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On Causes and Outcomes: The most Important Differences between Innovative and Non-Innovative Companies

An Empirical Analysis on SMEs in the Dutch Food Sector

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Abstract

Some companies are very innovative, facing no trouble responding to new trends. Other companies heavily struggle with innovation. This thesis develops an empirical analysis of the most important differences between innovative and non-innovative companies. We gathered data about the most important determinants of innovation by distributing a questionnaire among company owners in the Dutch food sector. The most important differences between innovative and non-innovative companies are: the presence of financial resources and the degree of cooperation. Furthermore the degree of intrinsic motivation and the composition of brainstorm sessions also have significant influence on the innovativeness of companies.

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Acknowledgements

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1. Introduction

One of the most important general objectives for each company, regardless of sector, type or nationality is being innovative. It is also one of the hardest things, as it is very difficult to forecast new trends and, at the same time anticipating your competitors. Remaining competitive requires constant innovation.

The innovation process is often seen as a process with certain short-term costs and uncertain long-term benefits, comparable with a risky investment. Many companies struggle with the question how to implement innovation in their organizations such that it becomes a controlled process with a controllable outcome.

At lot of research has been done on innovation. There is no doubt that creativity is an important determinant of innovation, but how this relation between creativity and innovation exactly works and how companies can anticipate to this is still not clear.

This relationship between creativity and innovation has been analyzed for many years. The ability to produce new products and improve existing processes in quick succession is critical in high velocity environments (Brown and Eisenhardt, 1997). Companies that fail to innovate face a grim future. To illustrate the importance of innovation, recent figures have been released by the UK Treasury stating that the top 100 innovating companies in the world gain 75% of their revenue from products or services that did not exist 5 years ago(Cox,2005).

It seems like innovation and creativity in the workplace, during the years have become increasingly important determinants in the success of organizations. For this reason it is paradoxical that the process of idea generation (creativity) and implementation (innovation) has become a source of distinct competitive advantage (Anderson, De Dreu and Nijstand, 2004; West, 2002a; Zhou and Shalley, 2003)

Creativity has often been viewed as a necessary antecedent of innovation (Gibson, 2008), which is the most important determinant of the organizational ability to maintain competitive. This, and the lack of a convincing empirical perspective, is presumably the main reasons for the exponential growth of academic literature on these topics (Drazin and Schoonhoven, 1996).

This thesis contains an empirical research on creativity and innovation among Small Medium Sized Enterprises in the Dutch food sector.

The Dutch food sector is highly competitive and part of the top sector policy of the Dutch government. This policy implies additional investments in innovative purposes by the

government. In addition the public and private sector extensively work together on Resource & Development projects. For those reasons it is an interesting sector to analyze.

By means of a questionnaire with a various number of questions related to innovation and creativity we aimed at defining differences (based on empirical research) between innovative and non-innovative companies.

With the help of a literature review we identify important differences between innovative and non-innovative companies indicated by the existing academic literature. On the basis of these differences we define six hypotheses divided among three different subjects; task motivation, resources and cooperation.

Research Question:

What are the main differences between innovative and non-innovative companies in the Dutch food sector?

These differences can be seen as success factors for innovation and therefore are valuable for companies which struggle with innovation. We test the hypotheses with the analysis based on the questions in the questionnaire and subsequently with three depth-interviews at companies present in our sample.

It will appear that most important differences between innovative and non-innovative companies in the food sector are a specific form of task motivation, the participation of companies in partnerships and the availability of financial resources.

We emphasize that there could be more crucial differences between innovative and non-innovative companies. It is well possible that certain differences are only present in certain sectors. Nonetheless the latter differences are the most important ones in our sector of interest, the Dutch food sector.

This thesis is not a manual with which one can change an organization from non-innovative to innovative. It identifies the differences between innovative and non-innovative companies in one sector. However it does provide some important insights in the question which factors in general have influence on the successfulness of innovation in companies.

The structure of the thesis is as follows. Section two provides an overview of the relevant earlier work on the resource curse; this entails also the theoretical foundations underlying the hypotheses. Section three gives insight in the Dutch food sector, improving the understanding and also the choice for this sector. Section four explains the empirical strategy

and gives justifications for certain choices made during the research process. Section five highlights the descriptive statistics, and explicates in this way the used variables and regressions. Section six presents the results of the regression equations. Section seven discusses the qualitative component and highlights three interesting companies in our sample. Section eight concludes and section nice provides limitations and directions for further research.

2. Literature Review

2.1 In Perspective: Creativity and Innovation

The purpose of this chapter is to give a broad but structured overview of the existing academic literature on creativity and innovation. In a sense this review is comprehensive and preparing for the remainder of this research.

The topic of creativity has been studied from different perspectives in the literature which varied in level of analysis. Several scholars have made distinctions between the individual, the work team, organizational and multilevel approaches (Anderson, Potocnik and Zhou, 2014). For sake of simplicity this review is structured according to a theory which discusses two of the four approaches. We distinguish literature focusing on an individual approach to creativity and innovation and literature which took an organizational approach. These approaches enable us to provide a structured and complete overview of the relevant literature.

The two approaches are mostly studied independently of each other, although they are actually narrowly connected. We address both perspectives on creativity and innovation in organizations.

Why reviewing both creativity and innovation? Discussing one of the two is probably enough to fill your entire bookcase. The reason is awfully simple. In our contemporary economy two things concerning the complete process of innovation are crucial: the development of new ideas (creativity) and the commercialization of these new ideas (innovation). Additionally, it is comprehensive to provide a complete view on factors influencing organizational innovativeness. At the same time we will put emphasis on some factors and explain these more extensively. In this way you can place extensively treated factors in a broader context and understanding.

Creativity is the production of novel and useful ideas. Innovation is the successful implementation of these creative ideas within an organization (Amabile, 1996). All innovations start with creative ideas. For the latter reason this study emphasizes organizational factors influencing creativity, without neglecting factors influencing innovation.

This vision is supported by Robert G. Cooper who developed the stage gate model, which is a business model for the implementation of innovative ideas. This stage gate model

is a practical, operational road map for commercializing new ideas. Figure 1 also clarifies visually why discussing creativity and innovation separately is similar to telling an incomplete story. The two are part of the same process, are connected and strongly influence each other.

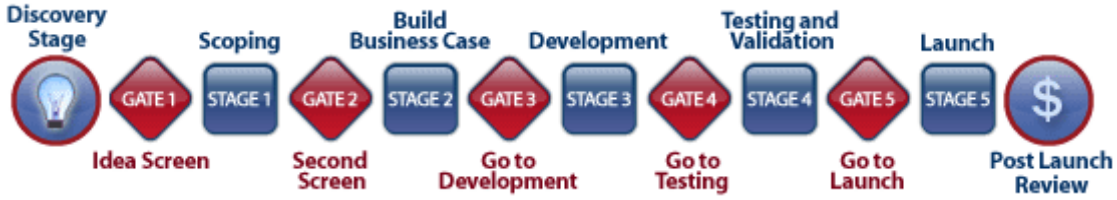

Figure 1: The Stage-Gate model

2.2 The Componential model of Organizational Creativity and Innovation

One of the few models which connects the organizational approach and the individual approach orderly is Amabile's (1999) Componential Model of Organizational Creativity and Innovation..

For the degree of creativity in an organization, this model formulates three important characteristics that employees should have: domain-relevant knowledge, creativity-relevant skills, and motivation. Subsequently the model describes three important organizational characteristics which influence individual creativity through the aforementioned individual characteristics. These crucial characteristics for the degree of organizational innovativeness include: organizational motivation to innovate, resources and management practices. The main idea of Amabile's theory is that the individual components which determine the degree of creativity among employees are influenced by the characteristics of the work environment, which determine the degree of innovativeness. Consequently, the creativity 'produced' by individuals in a certain organization serves as a primary source of the degree of innovation in an organization. For the structure of this literature framework we will use the division of Amabile's Componential Model as it provides a clear structure for classifying current literature. In this way it is possible to discuss the large amount of literature on both creativity and innovation.

We have added one additional component to the original model. In our opinion this component, external linkages, is very relevant. Justification for the adding of the External Linkages component can be found in chapter 3.1.

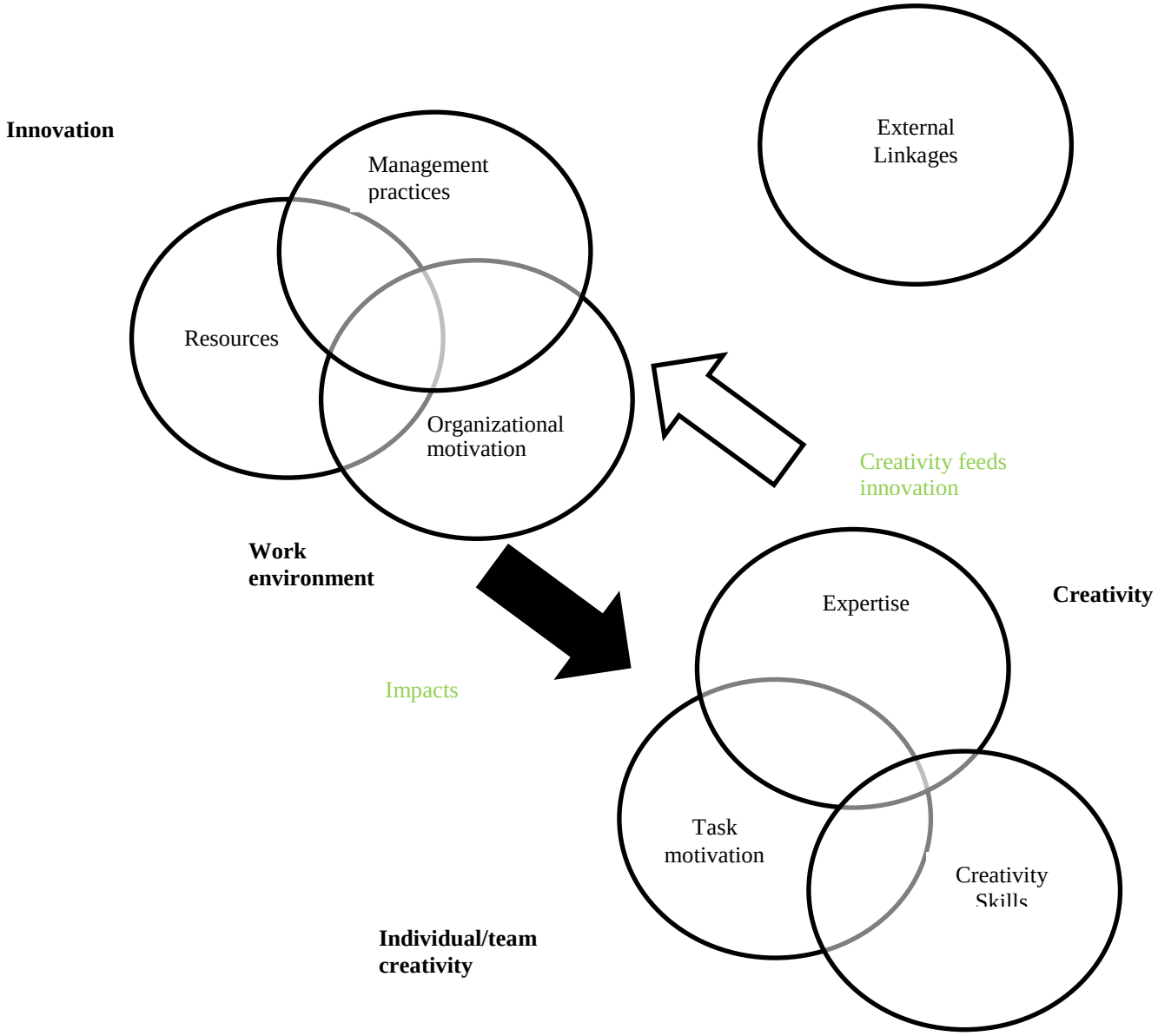

Figure 2: The componential model of organizational creativity and innovation

2.3 The Components of Individual Creativity

2.3.1Domain Relevant Knowledge (expertise)

An expert is someone who has the capability to acquire, store and utilize all the explicit knowledge (facts, major ideas, principles and formulae) in a certain domain(Gardner,2000). According to Amabile (1997), expertise (domain-relevant knowledge) can be seen as the set of cognitive pathways that may be followed for solving a given problem or completing a given task. It involves technical knowledge and experience to solve such issues. An increase in this 'domain-relevant knowledge' will positively affect the individual creative performance through a better developed ability to generate and assess potential solutions for complex problems (Campbell, 1960; Munford & Gustafson, 1988; Simonton, 1999).

This finding is supported by Andrews & Smith in 1996. They constructed a study on marketing managers and found that product managers with more knowledge of the marketing environment produced more creative marketing campaigns. Although the definition of a creative marketing campaign is of course subjective.

It is not only the sole individual increase in expertise which affects the level of creativity. This individual increase in expertise potentially gives rise to 'spill-over effects' when this person also has the social skills to transfer his expertise to individuals around him. Walshok(1999) states that institutional mechanisms like dialogue and collaboration affect collective creativity and innovation.

In short, individual expertise is an important determinant for the level of creativity.

2.3.2 Creativity Skills

When a person has expertise in a certain domain, one can be sure that his performance concerning activities in this domain will be acceptable and sufficient at least. Everybody knows those students, always delivering decent work, but never something special and extraordinary.

People will never produce creative/excellent work if their creative thinking skills are not sufficient. (Nystrom, 1993) writes that the essential element of creativity is divergent thinking, which requires flexibility. Creative thinking depends to some extent on personal characteristics like self-discipline, risk-loving, independence, extraversion, tolerance for ambiguity and flexibility (Feldman, 1999 (Ryan & Deci, 2000)). It is the ability to think beyond constructed guidelines and consider different new approaches to complex problems. "You can never solve a problem on the level on which it was created" (Albert Einstein).

2.3.3 Task Motivation

Task motivation is the difference between what a person is capable of, and what he actually will do. The capacities of a person depend on his levels of expertise and creative thinking skills (Amabile, 1997). Eventually, it is however the task motivation which determines whether a person will fully engage in his domain relevant skills and creativity relevant skills.

Motivation can take two forms. Intrinsic motivation, which refers to doing something because it is inherently enjoyable (Ryan and Deci, 2000), and extrinsic motivation which refers to doing something to derive some kind of rewards that are external to the activity itself (Vallerand, 2002).

A traditional 'rational economic approach' to elicit high quality work is to increase extrinsic motivation (rewards). The effects of extrinsic motivation on creativity are not obvious while evidence is mixed and empirical research provides support in both directions. A number of studies report positive effects of rewards on creativity (Eisenberger et al., 1998) and (Eisenberg and Rhoades, 2001). Others show negligible or negative effects, (Frey and Jegen, 2001). Deci, Koestner and Ryan (1999) confirmed that all tangible rewards contingent on task performance do reliably undermine intrinsic motivation. Moreover Deci (1972) concluded that extrinsic rewards can lead to a crowd out effect with respect to intrinsic motivation[1].

With hypothesis 1a we test the latter controversy about the effect of extrinsic motivation empirically and try to shed some light.

Hypothesis 1a: Stimulating creativity through extrinsic motivation has a positive effect on innovative performance of a company

Additionally, we examine what the effect is of different 'reward packages'.

Hypothesis 1b: Different types of extrinsic motivation (rewards) have different effects on innovative performance of a company

Most research has shown theoretically that intrinsically motivated employees are most likely to exhibit high creativity (e.g. Amabile, 1996; Cameron and Pierce, 1996; Ryan and Deci, 1996). The small empirical literature focusses on intrinsic motivation in science by

[1] Extrinsic motivators such as rewards(but also punishments) can undermine intrinsic motivation

showing that it is important for productivity and Resource and Development efforts (Tierney et al., 1999). Given these findings, managers should be interested in increasing this intrinsic motivation. They should create an organizational environment which stimulates intrinsic motivation. One example of this stimulating environment is offering challenging jobs. By providing employees jobs which are demanding, dynamic and contain a lot of responsibility, managers increase the intrinsic motivation of their employees (Oldham and Cummings, 2003). Other important dimensions of this stimulating environment are personal relations, culture and organization structure (Alencar, Bruno Faria, 1997).

As stated earlier the importance of intrinsic motivation is rarely assessed empirically. We will perform a statistical analysis in our sample on hypothesis 1.

Hypothesis 2: Stimulating creativity through intrinsic motivation has a positive effect on innovative performance of a company

When studying figure 3 it becomes obvious that the work environment can have a large impact on creativity by influencing motivation. By implementing certain incentive schemes (Delfgaauw and Dur, 2007), ample training opportunities and making use of creative thinking techniques, both intrinsic and extrinsic motivation can be stimulated. Figure 3 shows that creativity is most likely to occur when people have passion for their jobs, feel stimulated, are highly competent and have the skills to think outside the box.

2.4 A Climate for Creativity

The core theory behind the model depicts that components of the work environment will influence individual creativity (the solid arrow). The components of creativity produced by individuals influence in return the degree of innovation within an organization (Amabile, 1996).

While the organizational environment theoretically has an impact on all components of individual creativity it is important to mention that the effects on task motivation seem to be the most clear and direct ones.

2.4.1 Organizational Motivation to Innovate

The highest levels in the hierarchy of an organization (top management) are the most important in determining the orientation toward innovation. Top management plays a key role in defining a strategy and communicating this strategy and associated attitude to the lower levels of the hierarchy. Factors like challenge, idea support, trust/openness, dynamism, conflicts, risk taking and idea time all play their part in this organizational orientation (Ekvall, 1996).

Employees, who are provided with the freedom and stimulant to develop new ideas, will be more creative. The primary organization-wide support for ideas and information, rewards and recognition for creative work appears to be the mechanism stimulating innovation and creativity. The organizational work environment is further explored in the paragraph on “Management Practices”.

2.4.2 Resources

When thinking of resources for innovative purposes most people directly think of money, materials and the quality of employees available to an organization. However when defining the relevant resources for creativity and innovation, things like quality of training, time, brainstorm sessions, developed systems and processes are also very important (Edquist, 1997). This component covers all elements in an organization which can be helpful for producing activities focused on innovation. It does not require much to realize that these resources of course are necessary for an organization to be innovative.

Brainstorming is a group creativity technique pioneered by Ales Osborn (1953). There exists a wide variety of literature on idea generation, most in the discipline of cognitive psychology. Many studies have been conducted among non-professional engineers and

designers, which keeps the associated outcomes far from real business processes (Pertula and Sipila, 2007. Little empirical work exists on the effect of brainstorm sessions in real industry environments.

The general finding is that group sessions compared to individual brainstorming inhibit productivity (Diehl & Stroebe, 1991; Nijstad & Stroebe, 2006) although this does not clearly tests the usefulness of the tool itself.

With hypothesis 3a we test whether brainstorm sessions are innovation enhancing at all.

Hypothesis 3a: Organizing more brainstorm sessions per year has a positive effect on innovative performance of a company

Research on the effects of group effectiveness has been conducted with respect to various compositions (Haytorn, 1968; Mann, 1959). Jackson May and Whitney concluded that, when looking at performance, the relationship between heterogeneity and performance is complex and not easy to explain. Part of the problem is the following question: heterogeneity with respect to what? The other part is related to the various incomparable contexts in which ideas should be created. An effective cross-functional brainstorm session which has to solve a problem/create an idea which is tangent to many disciplines is probably more effective when employees with different expertise and knowledge participate. Whereas an engineering firm wants to innovate they probably need only members in their sessions which have overlapping specific knowledge and skills.

Hypothesis 3b analyzes how the above works out in our sample.

3b: The composition of employees participating in brainstorm sessions has a positive effect on the effectiveness of those sessions

2.4.3 Management practices

This component includes the management practices in **all** layers of the organization. Some researchers have argued that the relationship between the amount of layers and the degree of innovativeness is negative. Having fewer layers, would therefore result in a more innovative organization. Employees which experience a considerable degree of freedom in their jobs are perceived to be more creative (King and West, 1985; West, 1986). The level of freedom

experienced by employees has also to do with their superiors and the question whether these superiors are willing to delegate authority.

Managers at any level in the hierarchy are essential in the process of innovation. These managers'[2] help to shape/structure the process of innovation are responsible for the communication of new ideas and they co-determine the culture present in an organization (Topalian, 2000; Buijs, 2007). Enthusiastic support, clear planning and feedback, trust (in/from) superiors, culture of continuous improvement and an appropriate hiring and screening process[3] are also very important for the degree of creativity and innovative performance in an organization.

[3] I.a Frey and Benz(2003) on the importance job matching for job satisfaction

2.5 The Missing Component: External Linkages

External Linkages are not included in the original Componential Theory of Amabile. Nevertheless in our opinion this would be a valuable addition, while the model is lacking attention to an organization's environment[4]. This chapter puts more emphasis on this component.

For SME's[5] in particular, it is important to invest in vertical and horizontal linkages with external parties (Rothwell and Dodsgon, 1991). Extensive collaborations contribute to internal resources (2.2.2) and extend the possibilities for product/process improvement or renewal. Investigating companies in seven European countries (Caloghirou, Kastelli and Tsakanikas, 2004) found that openness toward knowledge sharing among companies is important for upgrading innovative performance. A recent research in Italy substantiated that innovation performance is higher for SME's that are proactive in strengthening their relationships with innovative suppliers, users and customers. Furthermore research found evidence that SME's would have better product developments when they improved relationships with laboratories and research institutes (Lasagni,2012).

The organizational landscapes of companies are of course very different. Numbers of competitors, maturity of the market, customers, amount of suppliers etc. are all factors which play a role in this environment. It is not in the scope of this research to asses all these elements separately. In general it should be clear, especially for small companies, that an internal orientation toward creativity and innovation and an external orientation toward cooperation and information sharing is undoubtedly beneficial for the innovation and creativity in an organization

Hypothesis 4: Cooperation has a positive effect on innovative performance of a company

[4] Domain of Industrial Organization
[5] Small Medium Sized Enterprises

3. The Dutch food sector

The Dutch food sector is, after the U.S food sector, the second largest exporter of food products in the world. It generates €48 billion in added value and contributes approximately 10% to the Dutch General domestic product (Rijksoverheid, 2009). It is therefore not surprising that the sector is part of the top sector policy, initialized by the Dutch government in 2011. This policy implies additional investments for innovation, knowledge and creativity in outstanding performance sectors(ING, 2013).

Besides national dynamics, global developments are occurring rapidly. The world population grows; prosperity increases and quality requirements are becoming more severe. At the same time, sustainability is gaining ground as society starts to realize global warming is a serious problem. The food sector therefore seems to have a high potential yield for innovations of any kind regarding the latter problems.

In short, the contemporary challenges force the different actors in the food sector to be competitive, to be innovative and to supply products that satisfy the increased quality standards (Trail & Meulenberg, 2002).

3.1 Structure: Supply Chain Management

The supply chain of the Dutch food sector consists of 4 main components: the primary production, the processing industry, the suppliers and the retail section. The retail section also includes the distribution and catering sections.

The primary production entails commodity gathering organizations which are active in fishery, farming or livestock. The structure of this sector is fragmented and diverse. Cooperation between companies is scare and, as a result of economies of scale, a steadily decline is visible in the total number of companies.

The processing industry in 2010 consisted of approximately 4200 companies (CBS, 2010). As a result of scaling and pressure from the upstream supply chain companies, creation of competitive advantage is more and more shifting from high quality products to low prices. Subsequently R&D investments are under pressure.

Suppliers are the connection between the different links in the supply chain. Logistics and inventory management are precious activities. Added value can be increased by additional investment in process innovation.

Supermarkets are an important part of the retail section. These supermarkets are forcing smaller stores out of business. Competition among supermarkets is heavily and mainly

focused on prices. Through this, supermarkets emphasize low purchase prices with their distributors. This has effect on price development in the whole chain.

In 2011 the food sector was responsible for €70 billion revenue, about a quarter of the total revenue of the entire Dutch industry sector. There exists a large variety of product categories. Most important categories are dairy products, meat products, fruit and vegetables, bread and pastry, confectionary and biscuits, fats and oils, potato products and beverages.

Several large Dutch companies like FrieslandCampina, Unilever and Heineken are active in this sector. Nevertheless 98% of the companies active in the food sector, are SMEs. These enterprises contribute 49% of total sector revenue and generate 62% of total sector employment.

All products reach the consumer, through retail, catering or distribution. The majority is eventually sold through retail channels. Supermarkets are the contact point for consumers with the described supply chain (Rijksoverheid, 2009).

3.2 The Netherlands: an Innovation Area

The Dutch universities and knowledge institutions, specialized in food, are among the best in the world. The R&D intensity of organizations[6] in the Dutch food sector, and especially in the associated processing industry is very high compared to the food sectors of other countries. Only in Denmark the amount of food sector patent requests is relatively higher.

The Dutch food sector belongs internationally to the top and is mainly driven by private R&D investments. With an average R&D intensity of 0.6%, the investments in the Dutch food sector are relatively high, while the European average is 0.24%.

The share of investments made by the Dutch government in knowledge and innovation is high compared to other countries. This is reflected in the quality of the Dutch knowledge institutions[7]. As long as knowledge institutions, companies and the government keep participating jointly in innovation programs and maintain a stable cooperation, the food sector will remain as successful and competitive as it is today (Van Galen et al, 2013).

The vast majority of the Dutch patent requests is from a small number of large food concerns. The effectiveness of these and other patents is low compared to other countries. When an innovation is carried out, it is frequently a product or process innovation and less frequently about social innovation.

[6] Measured by patent requests
[7] Measured in publications

We refer to a product innovation when a new product is introduced and commercialized and to a process innovation when an existing product or process is improved.

Contrary, social innovation is about the non-technological side of innovation whereas innovation is often unfairly associated with solely technological developments. Social innovation is focusing on changes in the way organizations are structured and the type of people active in the organization.

3.3 The Position of SMEs

SMEs heavily contribute to the competitiveness and employment of the Dutch food sector. This contribution could increase when certain barriers, as the deficit of financial resources, and the lack of qualified personnel are overcome.

SMEs engage more often in "hidden R&D", which boils down to the fact that employees in these companies have less budget and are less trained to develop ideas, but they have more space to be creative (Bodeweges and de Jong,2002).

As earlier mentioned, the share of SMEs in the food sector is very large. SMEs mostly do not have formal R&D departments with general innovation projects, but are involved in niche markets. There are numerous of these companies.

Take for example a bakery with 25 employees which is too small for a separate R&D department, but which is certainly engaging in innovation. With small specific changes in the assortment of pastries they try to anticipate changes in their local niche market.

The SMEs in the food sector perform on average better, in the production of new product compared to other sectors (EIM, 2007). There is however still much potential for improvement, based on the earlier mentioned recent problems and developments.
Because SMEs are active in various submarkets with different circumstances[8] it is difficult to come up with one value judgment about the effectiveness of innovations for these companies.

As SMEs often have no budget for specialized R&D employees or a separate R&D department, it is interesting to analyze how these companies manage their innovation process and compose a creative workforce. (Logatcheva et al., 2013).

[8] These markets differ in number of competitors, number of customers and maturity

4. Empirical Design

This chapter describes the design of the research. It clarifies the reasons for certain choices made before, during and after the process of data gathering, construction and processing.

4.1 Data Construction

This section explains the mode of data processing and the structure of the database.

In analogy to several quantitative researches this research used an online questionnaire as the method to collect data.

We use data from 42 Dutch small and medium sized enterprises, active in or connected with the Dutch food sector. The sample period is from 24th of April 2014 to the 24th of May 2014. The data is (as earlier mentioned) collected by means of a questionnaire send to, approximately 1000 potential respondents by email.

To convert the questions into measurable data we use dummies and Likert scales. We do not use all 28 survey questions for this thesis while some are included specifically for the BDO assignment. The relevant questions with associated answers are quantified in an excel file.

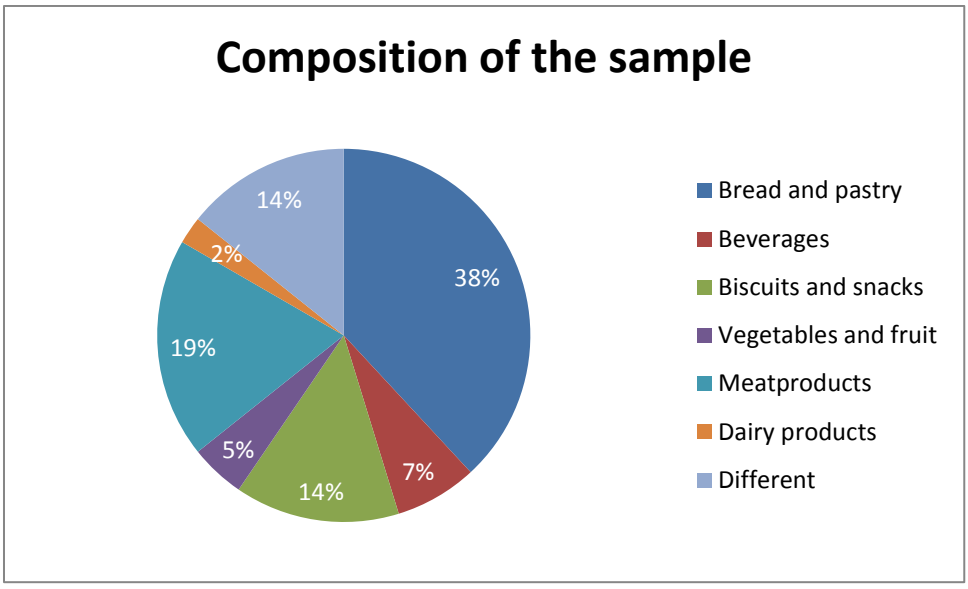

Figure 3: Composition of the sample, classified by subsector

4.2 Empirical Strategy

The internship at BDO enabled us to reach a target group which presumably could not have been reached in any other situation. The (top) management of SME's in the Dutch food sector. A sample size of 42 companies is not much it should be viewed in perspective of the

relevant population. There are approximately 25,000 SME's active in the Dutch food sector. Our sample is approximately 0,002% of the entire population which is in this perspective, not small.

4.2.1 The Target Group

First question that should come to mind: *why choose such a relative 'unreachable' target group?* The answer is simple but extensive.

To generate reasonable results, a reliable and broad view on the organizations of interest is necessary. In an ideal research design we would have access to all kinds of different people from different hierarchy levels in the organization. This would be **the** way to construct a complete multilateral view of an organization. As managers could have a totally different view than regular employees on how innovative and creative their organization is.
However, because of practical reasons (time constraints), we were not able to construct such a complete view. For this reason we chose the target group which could provide the best unilateral view on the organization through a questionnaire, owners of companies.

Regarding the nature of our target group, the pursuit for statistical significance and causality is too ambitious. This thesis is primarily about correlations.

4.2.2 The Questionnaire

The questionnaire consists of 28 questions and is classified among 3 different parts; The Environment, Organization & Culture and Process & Instruments. This distribution is descended from an innovation audit framework which is called the diamond model (Tidd, Bessant and Pavitt.2005[9]). This audit tool originally consists of 5 parts but should be easily accessible to respondents. To enhance clarity and to avoid confusion among respondents, the 5 parts from the original audit tool are pooled into the 3 latter parts.

4.2.3 The Isolation Strategy: A Qualitative Component

The qualitative component is in conjunction with the quantitative component, part of *an isolation strategy.* This isolation strategy entails 2 phases. The first phase is about data construction and analyzing. Afterwards the results are processed and analyzed; this is when the second phase starts. In the second phase we narrowed our view and choose 2-4 organizations which reported interesting results. With the respondents from these

[9] An innovation audit tool uses in practice by many organizations, consisting of 5 different parts: strategy, process, organization, linkages and process

organizations a depth-interview has been conducted to collect additional information about the organizations which remained unclear despite the questionnaire.

4.2.4 The Fundamental Problem of Causal Inference

We acknowledge the presence of **the fundamental problem of causal inference**[10] (Holland, 1986). This problem refers to the fact that it is impossible to observe "a treatment effect" for one organization. An organization cannot appear in the "the treatment" and "control" group at the same time. The latter means that, although we isolate differences between 'innovative' companies and 'not-innovative' companies, we do not measure **causal relationships** but **correlations**. It could be that 'innovative' companies differ from 'not-innovative' companies in many other factors beside the factors important for innovation and creativity. Innovative companies could for example be located in more urban areas and this is what causes the differences in innovativeness instead of the perceived factors.

In our research context, being in the treatment group refers to a company which introduced new or improved products and/or processes the past 2 years. Being in the control group refers a company did not introduce new or improved products and/or processes the past 2 years

For the remainder we assume that our constructed dependent variables are the best indicators of organizational innovativeness.

[10] Most common example of the problem is the difference in health status between persons who went to the hospital and people who did not go to the hospital. Treatment here is hospitalization. As a regular person would review the statistics he would state that people who went to the hospital have a worse health status compared to people who did not go to the hospital. From this he concludes that hospitalization is bad for one's health status. Of course this is not correct, the crucial element here is that people who went to the hospital have a worse health status in the first place. So the treatment group(hospital visitors) and the control group(healthy people) are in nature very different groups. For this reason, it is very difficult to compare these two groups and make appropriate statements about causal relations.

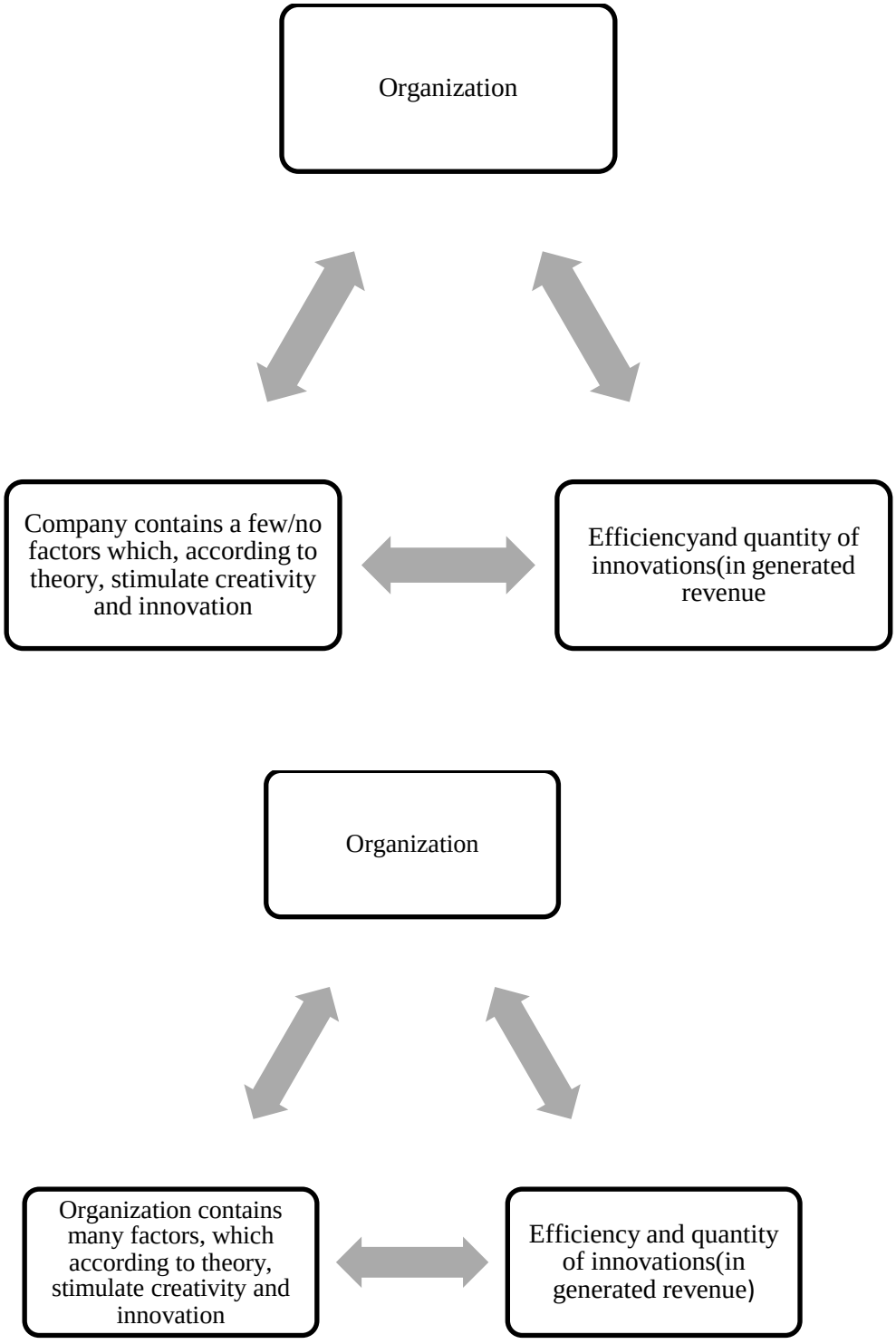

Figure 4: fundamental problem of causal inference: innovative companies

5. Descriptive statistics

By discovering correlations we try to construct comprehensive regressions which should result in complete pragmatic explanations.

5.1 Hypothesis 1a: Stimulating creativity through extrinsic motivation has a positive effect on innovative performance of a company

In the dataset we constructed a variable which measures this stimulation of extrinsic motivation. It is a variable specifying different rewards (0 = no reward, 1-5 indicate different types of rewards). As this variable gives different types of rewards different weighting factors we only can use it to draw figures.
By constructing a dummy (0 = no reward, 1 = reward) we are able to measure the effect of a reward (extrinsic motivation) on the dependent variables.

Our first dependent variable, "product innovation", is a measure of SMEs introduction of new or improved products over the last 2 years. Our second dependent variable, "process innovation", denotes whether SMEs have implemented new or improved processes and/or organizational structures (process innovation). Using 2 different measures enables us to present a multilateral view on innovative performance.

The dependent variables are dichotomous, coded as 1 if SMEs have introduced new/improved products (processes) and as 0 if SMEs have not introduced new products.

In a linear regression with a continuous normally distributed response variable, E[Y] would be the expected value of Y in the population. In this case of binary dichotomous dependent variables, the mean is equal to π. The model becomes a model for the probability of a 'success outcome'. In the analysis we will compare the results of a 'simple' OLS (ordinary least squares) with the results of a binary logistic regression.

Binary logistic regression is used, besides a "simple" OLS for the following reasons:

- The predicted values of π may be outside the interval [0.1].
- The regression assumption of normality of Y is not satisfied

We estimate the probability that the (extrinsic) motivation of employees has a positive effect on the innovativeness of an organization given the values of the explanatory variables;

$\pi = Pr\,(Y = 1\,/X = x\,)$

Instead of fitting the model for π we use the log of the odds[11] as a "success outcome.

The last step entails the addition of our constructed control variables. As specific market circumstances (Sector) and size potentially have a large effect on a company (Size) we include them as general control variables in every regression. Potential vulnerable factors concern resources, culture and the structure of an organization.

To get a first indication of the relationship between the dummy variable "extrinsic motivation" and the two dependent variables "product innovation" and "process innovation" we perform two correlation tests.

Table one shows that the correlation between "extrinsic motivation" and "product innovation" is most convenient with a coefficient of 0,158. The correlation between "extrinsic motivation and "process innovation" is 0.084. The coefficients contain no information about the causality of the relationship. Subsequently, it is important to acknowledge that the latter could potentially be product of reverse causality or omitted variable bias. However it provides insight about the nature and the results only enhance curiosity about the specific nature of this relationship.

Figure 4 images these relations. The first column indicates the relationship between "extrinsic motivation" and "product innovation"; the second column shows the relation between "extrinsic motivation" and "process innovation". For a valid comparison between it is necessary to compare columns one and three and two and four. Figure 4 shows that there is a relative difference, employees who receive a reward more often work in innovative companies. This relationship seems stronger for product innovations which is consistent with our correlation coefficients.

[11] $\text{Log}\,(\frac{\pi}{1-\pi})$

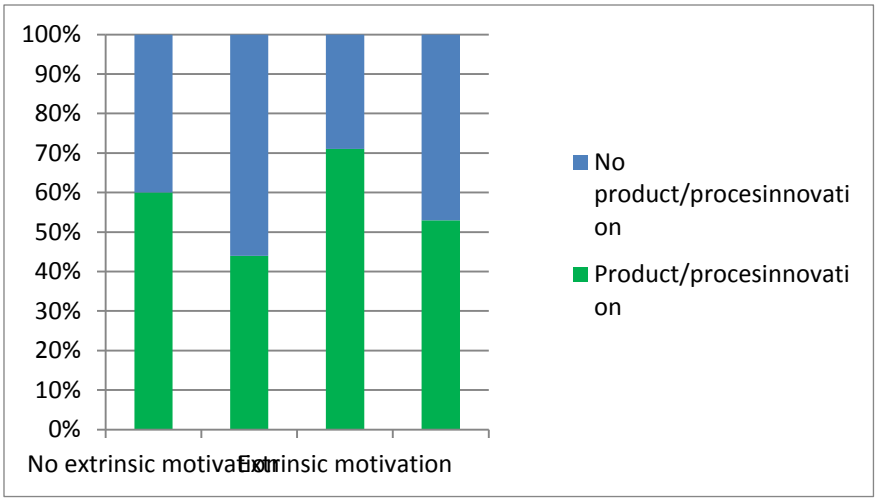

Figure 4: The effect of extrinsic motivation on product/process innovation

5.2 Hypothesis 1b: Different types of extrinsic motivation (rewards) have different effects on innovative performance of a company

For this hypothesis we use a variable of "extrinsic motivation which is quantified in such a way that it provides insight in the effects of motivating employees extrinsically in different ways. Nevertheless this variable has a major disadvantage, the impossibility to include it in a regression because of the earlier mentioned 'weighting factor problem'.

By creating dummies of the different types of rewards we can compare them with the benchmark case: no reward. A drawback of this method stern from omitting much data. For this reason we only construct a dummy for the 'no financial reward' option as this is the only option which has been chosen sufficiently in our sample, for statistical analysis. We will discuss the effect of the other reward options by means of figure*.

We construct a dummy representing a "non-financial reward" (0=no non-financial reward, 1= non-financial reward). Table one illustrates that the "use of non-financial rewards" and "product innovation" is 0,026 and the correlation between the "use of non-financial rewards" and "process innovation" is 0,083.

Figure 5 shows the relationship between the latter variables. It displays a clear difference between the effects of the different types of rewards. It seems that financial and non-financial rewards are resulting in the desired effect.

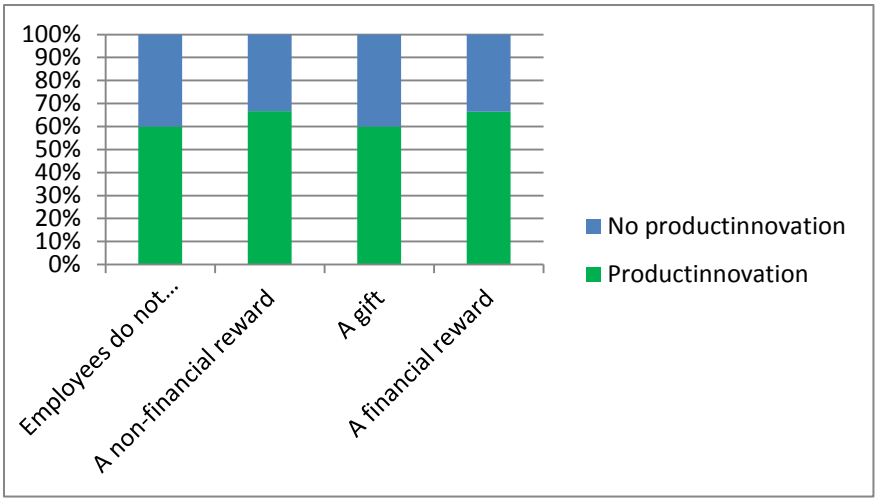

Figure 5: The effect of different types of rewards on product innovation

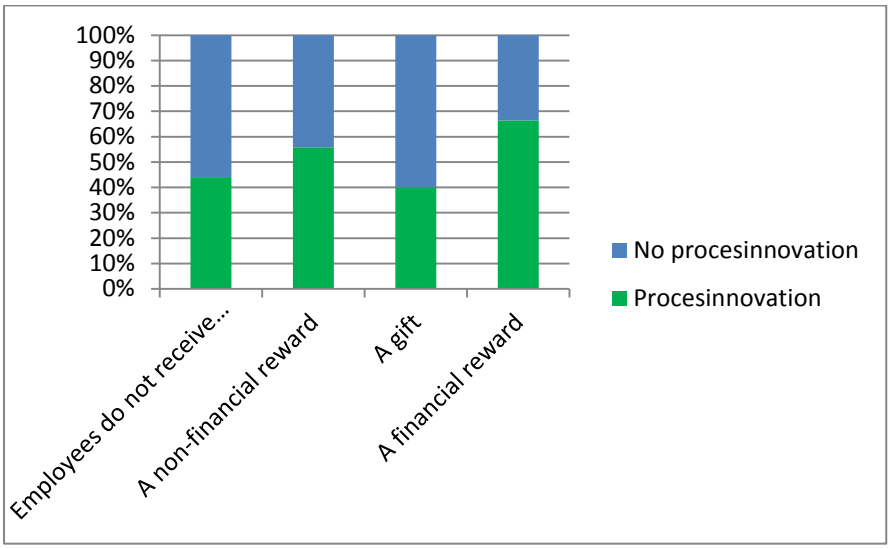

Figure 6: The effect of different types of rewards on process innovation

5.3 Hypothesis 2: Stimulating creativity through intrinsic motivation has a positive effect on innovative performance of a company

Figures seven and eight show the relation between different forms of intrinsic motivation and the dependent variables. We are able to quantify a hard measure, by creating dummies of the different ways of intrinsic motivation.

Brainstorm session and "organizing trips" seem to have an effect on product and process innovation. The other ways of intrinsic motivation do not have any effect.

A dummy measures the effect of a cozy canteen (0=no cozy canteen, 1= a cozy canteen), and a dummy measures the effect of organized trips (0=no organized trips, 1=organized trips). . The effect of brainstorm sessions will be examined in separate hypotheses (3a and 3b).

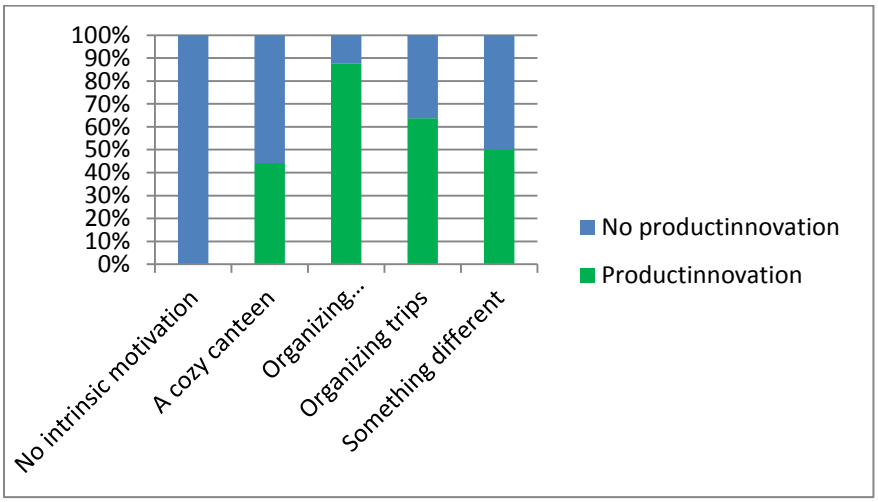

Figure 7: The effect of different types of intrinsic motivation on product innovation

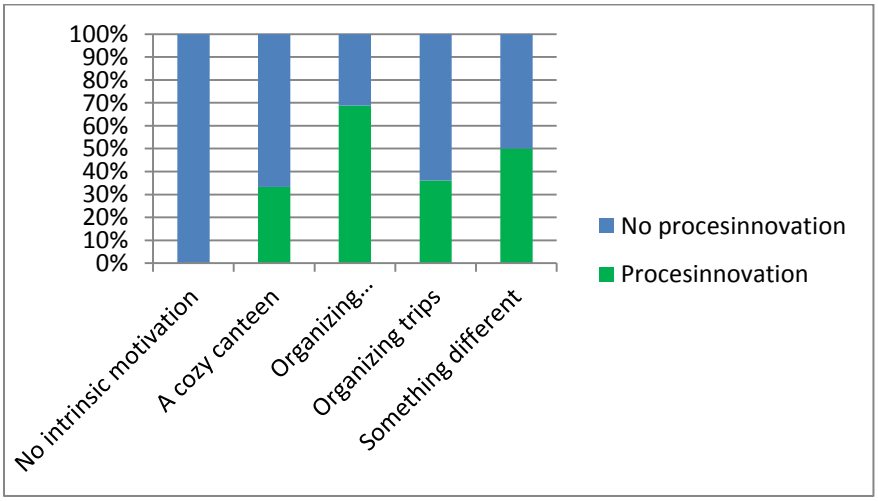

Figure 8: The effect of different types of intrinsic motivation on process innovation

Hypotheses 1 and 2 provide sufficient reason to analyze the effects of brainstorm sessions more extensively.

5.4 Hypothesis 3a: Organizing more brainstorm sessions per year has a positive effect on innovative performance of a company

This first hypothesis about brainstorm sessions analyzes the effect of the number of brainstorm sessions per year on innovative performance. A scale variable indicates the number of completed brainstorm sessions. Our dependent variables are again "product innovation" and "process innovation.

We use the same approach as in hypothesis 1a and construct correlation coefficients for both product and process innovation measures, compare OLS and binary logistic regression and add our general control variable s(the size and sector of the company).

The two associated correlation coefficients are negative, very small and not significant (-0.09 and -0,078). The latter implies no relationship between the number of brainstorm session held per year and innovative performance.

5.5 Hypothesis 3b: The composition of employees engaging in brainstorm sessions influences the effectiveness of these sessions[12]

The second hypothesis concerning brainstorm sessions investigates the effect of diversity in brainstorm sessions on the effectiveness of those sessions. Academic literature designates diversity as one of the crucial factors determining the effectiveness of brainstorm sessions.

The factor diversity is captured in 2 variables. The first variable indicates 'hierarchical diversity', which answers the question whether employees from all layers in the organization are represented in the brainstorm sessions. The second variable represents 'characteristic diversity', which answers the question whether there are employees with various characteristics present in the brainstorm sessions.

Furthermore we use a new dependent variable. A dummy, which represents the effectiveness of a brainstorm session in terms of derived initiatives in those sessions . We use this dependent variable, as it is our belief that it provides a more proper measure of the

[12] In terms of initiatives derived from those sessions.

effectiveness of brainstorm sessions in this case. We are not interested in effectiveness in terms of commercialized ideas (as the relationship between this diversity management in brainstorm sessions is far-fetched) but rather in derived new ideas. Brainstorm session's primary function to create new ideas and not to commercialize them.

As consistency implies clarity, we start by calculating the correlation coefficients. The correlation between hierarchical diversity and brainstorm efficiency is 0,258 and significant. With a very significant correlation coefficient of 0.482 it is obvious that there is a very positive relationship between characteristic diversity and brainstorm efficiency.

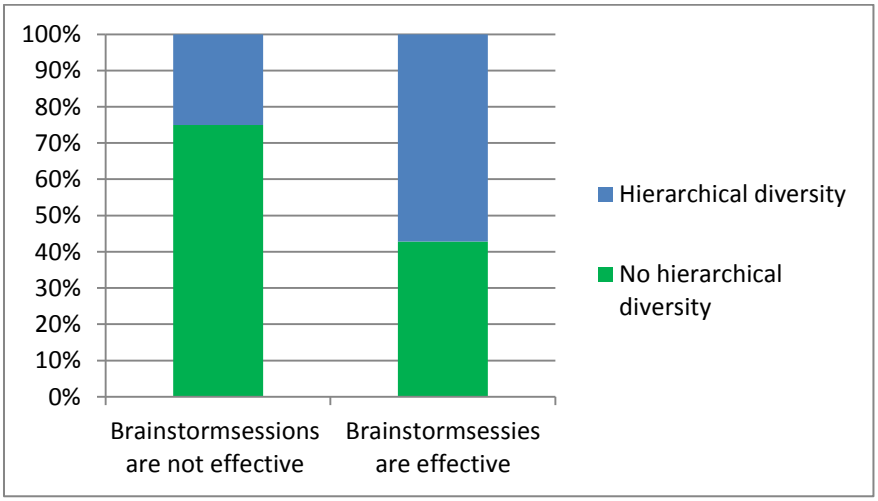

Figure 9: The effect of hierarchical diversity on effectiveness of brainstorm sessions

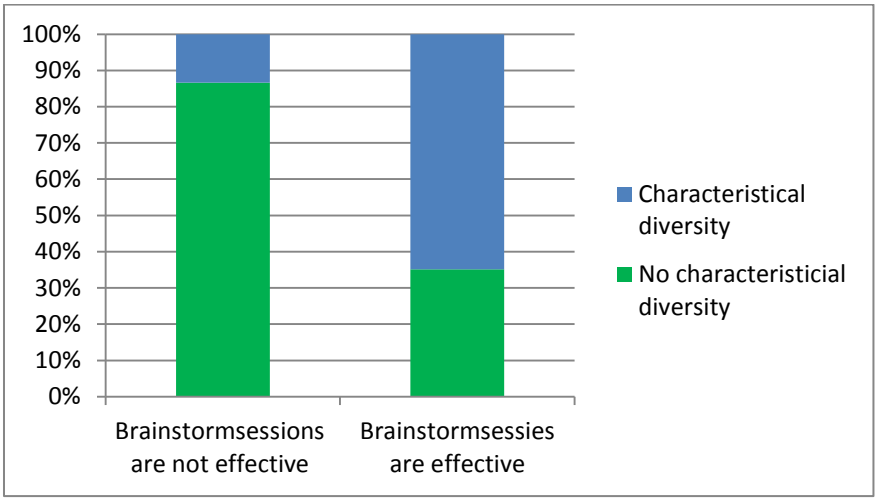

Figure 10: The effect of hierarchical diversity on effectiveness of brainstorm sessions

5.6 Hypothesis 4: Cooperation has a positive effect on innovative performance of a company

From earlier research it appears that there are some important differences between SMEs and (very) large organizations. One of the most important differences is the availability of resources. SMEs can overcome this problem by joining forces and engage in cooperation's, in this way they can create resources for R&D activities. This means that organizations which already participate in (a) cooperation'(s) should have more resources and thus possibilities for successful innovative performance. To test whether the latter is true, we analyze the hypothesis with binary logistic regression and OLS.

As dependent variables we use "product innovation" and "process innovation" again, besides the standard control variables. Our variable of interest now is a dummy measuring cooperation (0=no cooperation, 1=cooperation).

The correlation with the variable on "product innovation" is 0.284 and the correlation with the variable on "process innovation" is 0,432. Subsequently both coefficients are very significant. In combination with figures 11 and 12 there is enough reason to assume that the literature could be right.

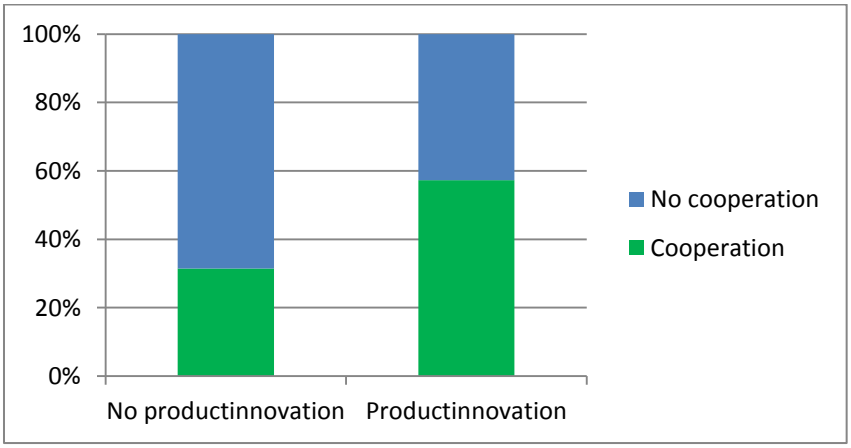

Figure 11: The effect of cooperation on product innovation

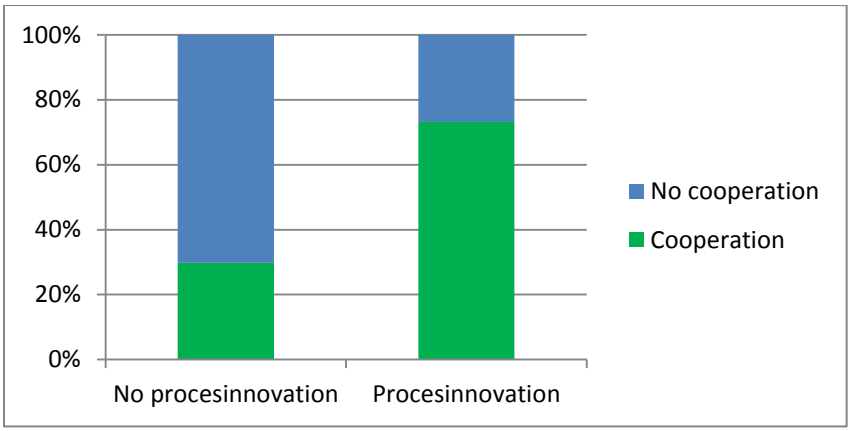

Figure 12: The effect of cooperation on process innovation

Table 1: Correlation Table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)Sector														
(2)Size	-0.289													
(3)Cooperation	-0.033	0,218												
(4 (Number of Brainstorm sessions	-0.083	-0,070	-0,009											
(5) Hierarchical Diversity	-0.148	0,041	0,151	0,235										
(6) Characteristic Diversity	0.002	0,051	0,626	0,224	0,382									
(7) Cozy Canteen	-0.123	-0,103	-0,083	-0,063	-0,101	-0,188								
(8)Organized Trips	-0.309	-0,275	-0,083	0,223	0,250	0,133	-0,311							
(9)Extrinsic Motivation	-0.182	0,195	-0,084	-0,091	-0,102	-0,173	0,185	-0,077						
(10)Non-financial Rewards	-0.309	-0,096	-0,315	- 0,136	0,017	-0,307	0,010,	0,217	0,185					
(11)Gifts	0.063	-0,156	-0,203	-0,009	0,127	0,137	0,166	-0,052	0,520	-0,192				
(12)Financial Reward	-0.093	0,419	-0,106	-0,031	-0,240	-0,163	0,080	-0,165	0,686	-0,145	-0,102			
(13)Effectiveness of brainstorm sessions	0.091	0,305	0,474	0,180	0,258	0,482	-0,177	0,206	0,099	-0117	0,033	0,155		
(14) Product innovation	-0.247	0,369	0,284	-0,078	0,043	0,132	-0,216	-0,008	0,158	0,026	-0,033	0,207	0,400	
(15) Process innovation	-0.012	0,477	0,432	-0,090	0,138	0,257	-0,149	-0,134	0,084	0,083	-0,056	0,106	0,421	0,412

6. Results

Table one illustrates coefficients from all hypotheses with "product innovation "as dependent variable. Table two shows the coefficients with "process innovation" as dependent variable.

With every hypothesis we compare the results of an linear regression with the coefficients of a logistic regression.

Hypothesis 1a: Stimulating creativity through extrinsic motivation has a positive effect on innovative performance of a company

Every individual is rational and the "homo economicus" does exist. This traditional approach assumes that an increase in extrinsic motivation i.e. triggers high quality work and incentives creativity. On the other hand, many recent studies report the negative effect of rewards on creativity, the most important determinant of innovation.

Placing this further in the context of innovation, means that we should distinguish between organizations which participate in monetary incentives and organizations which refrain themselves from monetary incentives. Coincidentally our survey contains a question/theorem with which we are able to make such a distinction. The associated variable of "extrinsic motivation".

The regression results of hypothesis 1a are present in the first columns of table one and two. [13]

Our variable of interest, "extrinsic motivation" is small and insignificant. Hardly anything changes after the insertion of control variables. The significance the control variable on "size" is remarkable. The small coefficient of "size" is logical as it denotes the real number of employees, while the dependent variable is a dummy variable. We can see that extrinsic motivation does not have any effect on the degree of product and process innovation.

The second columns of table one and two illustrate the odds ratios of Hypothesis 1a. When engaging in extrinsic motivation (providing rewards), organizations are 1.2 times as likely to have introduced new products/services in the past two years. Nevertheless the variable is insignificant in all models. The only significant variable in both comprehensive models is again the variable on "size".

The associated 0 hypothesis tests have a precise meaning. They test whether in the population; there is a difference in the logarithm of introducing new products/services for

[13] See appendix table four and five

organizations engaging in extrinsic motivation compared to non-rewarding organizations. In the latter models the 0 hypothesis for "extrinsic motivation" is not rejected.

The variable on the size of the company is our only significant variable. It seems like this is a key difference between innovative and non-innovative companies.

Hypothesis 1b: Different types of extrinsic motivation (rewards) have different effects on innovative performance of a company (non-financial rewards)

As we can see in columns three and four of table one (two for process innovation) the variable on non-financial rewards is mostly positive, but insignificant in the two full models[14]. Again the control variable on "size" is the only significant variable. The donation of non-financial rewards (with monetary value) to employees apparently does not have any effect on the degree of product and process innovation.

The odds ratios in column four roughly provide the same picture. The coefficient 4.7 in table two, column four tells us that organizations which engage in extrinsic motivation are 4.7 times as likely to have introduced/implemented new or improved processes. However, it is not possible to generalize this result outside our sample as the coefficient is not significant. It does not matter whether we perform an OLS or logistic regression, results stay the same. Gift giving to stimulate creativity and innovation does not have any effect of the degree of product or process innovation.

Hypothesis 2: Stimulating creativity through intrinsic motivation has a positive effect on innovative performance of a company

The coefficient of the variable "cozy canteen" is positive but insignificant. Additionally the binary logistic regression shows the same result does not have any effect on the degree of product of process innovation. Apparently this does not stimulate creativity at all.

The effect of organized company trips on creativity and thus on innovative performance is a bit more convincing. In the full models in table one and two[15] the variable is positive and contains relatively small standard errors. It seems like there is a positive effect of organized trips on innovative performance. This is in conjunction with the literature as organized trips would enhance employees' intrinsic motivation, which stimulates them to be

[14] See appendix tables six and seven
[15] See appendix tables ten and eleven

creative. Column six in table one shows that organizing trips enlarges the chance on product innovations with 1.962 times.

Hypothesis 3a: Organizing more brainstorm sessions per year has a positive effect on innovative performance of a company

The number of brainstorm sessions does not have any impact on innovative performance of organizations, whereas the variable on the size of the company is again the only significant variable.

Hypothesis 3b: The composition of employees engaging in brainstorm sessions influences the effectiveness of these sessions[16]

Characteristic diversity is significant in all models of table three. The participation of employees with different characteristics has a positive effect on the effectiveness of brainstorm sessions (measured by derived initiatives). In the comprehensive logistic model organizations which enable their employees with various characteristics to join in brainstorm sessions, increase their opportunity of a successful session with 8.253 times. In the linear model characteristic diversity has a positive significant effect of 0,407 on the effectiveness of brainstorm sessions.
Furthermore hierarchical diversity is significant in the linear regression model and insignificant in the logistic model. Thus, the effect of participating employees from different layers is unclear.

While the binary logistic model technically is most convenient, the influence of hierarchical diversity is highly uncertain.

Hypothesis 4: Cooperation has a positive effect on innovative performance of a company

Cooperation is significant in all full models. Cooperation seems to be an important difference between innovative and non-innovative companies. In the logit model 3 engaging in cooperation increase the chance on successful innovative performance with 6,429 times.

[16] In terms of initiatives derived from those sessions.

Variables Dep variable: Product Innovation	Hypothesis 1a OLS	Hypothesis 1a Logit	Hypothesis 1b OLS	Hypothesis 1b Logit	Hypothesis 2 OLS	Hypothesis 2 Logit	Hypothesis 3a OLS	Hypothesis 3a Logit	Hypothesis 4 OLS	Hypothesis 4 Logit
Sector	-0,027 (0,034)	0,837 (0,175)	-0,031 (0,035)	0,820 (0,175)	-0,021 (0,035)	0,861 (0,169)	-0,032 (0,032)	0,815 (0,166)	-0,031 (0,032)	0,829 (0,166)
Size	0,002* (0,001)	1,04** (0,020)	0,002* (0,001)	1,04** (0,020)	0,002* (0,001)	1,05** (0,022)	0,001* (0,001)	1,04** (0,021)	0,001* (0,001)	1,036* (0,020)
Extrinsic motivation	0,055 (0,171)	1,203 (0,92)								
Non Financial Rewards			-0,012 (0,208)	0,891 (1,026)						
Cozy Canteen					-0,138 (0,230)	0,561 (1,129)				
Organized trips					0,074 (0,095)	1,962 (0,438)				
Number of brainstorm sessions							-0,001 (0,001)	0,997 (0,818)		
Cooperation									0,001* (0,034)	2,427* (0,211)
No. of obs.	43	43	43	43	43	43	43	43	43	43

*Table 1: Standard errors in parentheses. * P < 0,10, **P<0,05*

Variables Dep Variable: Process Innovation	Hypothesis 1a OLS	Hypothesis 1a Logit	Hypothesis 1b OLS	Hypothesis 1b Logit	Hypothesis 2 OLS	Hypothesis 2 Logit	Hypothesis 3a OLS	Hypothesis 3a Logit	Hypothesis 4 OLS	Hypothesis 4 Logit
Sector	0,031 (0,033)	1,178 0,175)	0,044 (0,033)	1,272 (0,175)	0,037 (0,034)	0,861 (0,169)	0,438 (0,032)	1,126 (0,166)	0,025 (0,030)	1,128 (0,166)
Size	0,01** (0,001)	1,03** (0,020)	0,01** (0,001)	1,04** (0,020)	0,03** (0,001)	1,05** (0,022)	0,03** (0,001)	1,03** (0,021)	0,01** (0,001)	1,030* (0,020)
Extrinsic motivation	0,091 (0,167)	1,818 (0,906)								
Non Financial Rewards			0,279 (0,198)	4,740 (1,026)						
Cozy Canteen					-0,185 (0,225)	0,456 (1,129)				
Organized trips					0,006 (0,11)	2,057 (0,762)				
Number of brainstorm sessions							-0,000 (0,001)	0,999 (0,005)		
Cooperation									0,263** (0,129)	4,485* (0,850)
No. of obs.	43	43	43	43	43	43	43	43	43	43

*Table 2: Standard errors in parentheses. * P < 0,10, **P<0,05*

Variables **Dep Variable:** **Efficiency of** **B sessions**	**Hypothesis 3b** **OLS**	**Hypothesis 3b** **Logit**
Sector	0,035* (0,021)	1,042 (0,144)
Size	0,001* (0,001)	1,033 (0,020)
Hierchical diversity	0,194* (0,110)	1,067 (0,793)
Characteristic diversity	0,407** (0,107)	8,253** (0,642)

*Table 3: Standard errors in parentheses. * P < 0,10, **P<0,05*

7. A Case Study

After reviewing the quantitative results we chose three organizations from our sample with interesting results. With the help of depth-interviews and the results of the previous chapter we constructed blueprints of the companies.

We chose confectionery Jolink and bakery van Dongen as they are relatively similar companies. Confectionery Jolink is at the moment more successful in both revenue development and innovation development. Interesting is to analyze the differences between the two companies and see if they match with the results from our analysis.

Verstegen Spices & Sauces is an incredibly innovative company and an example for every company which does not know how to become innovative. The management of Verstegen is visionary and dares to take risks.

7.1 Industrial Confectionery Jolink: Revenue increased

Confectionery Jolink was founded in 1968 by Paul Jolink and his wife. They opened a confectionery in Brummen, Gelderland which became successful during the years.

At this moment Confectionery Jolink consists of two stores and 25 employees. The product assortment consists of a mix of small pies, bread, cakes, chocolate biscuits and related products. Almost all products are made by hand through a relative labor intensive production process.

The company has several sale channels as they sell products through their shops, through supermarkets, through other confectioneries and through restaurants.

The revenue of Jolink increased the past year. 8% of the company's revenue came from product innovations of the last two years. Additionally they saved €15.000 with process innovations which were implemented in the past 2 years.

As the latter are our indicators of innovativeness, at this point we can say that confectionery Jolink is innovative.

Confectionery Jolink is connected with the partnership 'Heerlijk & Heerlijk', the modern guild of confectioneries in the Netherlands. The members of 'Heerlijk & Heerlijk' guarantee quality by defining standards and controlling each other with unannounced shop visits. Additionally they copy products and production methods from each other and brainstorm together about new ideas. The fact that they go on an inspiration trip together every year is a beautiful example of cooperation targeted on innovations.

Paul Jolink also organizes brainstorm sessions within his company. In these sessions he discusses with his co-owner and chief production about the product assortments and production processes. Part of this discussion is a tasting session in which they choose a few products from their assortment randomly and test those products on 10 indicators.

Paul Jolink has a clear vision and is open minded, which allows him and his company to give innovation a prominent place in the overall strategy of the company. As of results of this the company houses an atmosphere of creativity and constant improvement.

Company owner Jolink does not make use of financial rewards. His employees nevertheless are highly motivated because Jolink organizes trips and occasionally gives employees a small gift like a box with cakes. Paul Jolink told me he once gave a bike to his chief. His argument: "everyday he rides on that bike so he will never forget that I gave it to him". The destination of the trips always has to do something with the products the company produces. Last year they went to a factory which produced raw materials for certain products which Jolink produced.

These last examples typify this visionary inspired entrepreneur, an attitude which can be said of the whole company.

7.2 Verstegen Spices & Sauces : Revenue increased

For 125 years Verstegen is a leading player in the food sector. It is a classical family business and active in all segments of the food sector. The company is supplier of spice mixes, herbs, sauces, marinades and other raw materials. Revenue increased past year, 10 % was subtracted from products which were introduced or improved in the past 2 years. Process innovations were less frequent as management is quite conservative regarding production methods.

Verstegen is a relative large SME company. Approximately 360 employees with various nationalities are active at Verstegen, varying from production staff to truckers to salesmen. The data and the complementary interview show that size and diversity are important, and this is not different in the case of Verstegen. The company has enough resources to limitless 'experiment' with new products as (financial resources) are abundantly available. Additionally as Jan den Heijer(director professional markets) indicated, larger companies have more employees and thus more external relations which can provide useful input. This automatically increases the opportunity for very useful ideas which eventually can transform in new products.

Verstegen regularly launches foreign product lines and uses the knowledge of their employees sometimes. An Indian employee once cooked and mixed new sauces and herbs for a new Indian product line.

Verstegen employs account managers who are especially hired to find useful ideas for new products. At the moment the interview took place on of their people was located in Mexico to gather inspiration and new ideas for a new Mexican product line.

As Verstegen is such a large SME, cooperation is not a very lucrative business for them. They do not have the need to bundle forces and exchange knowledge most of the time.

Brainstorm sessions are particularly organized with separate business units or with the top management. These brainstorm sessions are more characterized by discussing the state of affairs and individual achievement. In the sessions every participant has the opportunity to say his word and often these results in useful ideas. Of course there are employees with different characteristics but this is rather coincidentally, diversity management is not part of the organized sessions. This would be a potential opportunity for the company to enhance the efficiency of such sessions as the organization and composition could me improved

The company also actually engages in both extrinsic and intrinsic motivation. Since many years there exists a scheme which divides 10% of the extra yearly revenue *equally* among *all* employees. To continuously remember and motivate employees the state of affairs concerning the revenue appears on their payroll.

The company organizes trips and prepares a monthly package with the newest products and innovations for every employee, who subsequently can provide feedback on these products.

This large family business entails almost all facets of an innovative company; resources, an innovative culture and additional amplifiers in the form of brainstorm sessions and a well-organized motivation scheme.

7.3 Bakery van Dongen : Revenue decreased

Bakery van Dongen was founded 50 years ago and settled in Nunspeet. Nowadays the founder has retired and van Dongen consists of 8 shops all in the neighborhood of Nunspeet. The bakery produces primary bread, but also cakes and related products like small pizza's and sausage rolls. Bakery van Dongen employs 50 employees and can be classified as a pretty innovative company as they are very active with product innovation (range renovation). Furthermore there also exists the ambition to renew their production processes but they lack the necessary resources and last year, their revenue decreased.

To overcome this problem van Dongen is active in a partnership with other bakeries outside a rough radius of 50 kilometer. By learning from and cooperating with comparable companies van Dongen enables the possibility to improve their production process and increase the efficiency of their product innovations.

Through the financial developments and with the help of cooperating bakeries, management has created an extensive system of controls which should lead to recovery. Every part of the day, products and establishment are analyzed on profitability.

Once in a while brainstorm sessions are organized, although not on a regularly bases. Only management is attending those sessions. As our results suggest diversity to have a large impact on the efficiency of brainstorm sessions this would be a suggestion for the future.

Due to financial restrains the bakery is not able to extrinsically motivate their people but the owners try to compensate this with many intrinsic motivation techniques. The creation of a good creative atmosphere is not requiring money, so interesting for them.

Bakery van Dongen faces heavy competition of supermarkets and larger competitors. According to co-owner Henk Wijnbergen the future of labor intensive SMEs lies in chain integration and cooperation. This is the only way to compete with the really large companies. Looking at our quantitative results this seems not a bad idea.

8. Limitations & Impossibilities

Several shortcomings arise from certain choices we have made during the research process. As a result of my internship at BDO Consultants we had the possibility to construct our own research. By using at database of clients and prospects we were able to reach a large group of company owners and thus potential respondents. However, during the data gathering process the response was low and eventually we achieved a response rate of 4%. As the sample size is not large we had to be very careful in making inferences about a population larger than the food sector.

Because 958 from the 1000 potential respondents did not responded, potentially we have a highly selected sample which could imply a self-selection bias[17] in this case. We have to keep in mind that this was an examination of the most important differences between innovative and non-innovative companies. In this light it could be that potential participants had certain reasons to abstain from participation and companies who participated also had their reasons to participate.

Innovative companies do not have any incentive to participate. Those companies only lose from participation as they could give away information to less innovative competitors. Non-innovative companies do have an incentive to participate as the results of the research could be valuable information for them how to improve their innovation process. For the latter reason the sample could be non-representative for the food sector as a whole, as the share of non-innovative companies is too large. Results could therefore be biased and certain differences could remain undiscovered as the really innovative companies do not participate.

A huge problem with empirical research in the field of creativity and innovation is the question how to measure them. This research assumes that creativity is the most important determinant of innovation, so when one want to measure them both, it is most convenient to construct a measure of innovation. The crucial assumption we have made for this research considers the distinction between innovative and non-innovative companies. Companies which introduced new products or processes the past two years are classified as innovative companies. Companies which did not introduce new products or processes the past two years are classified as non-innovative companies. This is a strong but necessary assumption to construct a measure of innovation.

[17] Participant's decision to participate may be correlated characteristics that affect the study, making the participants a non-representative sample.

Several limitations are attached to the construction of the questionnaire and the corresponding database. First, the construction of control variables. Because we only could construct two control variables it is not possible to rule out the fact that too many variance remained unexplained. This omitted variable bias arises when as model leaves out one or more important causal factors. Coefficients of interest could be over- or underestimated. Second the quantification of the answers from the questionnaire. We used three and five point Likert scales and dummies to process the answers. The assumption underlying the Likert scales is that all Likert scales are not only scales ordinal but also interval. This means that the distance between the different answer options is assumed to be equal. This assumption is of course questionable but necessary to process questionnaires with Likert scales.

Third, the accuracy of the questions. With the questions we tried to measure certain effects like the degree of task motivation. It could be that certain questions are interpreted in a different way by our respondents. And by answering them from their own perspective they could provide a wrong view. This is unfortunately inherent to using questionnaires as data gathering method.

A last shortcoming is the composition of the sample. Within the food sector there are many subsectors which all contain different companies. The sample is very representative for the food sector as a whole but may be not for certain individual companies in or outside the sector. For this reason we chose to define general differences and recommendations.

9. Conclusion & Discussion

This study provides an examination of the differences between innovative and non-innovative companies in the Dutch food sector. Goal of this thesis was to answer its own research question. We defined several hypotheses on the basis of the extensive existing literature. With the help of a questionnaire spread among approximately 50 company owners in the Dutch food sector we aimed at analyzing these hypotheses empirically. On the basis of those questionnaires we constructed a database which made statistical analysis possible. Furthermore we added a qualitative component in the form of depth-interviews which should provide more insight and confirm the results of the analysis.

The results of this study show evidence for three of our six hypotheses.
It turns out that intrinsic motivation is more effective than extrinsic motivation. Organized trips seem to havea positive effect on creativity and are much often been organized in innovative companies than in non-innovative companies. Company owners Paul Jolink and Jan den Heijer highlight that extrinsic motivation is much more expensive; in practice intrinsic motivation is often preferred.

It is assumed that brainstorm sessions enhance creativity and make a company more innovative. This is true but only under certain conditions. The frequency of the brainstorm sessions does not have any effect. The difference between innovative and non-innovative companies entails the compositions and organization of the sessions. Innovative companies let employees participate from all layers of the organization and with different characteristics. We call this phenomenon, diversity management. Non-innovative companies restrict the participation only to the top management. Apparently employees appreciate the fact that they can be present at brainstorm sessions together with the higher management. In this way they get stimulated to think about the policy of the company. Employees from lower layers often have good suggestions and ideas for product/process improvement or renovation.

A factor which was not defined in the hypotheses but turned out to be very important is the size of a company. In all performed regressions the size was highly significant. An explanation lies in one the components of Amabile's model; resources. Since smaller companies have fewer resources than larger companies, larger companies are more innovative. Paul Jolink en Henk Wijnbergen told us that the decision to innovate is primarily dependent of financial resources.

When we view the innovation process as a process with large short-term costs and uncertain long term benefits this is actually not a surprising results. Apparently resources are the most important difference between companies in the private sector, where it is all about survival.

This is confirmed by our hypothesis on cooperation. Cooperation is identified as an important difference between innovative and non-innovative companies. It reflects the 'resource' argument as financial resources are the most important argument to refrain from innovations. Through partnerships smaller companies can join forces and share risks of risky innovation projects. On top of that cooperation enables knowledge sharing, mutual control systems and network extension.

As already mentioned we identify differences between innovative and non-innovative companies for one type of sector. This thesis therefore ends with a call for further empirical research. As the results show, under a few assumptions, differences are clearly, further research in other sectors or countries would be valuable. In this way the rich theoretical literature could supplemented with empirical support. Furthermore it can help companies who struggle with new trends, developments and heavy competition to survive.

10. References

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11. Appendix

Hypothesis 1a: Stimulating creativity through extrinsic motivation has a positive effect on innovative performance of a company

$$Np1_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Rw2_i} + \varepsilon_i$$

$$Np2_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Rw2_i} + \varepsilon_i$$

Variables	**Model 1: Y = Product innovation**	**Model 2: Y = Product innovation**	**Model 3: Y = Process innovation**	**Model 4: Y = Process innovation**
Control Variables				
Sector		- 0,027		0,031
Size		0,002 *		0,003 **
Independent Variable				
Extrinsic Motivation	0,158		0,084	0,091

Table 4: Regression Results – OLS - Hypothesis 1a

Variables	**Model 1: Y = Product innovation**	**Model 2: Y = Product innovation**	**Model 3: Y = Process innovation**	**Model 4: Y = Process innovation**
Control Variables				
Sector		0,837		1,178
Size		1,042**		1,034 **
Independent Variable				
Extrinsic Motivation	1,600	1,203	1,432	1,818

Table 5 Regression Results – Logit – Hypothesis 1a

Hypothesis 1b: Different types of extrinsic motivation (rewards) have different effects on innovative performance of a company (non-financial rewards)

$$Np1_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Rw3_i} + \varepsilon_i$$

$$Np2_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Rw3_i} + \varepsilon$$

Variables	Model 1: Y = Product innovation	Model 2 Y = Product innovation	Model 3: Y = Process innovation	Model 4: Y = Process innovation
Control Variables				
Sector		-0,031		0,044
Size		0,002*		0,003***
Independent Variable				
Non-Financial Rewards	0,030	-0,012	0,101	0,279

Table 6: Regression Results –OLS – Hypothesis 1b

Variables	Model 1: Y = Product innovation	Model 2 Y = Product innovation	Model 3: Y = Process innovation	Model 4: Y = Process innovation
Control Variables				
Sector		0,820		1,272
Size		1,042***		1,037***
Independent Variable				
Non-Financial Rewards	1,143	0,891	1,500	4,740

Table 7: Regression Results –Logit – Hypothesis 1b

Hypothesis 2: Stimulating creativity through intrinsic motivation has a positive effect on innovative performance of a company

$$Np1_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Cr2_i} + \varepsilon_i$$

$$Np2_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Cr2_i} + \varepsilon_i$$

Variables	**Model 1: Y = Product innovation**	**Model 2 Y = Product innovation**	**Model 3: Y = Process innovation**	**Model 4: Y = Process innovation**
Control Variables				
Sector		0,021		0,037
Size		0,002*		0,003***
Independent Variable				
Cozy Canteen	-0,253	-0,152	-0,182	-0,187

Table 8: Regression Results –OLS – Hypothesis 2

Variables	**Model 1: Y = Product innovation**	**Model 2 Y = Product innovation**	**Model 3: Y = Process innovation**	**Model 4: Y = Process innovation**
Control Variables				
Sector		0,856		1,184
Size		1,045**		1,034***
Independent Variable				
Cozy canteen	0,348	0,421	0,471	0,378

Table 9: Regression Results –Logit – Hypothesis 2

$$Np1_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 RCr3_i} + \varepsilon_i$$

$$Np2_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Cr3_i} + \varepsilon_i$$

Variables	**Model 1: Y = Product innovation**	**Model 2 Y = Product innovation**	**Model 3: Y = Process innovation**	**Model 4: Y = Process innovation**
Control Variables				
Sector		-0,027		0,028
Size		0,002*		0,003***
Independent Variable				
Organized Trips	-0,009	0,074	0,397	0,059

Table 10: Regression Results –OLS – Hypothesis 2

Variables	**Model 1: Y = Product innovation**	**Model 2 Y = Product innovation**	**Model 3: Y = Process innovation**	**Model 4: Y = Process innovation**
Control Variables				
Sector		0,843		1,167
Size		1,045**		1,037**
Independent Variable				
Organized Trips	0,963	1,962	0,560	2,057

Table 11: Regression Results –Logit – Hypothesis 2

Hypothesis 3a: Organizing more brainstorm sessions per year has a positive effect on innovative performance of a company

$$Np1_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 RBs_i} + \varepsilon_i$$

$$Np2_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Bs2_i} + \varepsilon_i$$

Variables	**Model 1: Y = Product innovation**	**Model 2: Y = Product innovation**	**Model 3: Y = Process innovation**	**Model 4 Y = Process innovation**
Control Variables				
Sector		- 0,032		0,438
Size		0,001*		0,003**
Independent Variables				
Number of Brainstorm sessions	-0,001	-0,001	-0,001	0,000

Table 12: Regression Results – OLS – Hypothesis 3a

Variables	**Model 1: Y = Product innovation**	**Model 2: Y = Product innovation**	**Model 3: Y = Process innovation**	**Model 4 Y = Process innovation**
Control Variables				
Sector		0,815		1,126
Size		1,044**		1,033**
Independent Variables				
Number of Brainstorm sessions	0,997	0,997	0,997	0,999

Table 13: Regression Results – Logit – Hypothesis 3a

Hypothesis 3b: The composition of employees engaging in brainstorm sessions influences the effectiveness of these sessions[18]

$$Bs3_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Div3_i} + \beta_4 Div4_i + \varepsilon_i$$

$$Bs3_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \beta_3 Div3_i + \boldsymbol{\beta_4 Div4_i} + \varepsilon_i$$

Variables	**Model 1: Y = Effectiveness B sessions**	**Model 2: Y = Effectiveness B sessions**
Control Variables		
Sector		0,035*
Size		0,001*
Independent Variables		
Hierarchical Diversity	0,074	0,194*
Characteristic Diversity	0,394***	0,407***

Table 14: Regression Results – OLS – Hypothesis 3b

Variables	**Model 1: Y = Effectiveness B sessions**	**Model 2: Y = Effectiveness B sessions**
Control Variables		
Sector		
Size		1,033
Independent Variables		
Hierarchical Diversity	1,857	1,067
Characteristic Diversity	9,797 ***	8,253***

[18] In terms of initiatives derived from those sessions.

Table 15: Regression Results – Logit – Hypothesis 3b

Hypothesis 4: Cooperation has a positive effect on innovative performance of a company

$$Np1_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 RCo_i} + \varepsilon_i$$

$$Ip1_i = \beta_0 + \beta_1 Sc_i + \beta_2 Si_i + \boldsymbol{\beta_3 Co_i} + \varepsilon_i$$

Variables	**Model 1: Y = Np1**	**Model 2: Y = Np1**	**Model 3: Y = Np2**	**Model 4 Y = Np2**
Control Variables				
Sector		-0,031		0,025
Size		0,001		0,002***
Independent Variables				
Cooperation	0,273*	0,001*	0,432***	0,263*

Table 16: Regression Results – OLS – Hypothesis 4

Variables	**Model 1: Y = Np1**	**Model 2: Y = Np1**	**Model 3: Y = Np2**	**Model 4 Y = Np2**
Control Variables				
Sector		0,829		1,128
Size		1,036*		1,030*
Independent Variables				
Cooperation	3,400*	2,427*	6,429***	4,485*

Table 17: Regression Results – Logit – Hypothesis 4