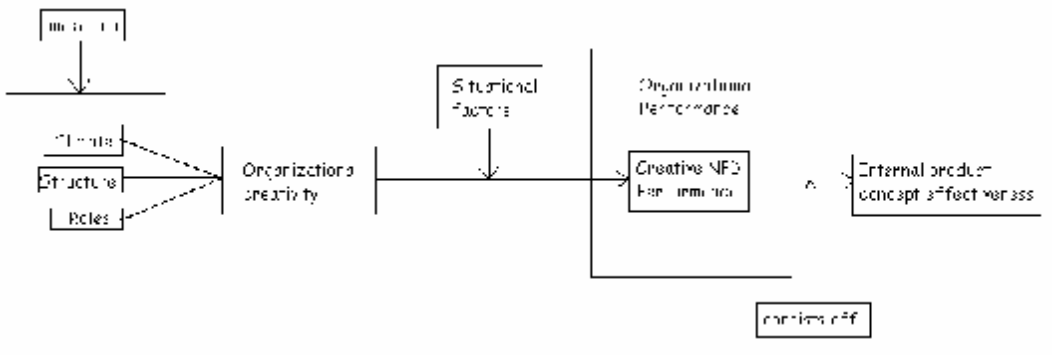

Figure 2: Research overview

For this research there are three main phases.

Phase 1: Theoretical framework

In the first phase literature on organizational creativity will be studied to give a list of significant organizational dimensions. For each of these dimensions there will be a summary on how parts of that dimension can inhibit or promote organizational creativity, giving a scoring model. This way organizational creativity will be measurable from the point of view of the different dimensions. Also literature on NPD performance will be studied to give a model for how innovativeness can influence NPD performance.

Phase 2: Data analyses

In the next phase data that has been gathered for the Patterns in NPD project from R&D departments in The Netherlands will be made ready for analysis. A description will follow of what kind of data is being used, why this data is used and what the data is.

The second part of this phase is data gathering on a lower level. Two companies from the Patterns in NPD project will be used as a case study to confirm the validity of the research.

Phase 3: Implications

Through analysis of all the data together with the theoretical framework this phase will come up with a measuring model for organizational creativity. This model will identify how companies are behaving when looking at organizational creativity and performance. A ranking model will be given what dimensions are the most important when influencing organizational creativity. A benchmark will be given as a general guideline to improve ones performance.

3 Organizational Creativity

Many different researchers have done projects with organizational creativity. This chapter will build on their research and develop a model for measuring organizational creativity. First organizational creativity will be explained in 3.1. After this 3.2 will then go in detail into how organizational creativity can be measured. This following picture shows this chapters place within the whole research.

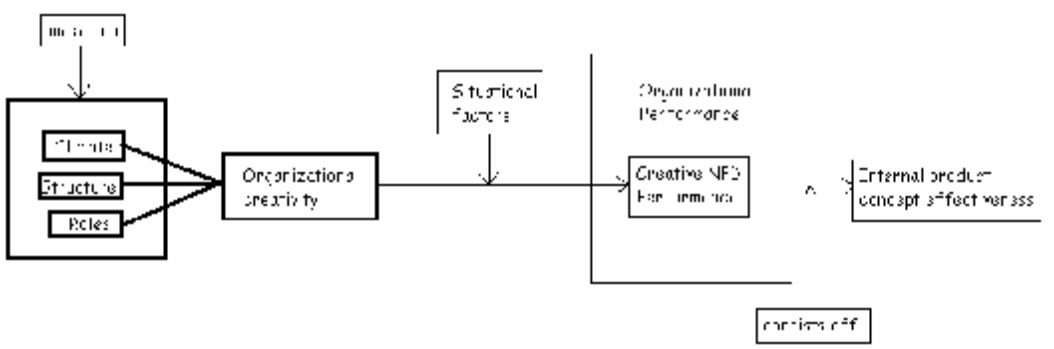

Figure 3: Organizational creativity within the research

3.1 Defining Organizational Creativity

Literature provides a sound basis for measuring quite a number of separate aspects for enhancing organizational creativity. This section will combine these separate entities and come up with a holistic based model for analyzing organizational creativity. This paragraph will explain the relevant dimensions that can influence organizational NPD creativity. Chapter 3.2 will then analyze all factors of these dimensions and give there expected relevance on influencing organizational NPD creativity. All assumptions made in this section are made after the study of all the literature found in the systematic literature study and as such is to be believed the combination of all relevant existing literature on the subject.

Organizational creativity is the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system. It is, therefore, the commonly accepted definition of creative behaviour placed within an organizational context (woodman, 1993). Organizational NPD creativity in this research will therefore be seen as the combination of certain organizational configurations within the NPD department which can influence creative behaviour of its employees.

Organizational configurations can be defined as commonly occurring clusters of attributes of organizational strategies, structures, roles, climate and processes (Miller, 1987; Miller & Mintzberg, 1983; Mintzberg, 1990). After studying the found literature from the systematic literature study for each of these dimensions it is now clear whether or not the dimension will be expected to influence organizational NPD creativity.

The first dimension that has been proven numerous times to have a significant influence on organizational creativity is climate. For this research climate will be seen as an attribute of the organization, a conglomerate of attitudes, feelings and behaviours which

characterizes life in the organization and can be influenced through organizational strategies (Ekvall, 1996). Amabile et al, Andriopoulos, Ekvall, Lapierre and Giroux and Sundgren and Styhre have all individually proved a relationship between high innovative companies and the climate of an organization. Climate should therefore most certainly be taken into account when assessing the work environment for creativity.

The next two dimensions both become relevant for organizational creativity because of their influence on diversity. The existence of diversity is a strong promoter of creativity, by giving new impulses, ideas, thoughts and experiences to people creativity can flourish (Groth and Peters, 1999; Cummings, 1997, Damanpour, 1991; Lapierre and Giroux, 2003).

Structure is the physical side of the possibility for diversity. Structure can influence the physical work environment of employees and as such give diversity by having different skills together in the same department or hinder it by keeping everyone separate.

The organizational side is the area of the process dimension. By enforcing certain processes, again, diversity can be promoted or inhibited.

The next dimension that comes back in many researches into organizational creativity is the existence of certain roles. Every company has, formalized or not, certain roles in place. According to, among others, Andriopoulos, Amabile et al, Woodman et al, Lapierre and Giroux and Sundgren and Styhre a positive relation exists between certain roles and organizational creativity.

The business strategy, the last of the dimensions of the organizational configuration, does not seem to promote or inhibit creativity. No research in this area suggests that strategy directly influences creativity; it can however greatly influence other dimensions like climate and roles which are relevant. Since this research will look at the direct factors that influence organizational NPD creativity, this dimension will be discarded.

The four relevant dimensions will be further defined in chapter 3.2, defining the full construct of each dimension first and then looking at the relevant factors that have the possibility to promote or hinder organizational creativity. Chapter 3.2 will first identify the optimal way of measuring each dimension. For this research however the Patterns in NPD Questionnaire will be used which has questions about all these dimensions but has not got questions about all relevant factors for these dimensions. Per dimension an analysis will be presented how well the questionnaire will give insight in the relation between the dimension and organizational creativity. Any apparent weaknesses will be addressed by an in depth case study, as to get the extend in which this really is a weakness.

3.2 Measuring Organizational Creativity

The organization will be analyzed from 4 different viewpoints, namely Roles (3.1.1), Processes (3.1.2), Structure (3.1.3) and Climate (3.1.4). It will finish with a summary where all individual dimensions will be combined in a model for measuring organizational creativity (3.1.5). For each of these sections the research will first define the dimension and give the significance of it in normal business practice. After that it will move on to the organizational creativity domain where the link will be studied between the dimension and organizational creativity. Every section will conclude with a summary and overview of how the Patterns in NPD questionnaire measures the important factors of each dimension, pointing out weaknesses if there are any.

3.1.1 Roles & Organizational Creativity

Mintzberg's observations and subsequent research indicate that diverse manager activities can be organized into roles. A role is a set of expectations for a manager's behaviour (Mintzberg, 1979). The roles that are active in a company are not defined in writing, but can be seen as a direct result of companies' rules, procedures, strategy and expectations (Daft, 2000). So even though one can't formally instate someone in a role, it is possible to manage in such a way that certain roles will be fulfilled (Tushman and Nadler, 1986). There are a number of accepted ways of looking at roles. After comparison of Mintzberg's ten managerial roles, Roberts and Fusfeld's five and others it is clear that Roberts and Fusfeld's are at the basis of all roles and as such these five roles will be looked at in greater detail.

Roberts and Fusfeld identified five critical roles in their study (Roberts and Fusfeld, 1981):

> The idea generator searches for the breakthroughs by linking diverse ideas and also tests the feasibility of the ideas.
>
> A champion sells new ideas to others in the organization and gets resources. The person recognizes, proposes, and pushes a new technical idea for formal management approval.
>
> The project leader provides the team leadership and motivation. The person plans and coordinates the diverse sets of activities and people involved in moving a demonstrated idea into practice.
>
> The gatekeeper collects and channels information about important changes in the internal and external environments. The person passes information on to others and serves as an information resource for others in the organization.
>
> A sponsor provides encouragement, guidance, and acts as a sounding board for the project leader and others. The person guides and develops less experienced personnel in their roles; by for example behind-the-scenes support, protection, advocacy, and sometimes "bootlegging" of funds.

According to organizational creativity literature the existence of certain roles within the NPD function promotes creativity for the whole group.

Looking at the idea generator it quickly seems logical to assume this role can promote creativity. Innovative organizations seem to have a tendency to at least conceptually separate the idea generation function (Cummings, 1965). Interviews with managers also

emphasize the need for an idea generator in a NPD Function. According to them having someone who is free to explore or question whatever they want gives the openness that is needed to find new breakthroughs and help the whole innovation process (Sundgren and Styhre, 2003). As such the conclusion is that having an idea generator will influence organizational creativity positively.

Katz and Allen (1985) basically found that appropriate separation of roles between project and functional managers promotes creativity. This in a way supports that all roles given by Roberts and Fusfeld promote creativity. However it focuses mainly on one which is the champion. The champion is busy on a higher level and sorts things out on that level, leaving the employees free of worries and giving them the time to focus on the invention (Woodman et al., 1995). According to Cummings having a champion can take away the stress and frustration of employees in the NPD Function. If a champion isn't in place employees will have to directly be involved in appealing for resources and permission with top management. Seeing that many innovative ideas and creative responses are likely to be perceived as threatening stimuli to the hierarchy incumbents, many of these ideas might be vetoed in an early stage not to proceed. This way creative employees may slowly be smothered by the conservative nature of management. A champion can take the resistance from top management and the frustration of creative employees away by acting as a facilitator (Cummings, 1965; Sundgren and Styhre, 2003). To conclude this section, having a champion has a positive effect on organizational creativity.

Having a project leader immediately makes sense when looking at it from an organizational point of view. Without direct supervision the project would have neither direction nor vision. That it also promotes creativity is not as simply understood. Where one would assume that complete freedom would encourage creativity, numerous researches has shown this not to be true. Goal clarity is essential for creative behaviour (Bailyn, 1985). Defining everything isn't good, but having a sense of where to get, or what problems need to be solved and having this clear among al employees strongly increases creative behaviour. The main reason is that this way a sense of commitment is created; one knows why they are there. The project manager is seen as the most appropriate person to install this sense of clarity in its employees and as such enhance creative behaviour (Amabile et al., 1996). Having a project leader is positively associated with organizational creativity.

The fourth role defined is the gatekeeper. Not a lot of direct evidence exists in linking this with organizational creativity. Both Woodman et al. and Amabile et al. refer to it indirectly but no hard evidence exists that links the two together. Looking at more broad literature it does seem that having a gatekeeper could positively influence organizational creativity. By collecting and distributing information it brings employers new inputs from inside and outside sources. According to literature diversity does support creativity. So by having someone who makes sure everyone gets new data it could help creativity. On the other hand, by only having one person selecting information to be distributed, a rather one sided view is introduced which inhibits diversity. To conclude there is no substantial evidence to link a gatekeeper to organizational creativity and as such it won't be seen as a factor in this research.

Finally the sponsor, whose task it is to encourage and guide. The main benefit of having this role is the first step towards an open climate (see 4.4 for more details). By having someone who can act as a sounding board and a "safe" place to discuss differences,

employees can feel supported and can act with the freedom they need to exhibit creative behaviour (Andriopoulos, 2001; Amabile et al., 1996). A sponsor is therefore positively linked with organizational creativity.

Conclusion
Looking at Roles as an organizational factor it becomes clear there is the potential to promote organizational creativity. By having an idea generator, champion, project leader and or sponsor, people will be given the opportunities necessary for creative behaviour. The Patterns in NPD questionnaire also asks about Robert and Fusfeld's five roles. This dimension is well covered by the questionnaire and as such does not need any extra attention in the case studies to overcome any weakness. To summarize, the table gives an overview on which authors support which questions from the Patterns in NPD questionnaire.

Author\Question	28a) Existence of Idea Generator	28b) Existence of champion	28c) Existence of project leader	28e) Existence of sponsor
Andriopoulos, 2001				+
Amabile et al., 1996			+	+
Cummings, 1965	+	+		
Sundgren and Styhre 2003	–	+		
Woodman et al. 1995		+	+	

Table 1: Roles and organizational creativity

3.1.2 Process & Organizational Creativity

Processes in a company are the way in which certain tasks are done. Griffin (1997) describes how processes can be described by looking at the procedures in place. Procedures formalize processes so it's done in the same way every time. Looking at the development process it becomes quite clear that the official procedures for it are for a big part the cause for success or failure. Because of this a number of researches have looked at what tasks should be completed within the whole development process. While this gives guidance in what tasks have to be done before a product is finished it also has some negative consequences. Haapasalo and Pekka (2001) argue that clarity of tasks is good, but defining tasks too narrowly, and separating them in the development process, strongly inhibits creativity. Formally documented processes only narrow the boundaries of employers and restrict diversity of skills because each skill will have its separate function, not communicating with the rest during the whole process. On the other hand complete freedom is just as bad as defining too much. Having no idea of what tasks need to be done will not give any clarity in the department and the chaos because of it will inhibit as much creativity as it gains because of freedom (Cummings, 1997). It is clear that no clear picture can be painted for the process and organizational creativity as of yet. Maybe with a specialised questionnaire about processes all relevant factors might be taken into account, but even then it is not clear what combination of clarity and freedom needs to be achieved. For the purpose of this research it is to erratic and based too much on change to give valuable insight in the stimulation of creative behaviour. Because of this the dimension will be scrapped from the model. It is recommended to look back at this dimension in the future to either give more clarity to it, or combine it in such a fashion that relevant data can be used.

3.1.3 Structure & Organizational Creativity

The structure of a company is the official way on how persons are physically organized. Where processes tell people if they should interact with each other, structure is organizing people in locations where they will interact with each other. Ideally process should resemble the structure, so that the employers who work in the same location also have to work together for their jobs. Because of the power structure has over which people physically work together it should be clear it can also have a great effect on creativity in an organization.

According to Caudron (1998) companies that have a long history of promoting creative thinking are pulling people together from all levels and locations as to promote creativity. Structure can help achieve this by physically making diversity happen on the workplace. Damanpour (1991) supports this in a negative way. In his research he found a negative association between creativity and centralization. Centralization basically ensures that diversity will not take place. Departments are organized in a functional manner, and people with the same skills will be put together to give scale advantages. This way physical skill diversity will be a rarity, which can strongly inhibit creativity (Cummings, 1965).

A structure that will allow for important decisions to be made swiftly at all levels of the organization is imperative for organizational creativity (Brand, 1998). Cross functional teams have the possibility to do this and structure should enforce this (Andriopoulos, 2001).

To summarize, structure can enhance creativity by helping diversity and interaction take place. A number of articles found a significant link between organizational structure and creativity and as such it can be taken into account. The questions regarding this section from the NPD questionnaire, gives four distinct ways of organizing a NPD function. Each step has more diversity in it then the last one. This way all relevant steps that, according to literature, influence organizational creativity are possible answers and as such gives a complete overview on how the structure dimension should influence organizational creativity. No extra attention is needed for this section when looking in-depth at two companies.

Author\Question	35) NPD Function	36) Level of diversity and interaction because of structure of the organization
Andriopoulos, 2001	+	+
Brand, 1998	+	+
Caudron, 1998	+	+
Cummings, 1965	+	+
Damanpour, 1991	+	+

Table 2: Structure and organizational creativity

3.1.4 Climate & Organizational Creativity

Ekvall (1996) defines organizational climate as an attribute of the organization, composed of behaviours, attitudes, and feelings, which are characteristics of life in the organization. In his study Ekvall (1996) concludes that the measurement of climate defined this way makes a difference between innovative and stagnated organizations.
The definition of climate concerns organizational climate opposite to psychological climate. Psychological climate is the cognitive appraisal by an individual of environmental attributes. When individual appraisals are aggregated the result is referred to as organizational climate (James et al, 1990). When the climate is defined this way it can be assessed by the members of the organization (Ekvall, 1996).

Ekvall states, after several large-scale factor analytic studies, that climate consists of 10 dimensions (Ekvall, 1996):

- Challenge
- Freedom
- Trust/openness
- Idea time
- Playfulness / humour
- Conflicts
- Idea support
- Debates
- Risk taking
- Dynamism / liveliness

After validation Ekvall found that the Dynamism factor seems not to be discriminating and as such has been disregarded for further research. The other nine factors have a positive link with organizational creativity. The Patterns in NPD research also uses these nine dimensions. The rest of this section will be about each of these dimensions to see if other authors found significant links as well between the dimension and organizational creativity.

Challenge
This dimension is defined as the emotional involvement of the members of the organization in its operations and goals. A high-challenge climate is seen when the people are experiencing joy and meaningfulness in their job, and, therefore, they invest much energy. Low challenge means feelings of alienation and indifference; the common sentiment and attitude is apathy and lack of interest for the job and the organization (Ekvall, 1996).

Handy (1996) wrote that boredom is one of the biggest killers for creativity. This has been used in a research done by Lapierre and Giroux (2003) who found a positive significant link between organizational creativity and involvement for the job. A challenge keeps employees motivated to keep searching for solutions and with it explore new ideas. Sundgren and Styhre (2003) found something similar when they conducted interviews with employees of companies who exhibit high innovation. According to the managers as well as the employees an important reason for their success was the involvement everyone shared for the job. People are enthusiastic about their job and feel their efforts are rewarded by the company. This is an important reason why they kept searching for new ideas.

Challenge has been proven in multiple research projects to be positively linked with organizational creativity, although almost all projects did this in a reverse manner by first looking at high innovative companies and then looking at the part challenge plays here.

Freedom

This is defined as the independence in behaviour exerted by the people in the organization. In a climate with much of this kind of freedom people make contacts and give and receive information; discuss problems and alternatives; plan and take initiatives of different kinds; and make decisions. The opposite climate would include people who are passive, rule-bound and anxious to stay inside established boundaries (Ekvall, 1996).

Creativity is fostered when individuals and teams have relatively high autonomy in their day-to-day conduct and a sense of ownership and control over their own work and their own ideas (Amabile et al, 1996; Bailyn, 1985; Caudron, 1998; King and West, 1985; Paolillo and Brown, 1978; Pelz and Andrews, 1966; West, 1986). Amabile and Gitomer (1984), on the same line of argument, suggest that individuals generate more creative work when they can choose how to go about achieving their assigned tasks (Andriopoulos, 2001). According to Cummings (1997) freedom is necessary for organizational creativity because this way researchers have the ability to plan their job in such a way that novel ideas can be pursued in a useful way. Lapierre and Giroux (2003) found a similar strong link between freedom/autonomy on the job with organizational creativity.

For freedom as well, most research that proofs this dimensions has an influence on creativity, does this in a reverse way by first discriminating between innovative and non-innovative firms and then looking at the common factors they share.

Trust / Openness

The emotional safety in relationships. When there is a strong level of trust, everyone in the organization dares to put forward ideas and opinions. Initiatives can be taken without fear of reprisal and ridicule in case of failure. Communication is open and straightforward. Where trust is missing, people are suspicious of each other and are wary of making expensive mistakes. They also are afraid of being exploited and robbed of their good ideas (Ekvall, 1996).

Ensuring participative safety is an important element when enhancing organizational creativity (Anderson et al., 1992). It is suggested that employees can only be encouraged to think creatively if they are not afraid of criticism and punishment (Andriopoulos, 2001; Tan, 1998). Therefore, as indicated by Brand (1998), creative employees need to be in an environment where top management takes a long-term view in order to tolerate a few mistakes. Lapierre and Giroux (2003) also proofed that high levels of trust support organizational creativity.

Again there is an abundance of evidence that links this dimension with organizational creativity, and again it is done in a reverse way by first identifying innovative companies.

Idea time
The amount of time people can use (and do use) for elaborating new ideas. In the high idea-time situation, possibilities exist to discuss and test impulses and fresh suggestions that are not planned or included in the task assignment; and people tend to use these possibilities. In the reverse case, every minute is booked and specified. The time pressure makes thinking outside the instructions and planned routines impossible (Ekvall, 1996).

Woodman et al. (1995) concludes that creativity is positively related to idea time because of higher motivation. In companies where people were encouraged to come up with new ideas, motivation of employees was much higher and the number of generated ideas as well. This is supported in a more recent research by Sundgren and Styhre (2003). In this research researchers from successful innovative companies were asked why they thought the company was successful. One of the findings was the openness towards new ideas, according to employees the fact that it was encouraged to walk around with your own ideas and talk about them with colleagues helped the whole development process. It is argued this is because this way researchers hear new ideas which trigger creative behaviour for their own projects (Amabile et al, 1996).

In conclusion, idea time affects organizational creativity through intrinsic motivation and cross-fertilization of ideas on the job.

Playfulness / Humour
The spontaneity and ease that is displayed. A relaxed atmosphere with jokes and laughter characterizes the organization which is high in this dimension. The opposite climate is characterized by gravity and seriousness. The atmosphere is stiff, gloomy and cumbrous. Jokes and laughter are regarded as improper (Ekvall, 1996).

Workload pressure is negatively associated with a relaxed atmosphere. According to Amabile et al. (1996) this dimension can upset creativity strongly. By having too much work pressure a sense of stress hangs over the whole organization and there will be a focus on the serious matters which all stifle creative behaviour. A number of employees in Sundgren's research pointed towards the relaxed atmosphere as a reason for their success. Ideas need time to incubate which will only happen if there is a relaxed atmosphere and idle time (Sundgren and Styhre, 2003; Lapierre and Giroux, 2003; Groth and Peters, 1999).

Having idle time to play and relax helps incubation of ideas and as such improves organizational creativity.

Conflict
The presence of personal and emotional tensions (in contrast to conflicts between ideas) in the organization. When the level of conflict is high, groups and single individuals dislike each other and the climate can be characterized by "warfare". Plots and traps are usual elements in the life of the organization. There is gossip and slander. In the opposite case, People behave in a more mature manner; they have psychological insight and control of impulses. This is the only dimension from Ekvall's research which has a negative correlation with organizational creativity, the higher the score the lower the creativity is likely to be (Ekvall, 1996).

Sundgren et al. (2005) and Mohammed and Rickards (1996) validated this dimension when using it in their own research. Both found a negative link between conflict and organizational creativity.

Idea Support
The ways new ideas are treated. In a supportive climate, ideas and suggestions are received in an attentive and supportive way by bosses and workmates. People listen to each other and encourage initiatives. Possibilities for trying out new ideas are created. The atmosphere is constructive and positive. When idea support is low, the reflexive "no" prevails. Every suggestion is immediately refuted by a counter-argument. Fault finding and obstacle raising are the usual styles of responding to ideas (Ekvall, 1996).

To encourage creativity within R&D functions, companies need to develop what Brand (1998) defines as a supportive climate (Andriopoulos, 2001). A number of other studies have revealed that enhancing organizational creativity can occur within work groups through mutual openness to ideas (Albrecht and Hall, 1991; Amabile et al, 1996; Andrews, 1979; Monge, Cozzens and Contractor, 1992; Payne, 1990). By being open to new possibilities innovation can grow because of exposing individuals to a greater variety of unusual ideas; such exposure has been demonstrated to positively impact creative thinking (Parnes and Noller, 1972). Tan (1998) proofed when management leads in a style that kills ideas prematurely, creativity is hindered.

To summarize, being open to new ideas within the company and supporting these on al levels can enhance organizational creativity. Killing ideas prematurely will lead to aversive behaviour and soon no new ideas will be generated.

Debates
The occurrence of encounters and clashes between viewpoints, ideas, and differing experiences and knowledge. In the debating organization many voices are heard and people are keen on putting forward their ideas. Where debates are missing, people follow authoritarian patterns without questioning (Ekvall, 1996).

Constructive challenging of ideas is likely to enhance organizational creativity because of increased motivation. People feel free to air their concerns and have a sense that it will be appreciated (Amabile et al., 1994; Harter, 1978; White, 1959; Woodman et al., 1995). Cummings (1997) and Sundgren and Styhre (2003) suggest that leaders who condone criticism and encourage debate will have more creative organizations. By giving employees the possibility to criticize a new product will be made which has had the benefit from a multitude of skills all discussing about how to make it better (Caudron, 1998; Lapierre and Giroux, 2003).

By encouraging debates people feel more involved with the product and are more motivated to make it right. This has a positive effect on organizational creativity.

Risk Taking

The tolerance of uncertainty in the organization. In the high risk-taking case, decisions and actions are prompt and rapid, arising opportunities are taken and concrete experimentation is preferred to detailed investigation and analysis. In a risk-avoiding climate there is a cautious, hesitant mentality. People try to be on the "safe side". They decide "to sleep on the matter". They set up committees and they cover themselves in many ways before making a decision (Ekvall, 1996).

Climates that encourage and support risk-taking should enhance creative achievement (Amabile, 1988; Sternberg et al., 1997; Nystrom et al., 2002). Tan (1998), in his total system approach towards organizational creativity, concludes that by discouraging risk-taking creativity is hindered. Risk taking is necessary for ideas to be completed in time. In a complex world expecting that all risks are first categorized before moving on will only ensure that innovative behaviour will crumble. Employees will not stick their neck out and go out on a limb with a new idea if they know they will bear the responsibility if it happens to fail (Caudron, 1998; Damanpour. 1991; Woodman et al., 1995).

To conclude it can be said that risk taking positively affects organizational creativity. By giving researchers the possibility to go out on a limb and try something completely different, which will exhibit more risk-taking, creativity can flourish.

Conclusions

All nine dimensions have been numerously backed up and validated by different researchers. All researches agree that Ekvall's climate definition gives a full idea about the creative climate in a company. And as such can be well used for measuring organizational creativity. Eight dimensions are positively associated with organizational creativity and only one, conflict, is negatively associated. The next table gives an overview on what articles support this claim. The Patterns in NPD questionnaire has questions about all nine relevant dimensions.

Author \ Question	37a) Challenge	37b) Freedom	37c) Trust	37d) Idea Time	37e) Relaxed	37f) Conflict	37g) Idea Support	37h) Debates	37i) Risk Taking
Albrecht and Hall, 1991							+		
Amabile et al., 1996		+		–	+		+	+	+
Anderson et al. 1992			+						
Andrews, 1966, 1979		+					+		
Andriopoulos, 2001		+	+		+		+		
Bailyn, 1985		+							
Brand. 1998			+				+		
Caudron. 1998		+						+	
Cummings, 1965									
Cummings, 1997		+						+	
Damanpour, 1991									+
Ekvall, 1996	+	+	+	–	+	+	+	+	+
Groth and Peters, 1999									
Haapasalo and Pekka,					+				

2001									
Handy, 1996	+								
Harter, 1978								+	
Hill et al., 1994								+	
King and West, 1985		+							
Lapierre and Giroux, 2003	+	+	+		+			+	
Mohammed and Rickards, 1996						+			
Monge et al., 1992							+		
Nystrom et al, 2002									+
Paolillo and Brown, 1978		+							
Parnes and Noller, 1972							+		
Payne, 1990							+		
Sternberg et al., 1997									+
Sundgren and Styhre, 2003	+			+	+	+		+	
Tan, 1998			+				+		+
West, 1986		+							
White, 1959								+	
Woodman et al., 1995				–				+	+

Table 3: Climate and organizational creativity

3.1.5 A Model for Measuring Organizational Creativity

Now that all dimensions have been defined and there individual link with organizational creativity has been proven, it is time to put them together in a way that they can be compared.

It is now known that all these 15 factors should influence organizational creativity. It is not known however to which extend each dimension influences it. The theory is that if a company is scoring well on many different factors the odds are better that it is influencing organizational creativity significantly as well. Therefore a model based on below and above average has been chosen

In the model an average score per factor will be calculated and the companies will be divided in those scoring above and those scoring below average. After this per company the sum of all the factors it scores above average will be calculated. This means there is now a scoring system for organizational creativity ranging from zero (no score above average in any of the factors) to 15 (scores above average on all factors). It is now expected that when a company has a relatively high number of scores above average a stronger organizational creativity will occur. On top of this the process will also be done per dimension. Giving a score per dimension, this is done to be able to cluster results per dimension and give more insight in the proposed relation. Per dimension the companies will be clustered in either high or low scoring for that dimension. High scoring will mean that on average that company scores more above averages on the individual factors for that dimension.

It is not expected that there are any interrelations between the different dimensions. Together they work to give a picture of the strength of organizational creativity, but separate companies can score differently per dimension. Companies for instance can have a very open structure, but not the climate that would benefit from it. Because organizational creativity is not well known yet, it is not likely that all companies will exhibit similar scores between dimensions.

3.3 Summary Organizational Creativity

This chapter has defined organizational creativity as the degree of being able to create valuable and useful new products through the influence of the organizational context. The organizational context has been defined and it has been explained in detail how the dimensions of climate, roles and structure within this organizational context are the dimensions that influence organizational creativity.

A model has been proposed as how to measure organizational creativity through these dimensions. Each dimension consists out of a number of factors and a company can score above or below average on each of these factors, so giving a score which can be clustered in either a high scoring dimension or low scoring dimension. These scores will be calculated in chapter five for verification of the hypothesis as well as ranking of the individual dimensions.

4 Organizational NPD Performance

This chapter will follow the process given in chapter two. The result will be a model for measuring NPD performance. First 4.1 will define what NPD performance means within this research and what is known about NPD performance. 4.2 will then choose an existing construct that best suits the needs for this research. A detailed description of this construct will also be given. This following picture shows this chapters place within the whole research.

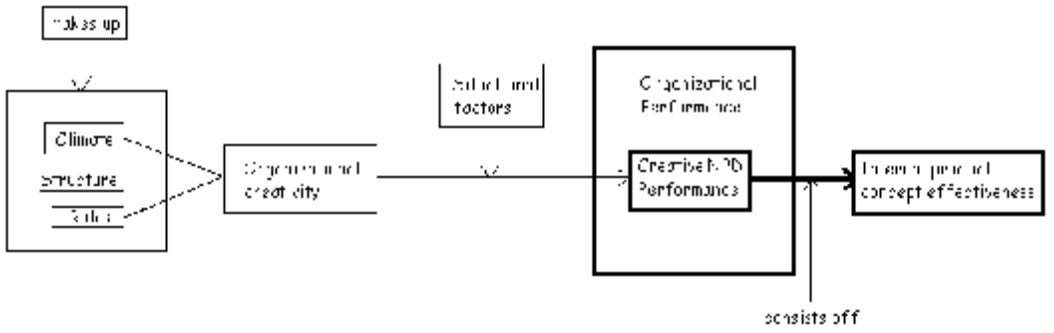

Figure 3: NPD performance within the research

4.1 Defining NPD Performance

As stated in the research design the hypothesis is that organizational creativity influences performance of the NPD function. For the definition of NPD performance for this research it is therefore imperative to focus on the kind of performance that can be influenced by organizational creativity. According to literature the performance that can be influenced through the innovativeness of a department must be of a technical effectiveness nature (Ramaswamy et al, 1993; Snow and Hrebiniak, 1983). The technical nature of a NPD department is the creation of product concepts. So it seems reasonable to assume that for this research *NPD performance is the performance of the product concept effectiveness within a NPD department*. By performance it is generally accepted that not only the results generated but also the actual way or manner of carrying out NPD activities are being taken into account. The organizational creativity gives a scale for the promotion of creativity, the organizational ways of enhancing how people behave. If people are being stimulated to behave more creative this research argues that because of the nature of a NPD function the product concept performance will also increase. Both concepts are closely linked to innovativeness of the NPD function. Organizational creativity has been defined through factors that help innovativeness of companies in the way of own perception. Performance of the NPD function is caused by actual innovativeness together with business competence. So on the one hand we have a measure that should give an idea about how innovativeness is promoted within the company and on the other hand we have the product concept performance of a NPD function that's based on the real innovativeness of a company (Loof and Heshmati, 2002; Armour and Teece, 1978; Hambrick, 1983; Miles and Snow, 1978; Venkatraman, 1989). If the hypothesis holds true there should be a direct link between organizational creativity and NPD performance.

In a dissertation by Altena (2005) a construct for measuring NPD performance has been designed. This research will use this design for measuring NPD performance. Chapter 4.2 will describe this construct in detail and the expected relations. Seeing that this construct was not developed to react solely on the rate of innovativeness, only the part that is expected to be influenced by organizational creativity of this construct will be used.

4.2 Measuring NPD Performance

Because of these findings the start for this research will be an already existing performance measuring model. The NPD performance model constructed for the Patterns in NPD Project is a performance model that has 5 different dimensions and questions about both operational effectiveness as well as strategic flexibility for each of these dimensions. The five dimensions are: Fit with market demands, Fit with firm competences, Speed of processes, Productivity and Flexibility. A full overview of this performance measure can be found in Altena's dissertation (2005). These five dimensions are divided into two aspects. The first is the product concept effectiveness of a NPD department, consisting out of the first two dimensions. The second is the process effectiveness of a NPD department. As stated in 4.1 it is the first aspect that is based upon innovativeness and as such is relevant for this research.

However the product concept effectiveness in this construct is divided into an external part, fit with market demands, and an internal part, fit with firm competences. Chapter three defined that organizational creativity is the influence of creative behaviour within a certain department. It is therefore argued that the external dimension will not have a relevant relation with organizational creativity. The creative behaviour of people within a department can very well help the internal product effectiveness, but it does not necessarily have anything to do with the external dimension. Being stimulated to act creatively holds no information about what the fit with market demand, but is expected to hold information about the fit with firm competences. Therefore the single dimension of fit with firm competence from this construct will be chosen as the NPD performance measurement model for this research. The other dimensions will be analysed as well to get a better picture about the influence of organizational creativity on all NPD performance.

This dimension consists out of 12 indicators. Six of which tell something about the operational effectiveness; the performance at this moment, and six tell something about the strategic flexibility; the ability to perform over time. Stimulating organizational creativity should bring on a change of behaviour which results in both short as long term benefits for the company. No research ever indicated that organizational creativity is only a short or a long term advantage. Therefore the whole dimension is thought to be relevant and all 12 indicators will be used for measuring the NPD performance (for an overview of all indicators see appendix 3). Again it is argued that not a single indicator is important on its own. Therefore the same principle will be used to measure NPD performance. For each of the indicators it will be calculated if the company scores above or below average and the sum of this calculation will be the score for NPD performance. The results will once more be clustered into high and low scoring. This will give an easy way of comparing both sides and proving the hypothesis.

4.3 Summary NPD Performance

To validate the hypothesis as well as be able to give a ranking of the strength of the dimensions of organizational creativity, this chapter searched for a suitable NPD performance measurement tool. It had to be a tool that could measure the performance within a NPD function but only on those parts that are expected to be influenced through organizational creativity. Organizational creativity increases the innovativeness of a company, according to literature the technical effectiveness aspect of a department is also highly influenced by innovativeness. As such the product concept effectiveness of a NPD function is the performance to test when looking at the possible influence of organizational creativity. The chosen construct comes from the Patterns in NPD project that has constructed and tested a full NPD performance measurement tool. Within this tool one dimension tests the internal product concept effectiveness of the department and as such is perfect for this research.

5 The Relation between Organizational Creativity and NPD Performance

With a working model for measuring organizational creativity and NPD performance this chapter will use these models on the data from the Patterns in NPD project. Section 5.1 will describe the data that will be used. 5.2 will analyse this data using the before mentioned models. This following picture shows this chapters place within the whole research.

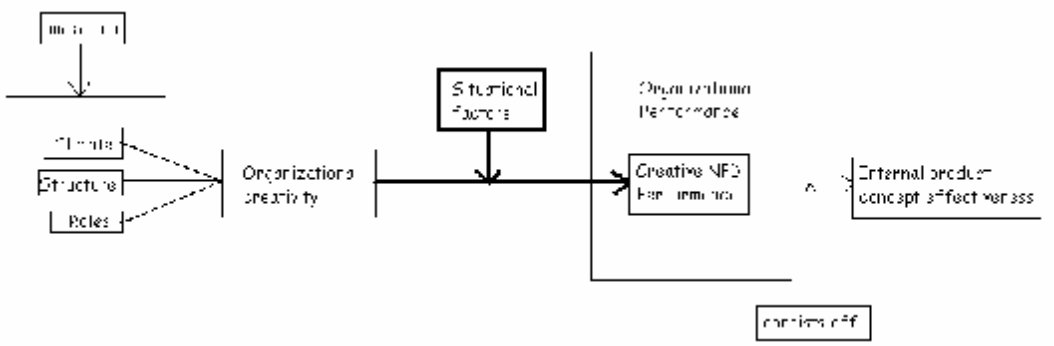

Figure 4: Data analysis within this research

5.1 Data Gathering

This section will describe the data used for this research. 5.1.1 will give an overview of the sort of companies that are in the database, which will be used and how many there are. 5.1.2 is about the in-depth case studies. Again giving an overview of the companies used and what uses the data can have.

5.1.1 Patterns in NPD Database

For this research the Dutch data from the Patterns in NPD project will be used. Because of cultural differences no other countries will be looked at, at this stage. In a later stage it is recommended to look at different countries as to identify relations and differences between them as to give a better comprehension of the model.

In The Netherlands at this time 43 companies have participated by filling out the Patterns in NPD questionnaire. This research will look at the areas of structure, climate, roles, processes and operational effectiveness and strategic flexibility. Five of the 43 companies did not answer a significant part of these areas and as such can not be used in this research. This leaves 38 companies in the database for further studies.

As a result of the demands for inclusion in the Patterns in NPD project all companies both have a manufacturing department and at least five R&D employees. The size of the companies ranges from less then 10 full time equivalent (FTE) employees to over 4000 FTE. In revenue a spread from just over 10 million to well over 10 billion can be seen. The full database with all relevant factors (performance, organizational dimensions and

situational factors) and the relevant part of the questionnaire can be viewed in appendix 4.

5.1.2 In-Depth Case Studies

For the In-Depth case studies two companies have participated. The two companies that agreed to help are company numbers 10 and 15. As can be seen the two companies do differ quite significantly, giving a better idea about the relevance of the questionnaire for all results.

5.2 Data Analysis

With all the results known, this part will analyze them. First this research will be looking at organizational creativity and NPD performance separately. What kind of scores are there, is there a significant difference (5.2.1 and 5.2.2). Then by looking at the link between organizational creativity and NPD performance, is there statistical proof for this link and how strong is this link (5.2.3). After this the analysis will look at the different sectors and situational factors, is the link stronger in certain sectors, and are there other differences worth mentioning (5.2.4). Last it will look at the strength of the data by comparing it with the results from the in depth case study (5.2.5)

5.2.1 Companies & Organizational Creativity

This section will give an overview of the scores within the organizational creativity measurement model. It will show that all the indicators vary in scores and a true cross section of company scores within each dimension has been achieved.

First up is the climate dimension which consists out of nine indicators. The mean scores for each indicator as well as the total score for this dimension can be found in appendix 5. It can be concluded that all nine indicators have a normal standard deviation around a mean that is slightly higher then the halfway mark on the scale. The skewness of the data is mostly within normal limits and hardly significant. This means that the climate dimension is seen as a valid dimension with scores giving a true feel of the company's attitudes towards each indicator. The same holds true for both the roles as well as the structure dimension.

As was expected no interrelations between the three dimensions can be found. They are at the moment separate entities in the mind of the company and any combination of scoring high or low can be found. This means that if a relation between high scoring companies in multiple dimensions with high scores on NPD performance can be found it is because of this relation and not because of a possible interrelation between dimensions.

As said this model consists out of three dimensions. The total score on each of these dimensions can be found in appendix 5. However for the analysis the results will first be clustered. On each dimension it is possible to score high or low (above or below the average score within that dimension). This means there are four relevant clusters. First the cluster where a company scores either all highs or all lows. Second the cluster where a company scores highs (or lows) on both the climate and structure dimensions

but low (and high) on the roles dimension. Third the cluster where a company scores highs (or lows) on both the climate and roles dimension but low (or high) on the structure dimension. Lastly the cluster where a company scores highs (or lows) on both the roles and structure dimension but low (or high) on the climate dimension. The four clusters will be called: Uniform result, No significance on roles, No significance on structure and No significance on climate. In the respective clusters there are 9, 9, 11 and 9 companies. As can be seen this clustering gives four clusters each with approximately the same amount of companies in them, giving a good idea about the relevance of each dimension.

5.2.2 Companies & Organizational NPD Performance

This section will give an overview of the scores within the NPD performance measurement model. It will show that all the indicators vary in scores and a true cross section of company scores within this dimension has been achieved.

When the same tests for mean and standard deviation are performed again all scores support the idea of having a true cross section. The means are roughly were expected and there is no significant skewness in any of the data ranges. It can be concluded that all 12 indicators have a normal deviation. This means that the performance model can be seen as a valid dimension with scores giving a true feel of the company's attitudes towards this performance dimension.

The separate indicators have also been tested for interrelations for the same reason as before. If a number of indicators behave in the same manner, they are not a unique indicator for measuring a certain attribute of this dimension and as such would make the findings less significant. Seeing that there are no relevant interrelations between the indicators it can safely be said that a high score on this dimension truly gives a better performance and if any relation will be found it will be a relevant finding.

As said the scores for this model will be clustered in two groups, namely high scoring companies and low scoring companies. Because of rounding down there are 21 companies in the high scoring cluster and 17 in the low scoring (high scoring is 6 and higher, low scoring is 5 and lower). The other option (high scoring 7 and higher) will give 14 in the high scoring cluster and 24 in the low scoring cluster therefore the original clustering will be used (see appendix 6 for scores).

5.2.3 Organizational Creativity & NPD performance

This section will compare the scores for organizational creativity with the scores for NPD performance by comparing clusters with each other. It is expected that if the majority of dimensions is high (2 or more) the performance should also be high. The following table will give the amount of correct predictions per cluster.

	# of companies in the cluster	#of companies having performance scores in accordance with organizational creativity scores
Uniform results cluster	9	8
no significance on roles cluster	9	8
no significance on structure cluster	11	7
no significance on climate cluster	9	3

Table 4: Relation organizational creativity and internal product concept effectiveness performance

As can be seen 8 out of 9 companies that score high on all three organizational creativity dimensions score also high on NPD performance. When not taking into account one of the three dimensions it soon becomes clear that the roles dimension has no significance in this relation, the structure dimension holds extra significance and the climate cluster is essential. It seems the roles dimension therefore can be scrapped from this research. A possible explanation for this will be given in 5.2.5. When only looking at the structure and climate dimensions 18 out of 38 companies score either both highs or both lows at it and for 15 of these companies the expected performance score is also found. This means that when a company manages to get high scores on both organizational creativity dimensions there is an 89% change it will also score high on performance.

Next this research will look at each dimension individually and see how well it can predict the outcome for NPD performance. This will give another idea about the significance of each relation.

	# of companies in the cluster	#of companies having performance scores in accordance with organizational creativity scores
climate	38	29
structure	38	25
roles	38	19

Table 5: Relation individual dimensions and interna product concept effectiveness performance

Again it can be seen the roles dimension is insignificant at 50% which is just as good as random change. After that structure with 66% and climate with 76%. After taking out the random change in it, it can be seen that structure on its own has about 33% reliability, climate about 50% reliability but the combination of climate and structure almost 80% reliability.

Even though the amount of data is not really enough to do a numerical comparison, the next scatterplot portraits the numerical relation between total score on organizational creativity and total score for NPD performance.

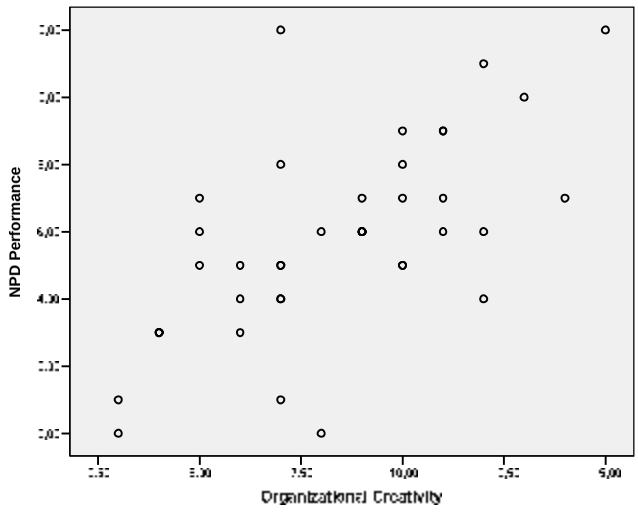

Figure 5: Scatter plot organizational creativity with the internal product concept effectiveness performance

As can be seen even with the limited amount a data a relation becomes obvious. Even though this relation is only about 39% according to statistics. The reason for this low number is probably because the limited amount of data, an outlier has much more weight at this moment.

The initial focus of this research is on the relation between organizational creativity and internal product concept effectiveness (the fit with firm competences). The database though also holds information about the external product concept effectiveness and the process effectiveness dimensions of the NPD performance. To get a better understanding the following analysis will do the same for these dimensions as has been done for the internal product concept effectiveness so to get a better idea about the possibilities and opportunities that can be gained through a focus on organizational creativity.

When looking at the relationship between external product concept effectiveness and organizational creativity the following scores where found.

	# of companies in the cluster	#of companies having performance scores in accordance with organizational creativity scores
Uniform results cluster	9	6
no significance on roles	9	7
no significance on structure	11	8
no significance on climate	9	1

Table 6: Relation organizational creativity and external product concept effectiveness performance

As can be seen the relation is not as strong as with internal. The best that can be done is 13 out of 18 which only gives a relation of just over 70 % or only 40% relevant.
The scatterplot also gives a different image.

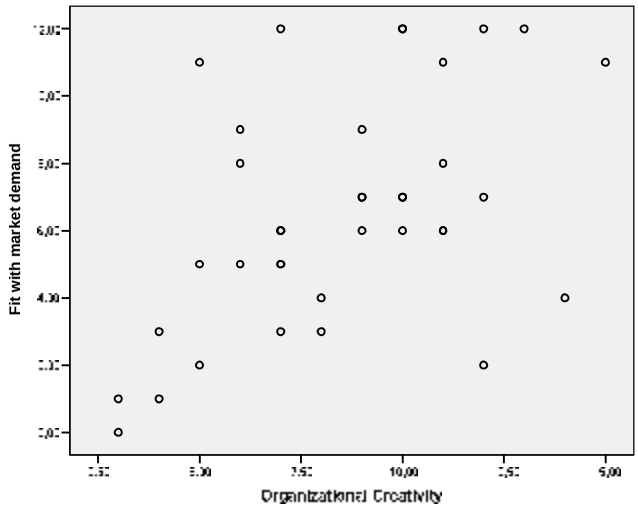

Figure 8: Scatter plot organizational creativity with the external product concept effectiveness performance

When looking at the relation between process effectiveness and organizational creativity a similar result is found.

	# of companies in the cluster	#of companies having performance scores in accordance with organizational creativity scores
Uniform results cluster	9	6
no significance on roles	9	7
no significance on structure	11	5
no significance on climate	9	4

Table 7: Relation organizational creativity and process effectiveness performance

Again the best possible relation is about 70% with 40% reliability. This is a lot worse then the 89% with 80% reliability when looking at the relation between internal product concept effectiveness and organizational creativity. The scatterplot of this relation is even worse then the one with external product concept effectiveness.

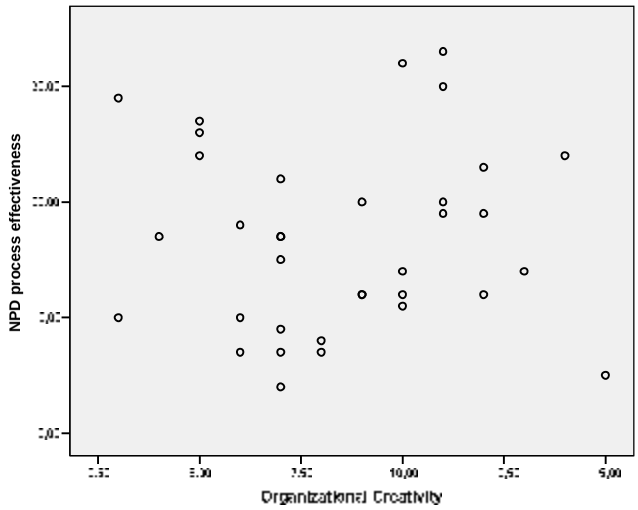

Figure 7: Scatter plot organizational creativity with the process effectiveness performance

5.2.4 Analyzing on separate levels

The data so far collected does not show that there is any significance when analysing situational factors like age, size or revenue. There are some small differences which suggest that companies with higher revenues have a better fit in this model, but that can't be said for certain. The collected data so far does not support any claims that situational factors can either influence or explain the difference of any of the dimensions. As for separate analyses for different sectors. At the moment there is not enough data to say anything worthwhile about this. For the future it would be a good point to do this analysis as to get a better idea about for which sectors this model works best.

In conclusion it can be said that the control variables show a verification of the findings. It is not a random relation that can be explained by other random dimensions and the variables itself do not change the outcome of the findings significantly. This results in the assumption that the found relation is truly between the given dimensions and not a fluke coincidence.

5.2.5 Validation questionnaire through in depth case study

This section will first discuss the relevant information obtained from the interviews and then give an overview of the data collected from the employees in regard to the verification of the climate dimension

During the interviews with the managers of the respective companies it became clear that some questions where not clear. The main complaint was about whether or not certain questions needed to be answered from the perspective of the whole organization or just from the R&D department. The bit that was relevant for this research was about the question about roles. Neither manager could give a clear answer on this one but both said that it is not something that can easily be answered and both admitted towards answering that question more from the department's structure. The point of the question about roles was meant to be more from the organic stand point of actions of certain employees in a way that could describe them as holding one of the roles, not being assigned part of that role. This means that it is very probable that the question about roles will not give a correct idea about the existence of certain roles that can inhibit or promote creativity.

When discussing the concept of creativity, it became clear that creativity is still mainly seen as an individual skill that can be enhanced or blocked at that level. The idea of fostering creativity through organizational structures and systems was not seen as an important part of creativity or of the performance of the department. The departments are run in a way where new ideas are accepted when time allows it, but in the end deadlines were more important then the potential of creativity. It is nice to see though that this sacrifice of creativity does not have to happen on the organizational level whilst still pursuing deadlines. Organizational creativity, other then individual creativity, can still flourish as a whole and help make the whole department more efficient and actually help in making those deadlines without sacrificing creativity in the process.

The survey that was given to the employees from the NPD department was about the climate within the department. The main reason for having this survey was to verify if the results given by the manager of the department reflect the real feelings of employees towards the climate. The average scores for each factor from the employees are given in appendix 7. These average scores have been calculated by taking the average on all the scores within a dimension. taking into account that indicators that have a negative relation with the factor are also negatively weight. As can be seen even though there seems to be a small tendency of managers to be more optimistic then the employers this is never more then a point and quite often within half a point. Both managers are roughly the same in being more optimistic about certain factors. It seems therefore reasonable to assume that the data from the questionnaire does give a relevant overview of the companies' attitude towards these factors. Or at least at this moment in time it does not disagree with the accuracy of these indicators. Further research should be done on this subject to give a definitive answer.

5.3 Summary of the influence of Organizational creativity on NPD performance

This chapter described the data that is being used for this research. Explaining that with a sample of only 38 companies the findings should be seen more as an exploratory research. When looking at the scores for both organizational creativity and NPD performance it shows that both constructs are based on independent indicators that are not influencing each other and which have a decent variance within each indicator.

When comparing the data it becomes clear a relation between organizational creativity and NPD performance is likely. By using clustering over 89% of the companies scoring high on both climate and structure also score high on NPD performance. The scatterplot of the numerical data also suggests a linear relation between the two constructs. It has become apparent both from the data as well as the interviews that the roles dimensions in this data set hold little to no significance. The question seems not to have been understood well and should be rephrased for future research. The implications and conclusion about these findings will follow in chapter 6.

6 Implications

After analyzing the results it is now clear how organizational creativity can influence internal NPD performance. This chapter will look at the implications of these findings (6.1). Which organizational dimensions can best be improved if a company wants to foster organizational creativity (6.2)? What strategies should companies promote if they want to improve organizational creativity (6.3)?

6.1 Relevance of the Analysis

When looking at the analysis in chapter five it becomes clear immediately that there is some sort of a connection between organizational creativity and NPD performance.
The found relation of 89% suggests that a company can most definitely improve ones performance through influencing organizational dimensions like the climate and structure of the NPD department. This in itself is very important. Where previous research only found a common factor in organizational creativity when looking at a certain group of better performing companies. This research now shows for certain that better organizational creativity, as defined by those studies, gives better performance, and on the downside, worse organizational creativity results in poorer performance for the NPD department. The notion that creativity is a soft thing that is within individuals and can't be improved is not true anymore. Hard organizational dimensions have an influence on how well creativity can be used on improving the performance of a NPD department. Even if this is only a select sort of performance the practical implications are significant. Through use of this model a company can be ranked in one of three groups: scoring below average on both dimensions of the organizational creativity with a high probability of also scoring below average on performance, scoring high on one and low on one dimension within organizational creativity with no real prediction on how they perform on performance (although scoring high on climate has a better change on scoring high on performance then only scoring high on structure) and scoring above average on both dimensions of the organizational performance with a high probability of also scoring above average on performance. By knowing in which group a company falls the management of that company can then make a more informed decision when deciding about improving ones performance through organizational creativity. The relevance of being in one of these groups will be discussed in detail later on in this chapter.

The next section of this chapter will have another look at the performance indicators who react strongly on a change in organizational creativity. There are 12 indicators in this category. The indicators are:

1. The degree of manufacturing cost advantage that NPD provides is satisfactory.
2. Few manufacturing problems occur during production start-up phases.
3. Only few product design changes are needed to solve manufacturing performance.
4. Marketing and NPD often share information.
5. Conflicts between marketing and NPD are of a constructive kind.
6. Marketing and NPD are more like teammates than competitors.
7. Our competence to explore new technological developments from inside the BU is well developed

8. We built upon manufacturing competences for the exploration of new technological developments
9. We are very much inspired by marketing for the development of new ideas form inside the BU.
10. We can pass lessons learned on across organizational boundaries.
11. We can pass lessons learned on over time.
12. We are able to enhance our competences by tapping into external sources.

As can be seen companies with a better score on this construct can be expected to have: more and quicker impact on the manufacturing process, be able to successfully share information both within the company as well as over time and have a better ability to build upon other firm competences in exploring new technological developments.

When looking at the sort of indicator that is being influenced it leads to the conclusion that organizational creativity can foster the ability of an NPD department to act upon requests better, but not about the process of inventing something new without directions. It seems that for invention the circumstances of climate and structure don't seem to matter too much which brings the notion that this part must come from within individuals themselves and can not be managed, controlled or measured from an organizational standpoint. However as soon as the initial invention is there the process of making this into a commercially viable product or the enhancement of older products can be influenced by organizational dimensions. Also the knowledge gained from this thrives better in companies which foster organizational creativity. To conclude, a NPD department which create a more creative environment through there climate and structure has the ability to perform there tasks more efficiently when it comes to incremental innovation, the radical part is not influenced by these dimensions. Organizational creativity makes the innovation process easier and is able to remember lessons learned, the "real" innovation moment is still left up to change.

6.2 A Theory for Creating Strong Organizational Creativity

Now it is known what the relation is between all dimensions found through the literature study on the performance of a company it is important to know the strength of these relationships. When it is known how well a certain dimension influences performance it is easier to make an informed decision for companies who want to get a better organizational creativity and through it a more effective NPD department. This part will therefore look at the individual strength of each dimension.

Chapter five has done a sensitivity research into the strength of each organizational creativity dimension on the performance. It showed clearly that climate is the strongest influencer and companies not scoring well on this dimension have ample opportunities to improve. The other dimension that seemed significant was structure. Again this dimension has possibilities in fostering organizational creativity. Remarkably however the dimension roles had no positive influence on performance. This raises the question of why not, since these dimensions should according to literature also affect the organizational creativity. There are two possible explanations for this. On the one hand the literature could be faulty and the dimensions really have nothing to do with organizational creativity, or at least not for influencing performance, or on the other hand

the way these dimensions have been measured in this research might not give enough information about the dimensions.
Ample backing from the literature suggests that the first explanation is not likely. Because of this the weakness of the measurement will first be addressed. The roles dimension based upon literature measures the existence of certain roles in the NPD process. However in all literature about these roles it is always said that no one has this role in their job description, it is more something that happens over time. Because of this it seems to be very hard to pinpoint exactly whether or not a certain role is actually being fulfilled within the department. From the interviews with the managers it became clear that both had a problem with this question. The role of project leader was easy, but this was because someone is actually given that title. With the rest they said they weren't to sure, it was more a process of when needed it seems to be fulfilled. This leads to the assumption that the answers on this part may not resemble the actual situation within a company. In future research it is therefore recommended to have either a better definition about this question or maybe add a number of other questions to this dimension to verify it's authenticity. For this research it seems that this dimension holds no relevant information, but it can't be said if this is because there is no relation or just because of misrepresentation of the collected data. Whatever the cause for the purpose of this research this dimension can no longer be taken into account and is discarded. This leaves the structure and climate dimensions. Both dimensions where the managers interviewed had no problem answering and the employees agreed roughly with the manager's statement. These two dimensions both are proven to have an influence on the performance of the department.
It seems that the construct that is now in place gives a strong idea about a company's organizational creativity and can predict the organizational performance based on this organizational creativity.

6.3 Sensible Strategies for Involved Companies

From the analysis it has become clear that a combination of scoring well on both climate and structure is the best configuration when a company wants to improve its NPD performance. This section will therefore look at the different possibilities a company can find itself in and give a strategy on how best to go forward if they are thinking about improving NPD performance through the use of organizational creativity.

The way companies score on organizational creativity it is possible to divide them into four groups. For each of these groups a strategy will be given later on.
Group 1: The Stagnators: These companies do not focus on organizational creativity and stagnate the innovation process through there choice of structure and behaviour in climate.
Group2: The innovation supporters: These companies support innovation through there choice of structure but do not act upon it behaviour wise. There is some improvement in performance but they are missing the big scoop.
Group 3: The innovation believers: These companies believe in organizational creativity and act upon it throughout there company, they do not however support it through there structure which halts some of the effectiveness, but on average this group does significantly better then the other two groups.
Group 4: The Innovators: These companies have embraced organizational creativity, they act upon the believe that attitudes will contribute towards effectiveness as well as

support this through there choice in organizations structure. It all works together creating the best performance within the NPD department.

The following chart gives an overview of this model

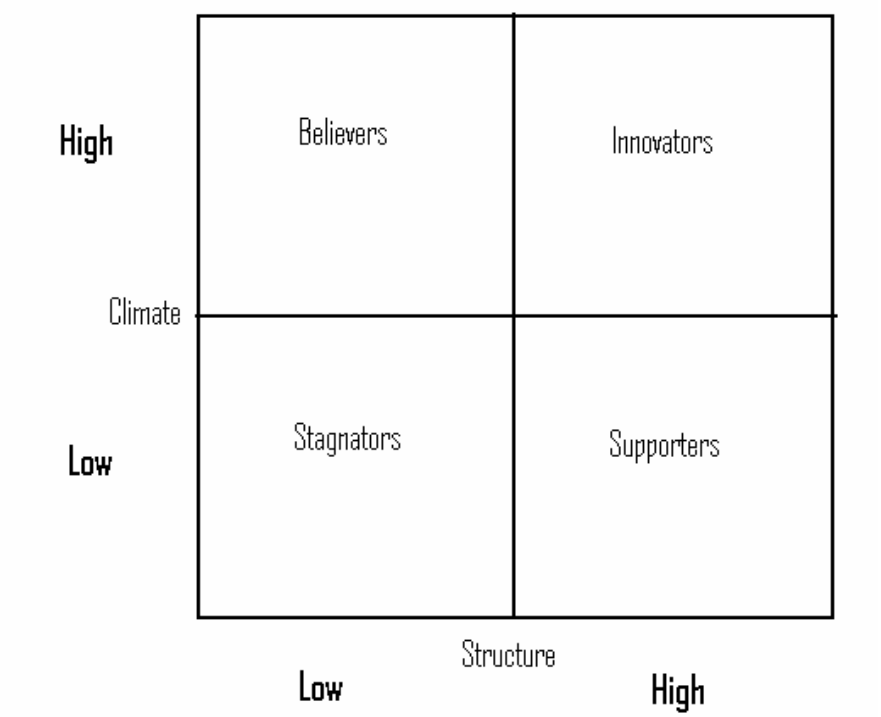

Figure 8: Benchmark model

Per group a strategy can now be given on how to best improve ones NPD performance:
Group 1: All improvement would be beneficial; however improving climate indicators first will give a better result. This is more difficult however, so a combined improvement would probably be best, start changing the structure towards a more supporting environment for creativity and start with a change in attitude from the top down to slowly start initiating change on the climate dimension.
Group 2: The support is there but the believe is missing. To improve these kinds of companies there is only one way, start believing in the model and start changing attitudes. Give people more freedom, but do it gently, being in this place it will take time to move up. People will have to get used to the new ideas and attitudes before they will start acting upon them. However if this group manages to improve their climate they will instantly rise into stardom and become true innovators.
Group 3: The hard part is done for this group. A believe in organizational creativity is there and it is being carried out by all participants. However the structure does not support this yet. It is time to make it official if the company is serious about improving the last bit of performance. The improvements will probably be minor, but it will help the stability in the long run, making it easier to stay on top of the innovator food chain.
Group 4: This group needs to consolidate. It can now reap the benefits of having an effective NPD department. Its main task should be monitoring to make sure no factors are dropping and keeping a healthy environment making this the perfect place to work for innovative people.

6.4 Conclusion

Organizational creativity seems to be able to influence NPD performance, or more specific the internal product concept effectiveness of a NPD department. 89% of companies that score high (or low) on both climate and structure also score high (or low) on NPD performance.

When looking at the numerical data the following scatterplot also shows the start of a definite relation between the two constructs:

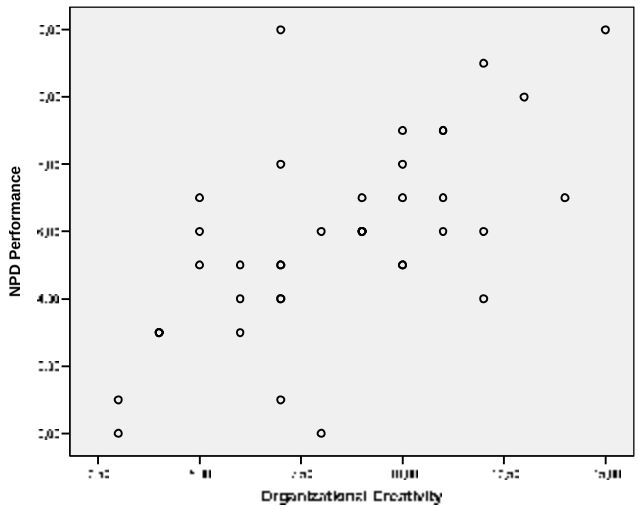

Figure 9: Scatter plot organizational creativity with internal product concept effectiveness performance

The practical implications for these findings are that organizational creativity can make the NPD department more effective. There is improvement to be made by focusing on certain elements of the organizational creativity. Roughly it can be said that there are four kinds of groups namely: innovators, believers, supporters and stagnators. Each following group scores less on NPD performance. And each group needs to focus on different strategies to get maximum organizational performance through enhancing organizational creativity.

The findings in this research suggest that this relation holds up, however this research only consisted out of 38 companies all set within The Netherlands. As a practical tool the model presented in this research will make decision making easier for companies thinking about increasing NPD performance. On the theoretical side however more data is needed before a definitive model can be presented. The indicative findings do certainly support other organizational creativity literature. Creativity is not only a human thing, organizational dimensions can hamper or foster it and help make the NPD function a more effective workplace.

7 Conclusion

This research set out to verify the hypothesis:

Increasing organizational creativity within an NPD function, which can be fostered through organizational dimensions of that function, will give better NPD performance

To do this first a model was created on how organizational creativity can be influenced through the dimensions of that function and how this could be measured. The dimensions found relevant in influencing organizational creativity are Climate, Roles and Structure. Each dimension is scored upon a number of indicators for that dimension giving a score of above or below average. These scores are then clustered to give an overall idea how organizational creativity can react.

For NPD performance a model was needed that was likely to react on changes in organizational creativity. It was found that technical effectiveness indicators are most likely to react on these changes. The chosen construct from the Patterns in NPD database holds information about the internal product concept effectiveness which is just that technical effectiveness that was assumed to change. The score for this construct is based on 12 indicators giving again a score above or below average.

When analysing data about both constructs a relation was discovered. When a company scores above average on the climate and structure dimension there is 89% change it also scores high on NPD performance. It was found that the roles dimension did not have a significant influence on NPD performance.

The practical implications of these findings are that companies can influence their internal product concept effectiveness (fit with firm competences) through fostering organizational creativity. A model is constructed where a company can score itself against competitors and base decisions about improving organizational creativity on this model. The influence of the separate indicators has also become clearer.

Besides these practical implications the theoretical implications of this research are that organizational creativity can be used as a predictor for certain NPD performance and with it business success. This is an extra step within organizational creativity literature, where it used to be a tool for explaining a common factor within a group of highly innovative companies. It can now be used as an analyser of groups of companies and make predictions based on this analysis. The limitations at this moment are the relatively low amount of data this research is based upon, as well as a faulty question which means this research was not able to use the roles dimension to its full potential. Even though this research has a more exploratory nature, it is believed it gives a firm idea about the possibilities of using organizational creativity as a prediction tool as well as a benchmark tool and builds on the believe that organizational creativity can't be dismissed when running a successful NPD organisation.

8 Recommendations

This part will focus on recommendations for further research within this area. It will be based upon eliminating the limitations from this research. The main downside of this research is the amount of data entered. By getting more data, not only from a limited source of sectors but also from different countries a stronger model can be presented. The emphasis should be on cultural and situational factors. When more data is available a difference between sectors and situational factors should be found. By defining these differences more knowledge can be gained about the creative process within companies and as such help decision making for companies that want or need to improve there R&D functions.

Next to this data problem the main thing future research should focus on is the creation of a data set especially set up for measuring organizational creativity and its effects. This research gives a solid understanding on what parts are important. This should be combined in a new questionnaire solely for the purpose of organizational creativity. That is the only way to find out for sure what the exact relation and significance of the individual dimensions are. It will also serve to take out the other major limitation of this research which is the use of the roles dimension. Special care should be taken to make sure this dimension will be measured correctly.

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Appendix 1

The systematic literature search

Number of hits for NPD Creativity:
Organization/organisation creativity: 83
Organization/organisation innovation: 500
Organization/organisation innovativeness: 89
Creative organization/organisation: 120

Organizational/organisational creativity: 165
Organizational/organisational innovation: 1530
Organizational/organisational innovativeness: 117
Creative organizational/organisational: 76

Climate creativity: 20
Climate innovation: 72
Climate innovativeness: 25
Creative Climate: 53

Number of total hits: 2860
Number of relevant articles at first glance: 104
Number of relevant articles after study of abstracts: 43

Number of hits for NPD performance
Performance innovativeness: 56
Performance innovation: 514

Number of total hits: 570
Number of relevant articles at first glance: 29
Number of relevant articles after study of abstracts: 7

Appendix 2

In depth case protocol and survey

Protocol for Case Studies

Semi-structured interview - "Patterns in New Product Development"

- The company or strategic business unit interviewed must have completed the NPD survey questionnaire previously.
- Company needs to be of a relative size
  - turnover of Euro 500,000
  - at least 5 (full-time equivalent) people involved in New Product Development or R&D
- Company needs to be involved in manufacturing
- Firms to be contacted by phone initially. Researchers will speak with the relevant managers who previously filled up the 1st. NPD questionnaire to mention about the case study and request for interviews with CEO/General Manager and another senior manager in R&D, NPD, Technology or Operations. Researchers to arrange interviews for CEO/General manager using Set A interview schedule and another senior manager using Set B interview schedule. (Researchers also need to inform about mini-survey on culture and climate with 5-10 people related to NPD functions)
- Researchers to gain agreement for managers' involvement in the case study followed by a letter of agreement
- Interview date and time need to be ascertained with managers at least two weeks before, and confirmed again one week before
- Case study interviewees need to involve two managers in separate interviews using two separate sets of semi-structured questions. The interview with the CEO/General Manager will include Set A questions. Set B questions will be used for interview with NPD Manager, R&D manager, Technology manager, Operations Manager or relevant manager who is familiar with the development, manufacturing and marketing of their products.
- Managers interviewed need to be employed full time
- Interview will take at least 90 – 120 minutes. Managers to be informed that interviews could last longer than 120 minutes.
- Additional survey questionnaire on culture and climate is to be filled in by 5 to 10 persons from various levels in the organization (e.g. senior managers, middle

managers, supervisors, administrators). They may not necessarily be in the NPD department, but must have some work relation to NPD functions.

- ❑ Survey questionnaires on culture and climate could be sent beforehand or given to the manager on the day of interview to be distributed to 5-10 employees.
- ❑ Survey questionnaires could be collected on the day of the interview before researchers leave the organization, or left with the organization to be returned by mail upon completion.
- ❑ Prior to interviews, researchers need to be aware of the contents/ response from the NPD questionnaire to have sufficient knowledge about the organization.

Survey questionnaire on Organisational Climate and Culture

Dear participant,
We are conducting a case study on your organisation in the area of New Product Development. This survey questionnaire entails your perception of the organisational climate and culture you work in. Thank you for your time and cooperation.

Organisational Climate

1. Involvement

To what extent do you agree with the next statements, please circle the right answer (1 = disagree, 7 = agree, n/a = not applicable).

		Disagree						Agree	
1.	People are committed in contributing to the goals of the organization.	1	2	3	4	5	6	7	n/a
2.	People lack interest in their work	1	2	3	4	5	6	7	n/a
3.	People are intrinsically motivated to contribute to the success of the organization.	1	2	3	4	5	6	7	n/a
4.	People view work as an opportunity not as obligation.	1	2	3	4	5	6	7	n/a
5.	Interpersonal interactions are dull.	1	2	3	4	5	6	7	n/a
6.	People feel associated with the long-term goals of the organization.	1	2	3	4	5	6	7	n/a

2. Freedom

To what extent do you agree with the next statements, please circle the right answer (1 = disagree, 7 = agree, n/a = not applicable).

		Disagree						Agree	
1.	People carry out their work in prescribed ways with little room to define their tasks.	1	2	3	4	5	6	7	n/a
2.	People in the New Product Development function make choices about their own work.	1	2	3	4	5	6	7	n/a
3.	People are given resources to define their own work.	1	2	3	4	5	6	7	n/a
4.	People here exercise discretion in day-to-day activities.	1	2	3	4	5	6	7	n/a
5.	Individuals are provided the opportunity to share information about their work.	1	2	3	4	5	6	7	n/a
6.	People work in strict guidelines and roles.	1	2	3	4	5	6	7	n/a

3. Openness

To what extent do you agree with the next statements, please circle the right answer (1 = disagree, 7 = agree, n/a = not applicable).

		Disagree						Agree	
1.	People in the New Product Development function trust each other.	1	2	3	4	5	6	7	n/a
2.	People count on each other for personal support.	1	2	3	4	5	6	7	n/a
3.	People here copy each others' ideas.	1	2	3	4	5	6	7	n/a
4.	People give credit where credit is due.	1	2	3	4	5	6	7	n/a
5.	People closely guard their plans and their ideas.	1	2	3	4	5	6	7	n/a
6.	People find it difficult to openly communicate with each other.	1	2	3	4	5	6	7	n/a

4. Idea time

To what extent do you agree with the next statements, please circle the right answer (1 = disagree, 7 = agree, n/a = not applicable).

		Disagree						Agree	
1.	People in the New Product Development function take the time to consider new ways of doing things.	1	2	3	4	5	6	7	n/a
2.	Time is available to explore new ideas.	1	2	3	4	5	6	7	n/a

3.	Possibilities exist to discuss suggestions not included in the task assignment.	1	2	3	4	5	6	7	n/a
4.	The New Product Development function incorporates flexible timelines that permit people to explore new avenues and alternatives.	1	2	3	4	5	6	7	n/a
5.	Within the New Product Development function every minute is booked and specified.	1	2	3	4	5	6	7	n/a
6.	The time pressure here makes thinking outside the instructions and routines impossible.	1	2	3	4	5	6	7	n/a

5. Pleasantry

To what extent do you agree with the next statements, please circle the right answer (1 = disagree, 7 = agree, n/a = not applicable).

		Disagree						Agree	
1.	People in the New Product Development function have fun doing their work.	1	2	3	4	5	6	7	n/a
2.	There is a great deal of good-natured joking.	1	2	3	4	5	6	7	n/a
3.	People here exhibit a sense of humor	1	2	3	4	5	6	7	n/a
4.	The atmosphere is characterized by seriousness.	1	2	3	4	5	6	7	n/a
5.	Jokes and laughter are regarded as improper.	1	2	3	4	5	6	7	n/a
6.	The climate is seen as easy-going.	1	2	3	4	5	6	7	n/a

6. Conflicts

To what extent do you agree with the next statements, please circle the right answer (1 – disagree, 7 – agree, n/a – not applicable).

		Disagree						Agree	
1.	People in the New Product Development function set traps for each other.	1	2	3	4	5	6	7	n/a
2.	There are power and territory struggles here.	1	2	3	4	5	6	7	n/a
3.	Groups and individuals dislike each other	1	2	3	4	5	6	7	n/a
4.	Personal differences yield gossip.	1	2	3	4	5	6	7	n/a
5.	People have psychological insight and control of impulses.	1	2	3	4	5	6	7	n/a
6.	People deal effectively with diversity in ideas.	1	2	3	4	5	6	7	n/a
7.	People deal effectively with diversity in colleagues.	1	2	3	4	5	6	7	n/a

7. Idea support

To what extent do you agree with the next statements, please circle the right answer (1 = disagree, 7 = agree, n/a = not applicable).

		Disagree						Agree	
1.	New ideas are received in an attentive way by other people.	1	2	3	4	5	6	7	n/a
2.	People listen to each other's initiatives	1	2	3	4	5	6	7	n/a
3.	People usually feel welcome when presenting new ideas here.	1	2	3	4	5	6	7	n/a
4.	The atmosphere is constructive when considering new ideas.	1	2	3	4	5	6	7	n/a
5.	At the proposal of new ideas the automatic "no" is prevailing.	1	2	3	4	5	6	7	n/a
6.	Fault-finding and obstacle-raising are the usual styles of responding to new ideas.	1	2	3	4	5	6	7	n/a

8. Debates

To what extent do you agree with the next statements, please circle the right answer (1 = disagree, 7 = agree, n/a = not applicable).

		Disagree						Agree	
1.	People in the New Product Development function discuss opposing opinions.	1	2	3	4	5	6	7	n/a
2.	A wide variety of viewpoints are expressed here.	1	2	3	4	5	6	7	n/a
3.	Many voices are heard when searching for solutions for problems.	1	2	3	4	5	6	7	n/a
4.	People are keen on putting forward their ideas for consideration.	1	2	3	4	5	6	7	n/a
5.	People often discuss opposing opinions.	1	2	3	4	5	6	7	n/a
6.	People follow authoritarian patterns without questioning them.	1	2	3	4	5	6	7	n/a
7.	People can often be seen sharing a diversity of perspectives.	1	2	3	4	5	6	7	n/a

9. Risk taking

To what extent do you agree with the next statements, please circle the right answer (1 = disagree, 7 = agree, n/a = not applicable).

		Disagree					Agree		
1.	People in the New Product Development function feel as though they can go out on a limb and be first to put an idea forward.	1	2	3	4	5	6	7	n/a
2.	People tolerate uncertainty and ambiguity when making decisions.	1	2	3	4	5	6	7	n/a
3.	People here often venture into unknown territory.	1	2	3	4	5	6	7	n/a
4.	People feel as though they can "take a gamble" on their ideas.	1	2	3	4	5	6	7	n/a
5.	People try to be on the "safe side".	1	2	3	4	5	6	7	n/a
6.	People tend to cover themselves in many ways.	1	2	3	4	5	6	7	n/a

Appendix 3

Patterns in New Product Development questionnaire (relevant parts)

"Patterns in New Product Development"

In the questionnaire you will find instructions for each set of questions. We understand that in some cases you may find that the particular question does not entirely fit your case. Whenever such situations happen, please use your best judgment to answer the question and try not to skip it. We sincerely appreciate your efforts in completing all questions.

2. What best describes your business unit (tick one)

☐	Independent company	Go to 4
☐	A division / business unit belonging to a parent company	Go to 3
☐	A single location / plant	Go to 3

4. What is the year of establishment of your business unit?

5. What is the primary geographic region where you do business?

- ☐ Limited to a single location
- ☐ Spread out over a single geographic region
- ☐ Nationwide
- ☐ International

6. Please answer the next questions about the size of your business unit:

What are total annual sales?		Million EUR
What is the total number of employees in full time equivalent?		FTE

Operational Effectiveness and Strategic Flexibility of your NPD Function

20. In this section please indicate your level of achievement on objectives concerning the *fit with market demands* achieved by your NPD function and the ability to *anticipate* on them.

		Not at all achieved						Very well achieved	Don't know
a.	Our new products meet customer requirements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
b.	Our new products are delivered on time.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
c.	The cost of our new products is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
d.	The quality of our products is good.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
e.	The impact of our NPD program on our sales level is positive.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
f.	We get good returns from our NPD program relative to our spending on it.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
g.	Our current development projects include new product-market options.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
h.	We prefer NPD projects that generate options for future product development	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
i.	NPD is successful in opening new markets to our organization.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
j.	NPD is successful in leading our organization into new product areas.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
k.	Our NPD activities open new technologies to our organization.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
l.	We incorporate solutions to unarticulated customer needs in our new products.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐

21. In this section please indicate your level of achievement on objectives concerning the *fit with firm competences* achieved by your NPD function and the ability to *build* these competencies.

		Not at all achieved						Very well achieved	Don't know
a.	The degree of manufacturing cost advantage that NPD provides is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
b.	Few manufacturing problems occur during production start-up phases.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
c.	Only few product design changes are needed to solve manufacturing performance.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
d.	Marketing and NPD often share information.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
e.	Conflicts between marketing and NPD are of a constructive kind.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
f.	Marketing and NPD are more like teammates than competitors.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
g.	Our competence to explore new technological developments from inside the BU is well developed	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
h.	We built upon manufacturing competences for the exploration of new technological developments	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
i.	We are very much inspired by marketing for the development of new ideas form inside the BU.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
j.	We can pass lessons learned on across organizational boundaries.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
k.	We can pass lessons learned on over time.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
l.	We are able to enhance our competences by tapping into external sources	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐

In the following section please indicate your level of achievement on objectives concerning the *speed* of the processes carried out by your NPD function as well as your ability to *anticipate* on future time constraints.

You may first want to take a look at this figure that shows the concepts of Development Time, Concept To Customer time and Total Time which are used in this question.

Stage	0	1	2	3	4
Name	**Concept generation**	**Project evaluation**	**Development**	**Manufacturing development**	**Commercialization**
Starting activity	Surfacing of idea	Developing of specs	Spending on physical development	Documentation of process development	Production trials (End: manufacturing for sales)
			Development Time (DT)		
		Concept To Customer time (CTC)			
Total Time (TT)					

22. Please indicate your level of achievement on following objectives:

		Not at all achieved						Very well achieved	Don't know
a.	Our new products are launched on schedule.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
b.	Scheduled time is in line with total development time (TT).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
c.	Our Development Time (DT) is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
d.	Our Concept to Customer Time (CTC) is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
e.	Our Total Time (TT) is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
f.	The speed of the NPD decision making process is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
g.	We can estimate future requirements on our total development time (TT).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
h.	We are able to adjust our NPD process to future time requirements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
i.	We can estimate future requirements	1	2	3	4	5	6	7	

	on the speed of our NPD decision making process.	☐	☐	☐	☐	☐	☐	☐	☐
j.	We are able to adjust our NPD decision making process to future requirements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
k.	We are able to forecast the future requirements on the commitment to translating our NPD decisions into actions.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
l.	We are able to adjust the commitment to translating NPD decisions into actions to the requirements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐

23. In this section please indicate your level of achievement on objectives concerning the *productivity* of your NPD function as well as your ability to *anticipate* on future productivity constraints.

		Not at all achieved					Very well achieved		Don't know
a.	We can develop the same products with a lower budget than assigned.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
b.	Development costs of our products hardly exceed budgets.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
c.	Beyond-budget products do not exceed budgets with a large amount.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
d.	Our development costs are relatively low.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
e.	Realized development hours do not often exceed budgeted hours.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
f.	We can estimate the future internal cost requirements for our development process.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
g.	We are able to adjust our development process to the future cost requirements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
h.	Our ability to predict future development costs is well developed.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
i.	We are well capable to adjust	1	2	3	4	5	6	7	

	development costs	☐	☐	☐	☐	☐	☐	☐	☐
j.	We are able to adjust the number of development hours to future requirements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐

24. In this section please indicate your level of achievement on objectives concerning the *flexibility* of the processes of your NPD function as well as the ability to *anticipate* on future needs for operational process flexibility.

		Not at all achieved						Very well achieved	Don't know
a.	The average time of product enhancement is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
b.	The average time of product redesign is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
c.	Our ability to change the design fast, after being confronted with new specs, is well developed.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
d.	The average cost of redesign is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
e.	We can process a change of specs without a lot of extra financial resources.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
f.	Our ability to change specs late is satisfactory.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
g.	We are able to forecast the requirements on the time of redesign.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
h.	We are able to adjust the average time of product redesign to future requirements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
i.	We are capable in forecasting the future requirements on the cost of product redesign.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
j.	We are capable to adjust the average cost of product redesign to future requirements.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
k.	We are able to predict changes in specifications.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
l.	We are able to anticipate on changes in specifications.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐

NPD process and roles

25. Please check the box that most closely describes your business unit's incremental development processes. Please tick one answer.

- ☐ No standard approach to new product development.
- ☐ While no formally-documented process is followed, we have a clearly understood path of the tasks to be completed in product development.
- ☐ We have a formally-documented process where one function completes a set of tasks, then passes the results on to the next function which completes another set of tasks.
- ☐ We have a formally-documented process where a cross-functional team completes a set of tasks; management reviews the result and gives the go-ahead for the team to complete the next set of cross-functional tasks.
- ☐ We have a formally-documented process where a facilitating "process owner" helps cross-functional teams move through stages and management reviews.
- ☐ We have a formally-documented process where a cross-functional team uses a staged process with overlapping, fluid stages and "fuzzy" or conditional stage decisions.

28. Please indicate for each of the roles described below whether these behaviors can be identified throughout your NPD function.

	Present in NPD? [yes/no]	Limited to one phase					Throughout the whole NPD process
Idea Generator							
- searching for breakthroughs by linking diverse ideas - testing feasibility of ideas	☐ Yes ☐ No	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Champion							
- sells new ideas to others in the organization and gets resources - recognizes, proposes and pushes a new technical idea for formal management	☐ Yes ☐ No	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

approval Project Leader - provides the team leadership and motivation - plans and coordinates the diverse sets of activities and people involved in moving a demonstrated idea into practice	☐ Yes ☐ No	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Gatekeeper - collects and channels information about important changes in the internal and external environments - passes information on to others	☐ Yes ☐ No	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Sponsor - provides encouragement, guidance, and acts as a sounding board for the project leader and others - guides and develops less experienced personnel in their roles	☐ Yes ☐ No	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

NPD structure

35. How are people within the NPD function organized?

☐ Departments
☐ Project teams
☐ Matrix management
☐ Self-managed work teams
☐ Other

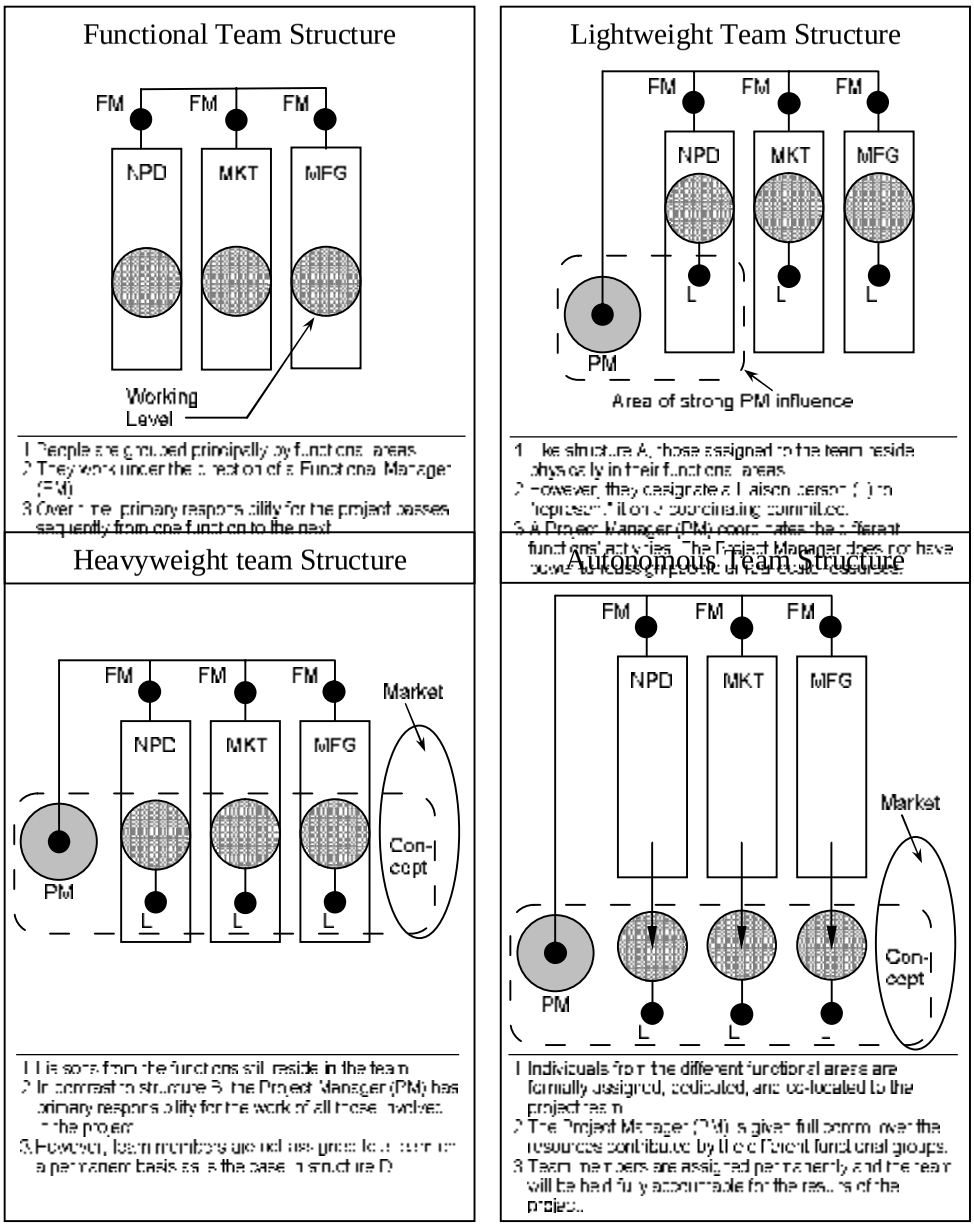
36. Please indicate which of the structures pictured and described in the next figure is / are the most common NPD structure(s) within your business unit.

If your NPD function is divided, please tick the most common structures for both incremental and radical innovation. If your NPD function is not divided, just fill in the appropriate structure for the whole NPD function.

	Functional Team Structure	Lightweight Team Structure	Heavyweight Team Structure	Autonomous Team Structure
Structure for Radical innovation	☐	☐	☐	☐
Structure for Incremental Innovation	☐	☐	☐	☐

(If your NPD function is not divided:)

One structure for the whole NPD function	☐	☐	☐	☐



NPD climate

37. In this section please indicate your level of agreement with each statement regarding your overall innovative climate

		Strongly disagree						Strongly agree	Don't know
a.	People are emotionally involved in goals set.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
b.	People have freedom to define their own work.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
c.	There is a high level of trust between people.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
d.	There is time for people to develop unplanned new ideas.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
e.	There is a relaxed atmosphere.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
f.	There is a high level of conflict.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
g.	There is a strong support for further development of new ideas.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
h	People are involved in debates about differing viewpoints.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐
I	High risk taking behavior is tolerated.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	☐

This is the end of the questionnaire. Thank you again for your cooperation!

Your answers will be treated with full confidentiality and the names of companies, business units, products or individuals will not be released!

Appendix 4

Full database with scores for all the parts mentioned in appendix 3

And the scores for above mentioned questions for all companies

1	13	16	17
Company	Sort of company	Operating where?	Founding date
Company #1	A division / business unit belonging to a parent c	International	1970
Company #2	A single location / plant	International	2003
Company #3		International	1993
Company #4	Independent company	International	1934
Company #5	Independent company	Nationwide	2000
Company #6	A division / business unit belonging to a parent c	International	1918
Company #7	A division / business unit belonging to a parent c	International	1960
Company #8	A division / business unit belonging to a parent c	International	1948
Company #9	A division / business unit belonging to a parent c	International	2001
Company #10	A division / business unit belonging to a parent c	International	1998
Company #11	A division / business unit belonging to a parent c	International	1830
Company #12	A single location / plant	International	1950
Company #13	A division / business unit belonging to a parent c	International	1923
Company #14	A division / business unit belonging to a parent c	International	1950
Company #15	A division / business unit belonging to a parent c	International	1948
Company #16	A division / business unit belonging to a parent c	International	1900
Company #17	Independent company	International	1924
Company #18	Independent company	International	1971
Company #19	A division / business unit belonging to a parent c	International	1995
Company #20	A division / business unit belonging to a parent c	International	2002
Company #21	Independent company	Limited to a single location	1994
Company #22	Independent company	International	1981
Company #23	Independent company	International	2000
Company #24	A division / business unit belonging to a parent c	International	
Company #25	Independent company	Limited to a single location	2000

Company #26	Independent company	International	1922
Company #27	A division / business unit belonging to a parent c	International	1920
Company #28	A division / business unit belonging to a parent c	International	1976
Company #29	Independent company	International	2001
Company #30	Independent company	International	1970
Company #31	Independent company	International	1955
Company #32	Independent company	International	2005
Company #33	A division / business unit belonging to a parent c	International	1873
Company #34	A division / business unit belonging to a parent c	International	1959
Company #35	A division / business unit belonging to a parent c	International	1928
Company #36	A division / business unit belonging to a parent c	International	1913
Company #37	A division / business unit belonging to a parent c	International	19999
Company #38	A division / business unit belonging to a parent c	International	1927

18	19	58	59	60
total annual sales (millions)	Total # of FTE	OESFdeman_1	OESFdeman_5	OESFdeman_1
164	18	7	2	7
950	130	7	5	6
140	150	5	4	3
65	8	6	4	5
230	140	6	6	6
2500	700	6	5	6
200	200	7	7	7
12000	2338	7	4	7
350	100	5	6	5
48	15	5	2	4
45	6	6	4	7
130	21	7	6	7
14100	2500	5	5	7
1000	150	4	4	5
40	10	6	7	7
900	500	6	6	6
1200	130	7	6	7
45	8	6	5	5
60	0	5	2	6
42	0	6	5	6
12	1	5	7	7
23	4	5	6	5
24	3	7	7	7
63	19	5	5	3

40	4	6	6	6
17	0	5	6	7
300	48	7	7	7
42	36	5	7	5
25	10	6	3	5
50	16	2	3	2
75	25	5	6	6
25	0	6	6	6
75	55	6		5
750	100	6	6	6
6000	4000	6	5	6
7000	1500	6	6	6
900	100	4	4	6
120	100	6	6	6

61	62	63	64	65
OESFdeman_3	OESFdeman_2	OESFdeman_6	OESFdeman_10	OESFdeman_9
6	6	5	5	3
6	5	6	2	3
4	3	3	4	3
4	6	5	4	3
6	7	6	2	3
4	4	4	4	4
5	5	4	5	1
4	6	3	3	3
3	3	6	5	5
4	3	6	2	2
6	6	5	6	5
6	7	5	4	4
7	2	7	3	3
5	2	3	4	3
4	2	6	3	5
6	6	6	6	6
5	6	7	7	7
3	5	4	6	3
2	3	4	3	4
5	2	7	2	2
6	6	6	5	4
7	2	5	3	3
7	6	7	7	7
4	2	4	6	
7	6	6	6	5
6	5	6	7	7
7	7	6	5	5
7	5	7	3	4
4	5	3	5	5
3	2	3	3	3

5	5	5	4	4
6	6	6	5	6
4	5	5	5	
5	5	6	6	6
6	5	6	3	4
5	5	6	3	3
4	5	4	2	3
5	5	4	6	5

66	67	68	69	70
OESFdeman_8	OESFdeman_7	OESFdeman_11	OESFdeman_12	OESFcomp_1
5	3	4		4
7	5	3	4	5
4	6	3	4	3
4	6	4		4
5	4	2	2	5
5	7	6	4	5
1	1	6	1	5
4	5	6	7	5
5	7	5	5	4
2	6	2	2	7
6	3	5	6	5
5	5	4	3	6
3	7	1	3	4
3	6	2	3	4
	5	5	6	2
6	6	5	6	6
7	7	7	6	7
6	2	6	6	4
5	4	1	2	6
4	1	5	5	7
6	5	3	4	3
4	5	4	7	5
6	7	7	7	7
	7	6	6	
5	7	7	6	6
7	7	5	5	5
5	6	7	7	5
4	5	2	5	5
5	4	6	6	5
3	3	3	3	3
6	6	3	5	4
7	7	6	5	5
5	5	6	5	5
6	6	6	6	5
6	3	6	5	3
5	4	5	3	6

5	5	3	4	5
6	6	4	5	3

66	67	68	69	70
OESFdeman_8	OESFdeman_7	OESFdeman_11	OESFdeman_12	OESFcomp_1
5	3	4		4
7	5	3	4	5
4	6	3	4	3
4	6	4		4
5	4	2	2	5
5	7	6	4	5
1	1	6	1	5
4	5	6	7	5
5	7	5	5	4
2	6	2	2	7
6	3	5	6	5
5	5	4	3	6
3	7	1	3	4
3	6	2	3	4
	5	5	6	2
6	6	5	6	6
7	7	7	6	7
6	2	6	6	4
5	4	1	2	6
4	1	5	5	7
6	5	3	4	3
4	5	4	7	5
6	7	7	7	7
	7	6	6	
5	7	7	6	6
7	7	5	5	5
5	6	7	7	5
4	5	2	5	5
5	4	6	6	5
3	3	3	3	3
6	6	3	5	4
7	7	6	5	5
5	5	6	5	5
6	6	6	6	5
6	3	6	5	3
5	4	5	3	6
5	5	3	4	5
6	6	4	5	3

76	77	78	79	80

OESFcomp_10	OESFcomp_9	OESFcomp_8	OESFcomp_7	OESFcomp_11
5	5	2	4	4
4	3	3	3	4
4	5	4	4	4
6	4		4	6
5	5	3	3	4
2	5	2	2	1
6	5	4	4	5
3	3	4	6	3
5	4	3	5	5
6	2		2	6
5	3	2	4	4
5	6	5	2	4
6	4	4	6	6
3	2	4	2	3
3	2	5	5	5
5	5	7	6	5
6	7	7	7	6
4	4	4	5	3
4	2	5	6	3
4	2	7	6	4
5	5	3		5
4	3	5	5	5
7	6	7	7	7
2			4	4
6	6	6	6	6
3	4	6	6	3
5	6	5	5	5
4	6	2	3	4
5	2	4	5	5
3	3	4	3	3
5	5	4	4	5
6	6	2		7
3	3	5	4	4
5	5	6	5	6
3	5	3	3	3
4	5	5	4	4
5	5	2	3	5
5	5	4	4	4

81	82	83	84	85
OESFcomp_12	OESFspeed_1	OESFspeed_5	OESFspeed_4	OESFspeed_3
5	5	4	6	5
5	3			5
3	3	3	5	5
4	4	4	5	4
5	6	4	3	5

5	4	4	3	3
6	5	4	3	4
6	2	3	3	3
6	3	5	5	4
6	6	4	5	6
6	2	4	3	3
3	6	6	5	6
6	3	2	2	2
5	1	1	1	2
6	1			2
5	7	6	6	6
7	6	4	4	5
5	3	2	4	3
6	3	3	3	3
5	2	3	3	2
3	3	3	3	2
5	2	2	2	5
7	7	6	6	6
5		2	2	2
6	2	4	5	3
3	4	6	7	7
5	7	4	6	6
5	5	5	5	5
6	4	3	5	3
3	3	3	3	3
4	5	6	6	6
5	5	5	5	5
4	4	5	6	6
5	5	5	5	4
6	5	4	4	4
4	4	3	4	5
5	3	2	2	2
6	5	5	5	6

86	87	88	89	90
OESFspeed_2	OESFspeed_6	OESFspeec_10	OESFspeed_9	OESFspeed_8
5	5	2		
5	3			
4	4	4	4	4
5	5	4	3	5
4	6	4	3	3
4	4	4	3	4
4	4		3	5
4	4	2	2	5
3	5	4	4	5
6	6	6	6	6
3	3	3	3	3

6	5	5	6	5
3	5	6	5	3
1	2	2	4	2
	4	4		
6	4	6	6	6
6	6	6	6	4
2	2	2	3	4
3	3	4	4	5
2	2	2	2	2
5	5	3	3	3
2	2			5
7	6	4	4	4
1	2		5	6
4	4	3	3	3
5	5	5	5	6
	5	5	5	6
4	5	6	6	6
3	5	5	4	4
4	3	4	4	3
5	6	5	5	5
5	7	2	2	6
5	4			5
5	6	4	4	6
3	2			2
4	3	5	4	4
2	1	2	1	3
4	5	5	4	5

91	92	93	94	95
OESFspeed_7	OESFspeed_6	OESFspeec_12	OESFprod_1	OESFprod_5
6	6		5	3
	5	5		3
5	3	4	6	5
3	3	3	4	3
4	3	5	5	3
4	4	3	4	3
5	6	5	5	6
4	2	2	2	2
4	3	4	4	3
5	6	6	5	5
5			3	2
4	5	5	4	
5	6	6	2	3
3	1	2	1	2
			3	3
6	7	6	4	4
6	6	6	6	4

3	2	3	5	4
5	3	3	3	6
3	2	2	4	6
3	3	3		
			5	3
5	4	4	4	3
2	6			3
4	5	6	2	4
5			7	6
6	5	5	7	2
5	5	5	4	4
5	5	5	3	3
3	4	4	5	4
6	4	5	5	5
5	5		3	5
5			5	4
5	4	4	4	4
3			3	3
4	4	5	4	3
2	2	2	4	2
5	4	5	4	3

96	97	98	99	100
OESFprod_4	OESFprod_3	OESFprod_2	OESFprod_5	OESFprod_10
3	6	3	5	4
2	4	5	5	4
4	4	5	4	3
5	4	5	3	5
5	6	6	4	5
5	6	5	5	6
	6	5	5	4
2	6	2	4	2
		3	5	4
5	5	5	3	3
5	5	4	4	3
6	6	5	6	3
1	4	4	5	4
5	3	1	2	2
		2	3	
6	5	5	6	6
3	5	4	5	6
4	4	3	4	4
2	4	3	4	5
7	7	7	4	6
6	6	6	3	4
6	4	3	5	6

4	5		3	
6	3	7	4	6
5	6	7	5	6
7	4	4	5	6
4	5	6	5	5
4	3	5	3	5
5	4	4	4	4
5	5	5	5	5
4	7	6	7	2
5	5	3	3	5
2	4	4	4	4
5	5	3	5	3
5	4	4	4	5
2	2	2	5	3
3	4	3	3	3

101	102	103	104	105
OESFprod_9	OESFprod_8	OESFprod_7	OESFprocflex_1	OESFprocflex_5
3	4	5	5	2
4	3	4	5	4
4	3	4	4	4
5	4	4	4	3
5	2	4	5	4
5	4	4	5	6
4	5	5	6	
2	2	4	4	3
5	5	5	4	6
1	1	3	5	6
3	3	4	3	6
3	5	5	5	3
5	4	4	2	3
2	1	2	3	5
4	5	4	5	
5	4	6	5	5
3	5	4	5	5
4	4	5	5	5
3	4	4	4	5
5	3	6	4	6
			4	5
5	4		5	5
4	5	5	5	6
	4	5	2	7
7	5	6	5	6
5	3	5	5	6
5	3	6	5	5
5	3	5	5	6
4	3	3	4	4

4	4	4	4	4
5	5	5	5	6
2	5	5		2
5	4	4	5	5
4	4	4	4	4
4	5	2	4	5
4	4	4	4	5
3	4	3	5	7
3	3	4	4	6

106	107	108	109	110
OESFprocflex_4	OESFprocflex_3	OESFprocflex_2	OESFprocflex_6	OESFprocflex_10
6	3	5	5	4
4	5	5	4	
3	5	3	2	4
5	3	5	5	4
5	6	5	6	3
6	6	5	5	6
6		6	5	
3	6	3	2	6
6	6	5	5	5
6	6	6	6	2
6	4	3	6	6
3	4	5	2	4
2	4	2	4	5
3	5	3	5	1
4		4	5	
3	3	6	4	6
6	7	6	4	4
3	5	5	5	3
4	4	4	5	3
6	5	3	5	5
	5	5	5	4
	5	5	5	
5	6	5	6	5
3	5	3	6	7
6	5	4	6	6
6	7	5	6	6
6	5	7	5	6
5	5	5	6	6
3	5	3	5	4
4	4	4	4	4
6	6	5	6	6
3	6		6	4
5	4	5	5	4
4	4	4	4	4
5	5	4	5	

5	5	5	5	4
5	6	5	6	5
2	3	6	6	5

111	1'2	113	1'4	115
OESFprocflex_9	OESFprocflex_8	OESFprocflex_7	OESFprocflex_11	OESFprocflex_12
∠	5	4	5	4
∠	3	5		5
	4	4	4	5
∠	5	3	6	6
∠	5	6	4	3
6	6	6	4	5
	5	6	5	4
6	2	2	3	5
6	5	5	6	7
2	3	5	4	5
	4	4	5	6
∠	5	5	5	5
	4	5	3	3
1	2	2	2	4
		5	6	6
6	6	4	6	6
∠	5	5	5	5
3	4	5	4	4
∠	4	4	5	4
∠	2	2	3	4
∠	4	4	4	4
	5	5	5	5
5	5	5	4	6
2		6	5	5
6	6	6	6	6
6	6	6	5	5
6	6	5	6	6
6	6	5	4	5
3	4		5	5
∠	4	4	4	4
6	6	6	6	6
∠	4	3	3	6
	5	5	3	4
∠	4	4	4	6
	5	5	3	3
∠	4	4	4	4
5	5	5	7	6
5	4	5	5	5

116	134	135	136	137	138
Proces	NPDrole_3_1	NPDrole_2_1	NPDrole_2_2	NPDrole_1_1	NPDrole_3_2
5	yes	yes	4	yes	5
5	yes	yes	5	yes	5
5	yes	yes	4	yes	4
1	yes	yes	5	yes	4
2	yes	yes	2	yes	6
3	yes	yes	5	yes	5
4	yes	yes	1	no	6
1			1		5
4	yes	yes	6	yes	6
2	yes	yes	5	yes	5
3	yes	yes	4	yes	2
4	yes	yes	5	no	6
4	yes	yes	6		6
1	yes	yes	3	yes	4
6	yes	no		yes	6
3	yes	yes	5	no	4
6	yes	yes	5	yes	5
2	yes	yes	2	yes	5
5	yes	yes	3	yes	5
6	yes	yes	5	yes	6
2	yes	no		yes	5
5	yes	yes	5	yes	6
2	yes	yes	6	yes	6
4	yes	yes	5	yes	4
3	yes	no		yes	5
3	yes	yes		yes	
6	yes	yes	4	yes	5
6	yes	yes	2	yes	6
1	yes	yes	5	yes	5
3	yes	no		yes	3
2	yes	yes	2	yes	6
2	yes	no		yes	5
4	no	yes	4	yes	
1	yes	yes	6	yes	6
4	yes	yes	3	yes	5
4	yes	yes	5	yes	6
5	yes	yes	4	yes	6
1	yes	yes	5	no	4

139	140	141	142	143
NPDrole_1_2	NPDrole_5_1	NPDrole_5_2	NPDrole_4_1	NPDrole_4_2
5	yes	5	no	
4	yes	4	yes	5

5	no	4	no	4
4	yes	4	no	3
3		5		3
5		4		3
	yes	6	no	
1		4		5
6	yes	6	yes	6
6	yes	3	yes	2
5	no		no	
	yes	5	yes	5
6	yes	6	yes	6
1	no		no	
5	no		no	
	yes	6	yes	4
5	yes	5	yes	4
4	no		no	
5	yes	3	yes	4
2	yes	4	yes	6
5	no		yes	4
5	no		no	
6	no		no	
6	yes	6	yes	6
5	no		yes	4
	yes		yes	
5	yes	5	yes	4
2	yes		no	
5	yes	5	yes	5
3	yes	3	yes	3
2	yes	6	yes	6
3	yes	5	yes	5
4	yes	4	yes	4
6	yes	4	yes	4
2	yes	3	no	
3	yes	6	yes	3
1	yes	6	no	
3	no	2	no	2

182	183	186	187	188
NPDstruct_1	NPDstruct_4	NPDclima_1	NPDclima_5	NPDclima_4
Project teams	C	5	4	6
Matrix management	D	5	6	4
Matrix management	B	5	4	3
Matrix management	A	5	2	2
Project teams	C	5	5	5
Project teams	D	4	3	2
Matrix management	C	7	1	1
Project teams	B	4	6	3

Project teams	C	3	2	4
Departments	A	6	6	6
Self-managed work teams	A	4	6	6
Self-managed work teams	C	6	5	5
Project teams	C	6	6	4
Departments	A	3	4	2
Self-managed work teams	D	7	5	5
Project teams	A	5	6	5
Self-managed work teams	D	6	6	6
Project teams	B	6	6	4
Project teams	B	6	2	4
	C	5	4	4
Other	A	6	6	5
Self-managed work teams	B	5	4	6
Project teams	A	6	7	7
Departments	D	6	4	3
Project teams	D	4	3	5
Other	0	2	5	6
Project teams	C	6	6	5
Project teams	C	5	4	4
Matrix management	C	4	3	4
Project teams	A	5	5	4
Project teams	C	6	4	5
Project teams	B	6	6	6
Matrix management	B	6	6	4
Departments	A	4	6	6
Matrix management	B	6	5	3
Departments	B	6	3	3
Matrix management	B	6	3	5
Departments	A	5	5	6

189	190	191	192	193	194
NPDclima_3	NPDclima_2	NPDclima_5	NPDclima_9	NPDclima_8	NPDclima_7
5	6	3	4	5	4
6	3	2	6	6	4
3	5	5	2	5	4
5	3	2	2	5	3
6	6	2	3	4	4
2	3	3	2	3	3
6	6	2	2	4	3
6	6	2	2	5	3
6	6	1	6	5	6
6	6	2	5	6	6

5	6	3	3	5	3
6	5	4	3	5	5
6	5	2	6	6	5
4	5	3	6	2	5
6	6	3	5	6	5
6	5	2	4	5	6
7	6	2	5	6	6
5	5	3	5	5	4
4	4	6	5	4	4
3	5	5	1	3	2
6	6	2	3	6	5
6	6	3	3	3	5
7	5	1	7	7	7
6	5	3	3	5	5
5	4	2	2	3	6
5	6	3	5	6	3
5	5	3	4	5	6
4	5	3	5	6	5
5	6	2	4	6	6
5	5	3	3	4	4
6	6	4	6	6	5
5	6	4	6	6	6
6	4	3	4	3	3
6	4	1	5	6	6
5	3	2	3	6	5
6	4	2	5	6	5
5	'	6	2	7	5
6	6	2	5	6	6

Appendix 5

The total scores for climate, structure and roles and the devide in above or below average per dimension

	Total score Climate	Above or below average	Total score structure	Above or below average	Total score Roles	Above or below average
Average score per dimension		4,894737		2,526316		1
Company #1	3	0	4	1	2	1
Company #2	5	1	4	1	1	1
Company #3	1	0	3	1	0	0
Company #4	1	0	3	1	0	0
Company #5	5	1	2	0	2	1
Company #6	0	0	4	1	2	1
Company #7	4	0	2	0	1	1
Company #8	4	0	2	0	1	1
Company #9	5	1	4	1	2	1
Company #10	9	1	3	0	0	0
Company #11	3	0	2	0	1	1
Company #12	6	1	3	1	2	1
Company #13	8	1	4	1	2	1
Company #14	3	0	0	0	0	0
Company #15	8	1	2	0	2	1
Company #16	7	1	2	0	1	1
Company #17	9	1	4	1	2	1
Company #18	4	0	2	0	1	1
Company #19	2	0	2	0	1	1
Company #20	1	0	3	1	1	1
Company #21	8	1	2	0	0	0
Company #22	4	0	3	0	1	1
Company #23	9	1	3	0	1	1
Company #24	4	0	3	1	1	1
Company #25	3	0	2	0	2	1
Company #26	5	1	0	0	0	0
Company #27	6	1	4	1	2	1
Company #28	4	0	1	0	2	1
Company #29	5	1	4	1	1	1
Company #30	2	0	0	0	1	1
Company #31	7	1	2	0	2	1
Company #32	7	1	2	0	1	1
Company #33	4	0	3	1	0	0
Company #34	7	1	4	1	0	0
Company #35	5	1	1	0	0	0
Company #36	6	1	3	1	0	0
Company #37	4	0	3	0	0	0
Company #38	8	1	1	0	0	0

Appendix 6

All performance scores

	fit with firm competence score above or below average per indicator						
Average score per dimension	4,810811	4,868421	4.921053	4.111111	4.194444	5.105263	4.5
Company #1	0	1	1	0	1	1	1
Company #2	1	1	1	1	1	0	0
Company #3	0	0	0	1	1	0	0
Company #4	0	0	0	0	1	0	1
Company #5	1	1	1	0	1	1	1
Company #6	1	0	0	0	1	0	0
Company #7	1	1	1	0	0	1	1
Company #8	1	0	0	0	1	0	0
Company #9	0	1	1	0	0	1	1
Company #10	1	0	0	1	1	0	1
Company #11	1	0	0	1	0	0	1
Company #12	1	1	1	1	1	1	1
Company #13	0	1	1	0	0	1	1
Company #14	0	0	1	0	0	0	0
Company #15	0	0	0	0	0	0	0
Company #16	1	1	1	0	0	1	1
Company #17	1	1	1	1	1	1	1
Company #18	0	0	0	0	0	0	0
Company #19	1	1	1	0	0	0	0
Company #20	1	0	0	1	1	0	0
Company #21	0	0	1	0	1	0	1
Company #22	1	1	0	1	0	0	0
Company #23	1	1	1	0	0	1	1
Company #24	0	0	0	0	0	0	0
Company #25	1	1	1	1	1	1	1
Company #26	1	0	1	1	1	1	0
Company #27	1	1	1	1	1	1	1
Company #28	1	1	1	0	0	1	0
Company #29	1	0	1	1	0	0	1
Company #30	0	0	0	0	0	0	0
Company #31	0	1	1	0	0	1	1
Company #32	1	1	1	1	0	1	1
Company #33	1	0	0	1	1	0	0
Company #34	1	1	1	0	0	1	1
Company #35	0	1	1	0	0	1	0
Company #36	1	1	0	1	1	0	0
Company #37	1	0	1	0	0	0	1
Company #38	0	1	1	0	0	1	1

4,27027	4.228571	4.361111	4,473684	5,052632	Total score Performance	Above or below average 5,842105
1	0	0	0	0	6	1
0	0	0	0	0	5	0
1	0	0	0	0	3	0
0	0	0	1	0	3	0
1	0	0	0	0	7	1
1	0	0	0	0	3	0
1	0	0	1	1	8	1
0	0	1	0	1	4	0
0	0	1	1	1	7	1
0	0	0	1	1	6	1
0	0	0	0	1	4	0
1	1	0	0	0	9	1
0	0	1	1	1	7	1
0	0	0	0	0	1	0
0	1	1	1	1	4	0
1	1	1	1	0	9	1
1	1	1	1	1	12	1
0	0	1	0	0	1	0
0	1	1	0	1	6	1
0	1	1	0	0	5	0
1	0	0	1	0	5	0
0	1	1	1	0	6	1
1	1	1	1	1	10	1
0	0	0	0	0	0	0
1	1	1	1	1	12	1
0	1	1	0	0	7	1
1	1	1	1	0	11	1
1	0	0	0	0	5	0
0	0	1	1	1	7	1
0	0	0	0	0	0	0
1	0	0	1	0	6	1
1	0	0	1	0	8	1
0	1	0	0	0	4	0
1	1	1	1	0	9	1
1	0	0	0	1	5	0
1	1	0	0	0	6	1
1	0	0	1	0	5	0
1	0	0	0	1	6	1

Appendix 7

Average scores for each climate factor as given by the companies employees

	Company #15 Employee #1	Company #15 Employee #2	Company #15 Employee #3	Company #15 Employee #4	Company #15 Employee #5	Company #15 Emp oyee #6
Involvement	5.57	4.33	6.17	5.00	6.50	7.00
Freedom	6.00	5.33	4.50	5.67	5.83	7.00
Openness	5.67	4.50	4.83	3.83	6.33	7.00
idea time	5.17	5.67	4.50	5.50	5.33	7.00
pleasantry	5.83	5.17	5.67	4.57	6.17	6.00
conflict	1.57	3.43	3.00	2.14	2.29	2.29
idea support	5.33	5.83	5.83	4.83	5.50	5.50
debates	6.00	5.43	5.71	4.86	5.57	7.00
risk taking	4.33	3.67	4.83	4.50	4.67	4.00

	Company #15 Employee #7	Company #15 Employee #8	Company #15 Employee #9	Employees average	Company #15 managers score
Involvement	5.50	2.67	5.33	5.94	7
Freedom	6.00	5.50	5.67	5.72	6
Openness	4.83	4.50	5.00	5.36	6
idea time	5.50	2.50	5.33	5.39	5
pleasantry	5.50	4.83	6.17	5.58	5
conflict	2.57	3.29	2.71	2.45	3
idea support	5.17	3.67	5.67	5.97	5
debates	5.43		5.29	5.66	6
risk taking	5.33		5.00	4.54	5

	Company #10 Employee #1	Company #10 Employee #2	Company #10 Employee #3	Employees average	Company #10 managers score
Involvement	4.80	5.20	6.33	5.67	6
Freedom	5.00	4.33	6.17	5.25	6
Openness	5.20	5.00	6.17	5.43	6
idea time	5.83	4.83	5.17	5.62	6
pleasantry	5.50	4.50	4.83	5.92	6
conflict	3.86	2.43	2.00	2.54	2
idea support	5.33	6.50	5.67	6.33	6
debates	5.83	5.00	5.43	5.53	6
risk taking	5.10	5.70	4.83	5.28	5