Non-R&D employees: the effects(s) on your innovation processes

A research about the effect(s) of employee involvement on process- and product innovation.

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Preface

In front of you lies the thesis 'Non-R&D employees: the effects on your innovation process.' This thesis is written in the context of my graduation from the master strategic management at the business department from Radboud university in Nijmegen. From February 2018 till June 2018 I have been busy with doing research and writing this thesis.

Together with my supervisor, Peter Vaessen, I came up with my research questions for this thesis. I wanted to do a mixed method study, because I really liked to do both quantitative and qualitative analysis. After using an existing survey to do the quantitative analysis, I also conducted three interviews with three different companies. This all made it possible to answer my research question.

Doing this research was not always easy for me, but Peter Vaessen, who was always ready for me to answer some question, helped me a lot. This made it possible to succeed in finishing my master thesis on time. With this said, I would really like to thank my supervisor, but also my 2nd examiner and Paul Ligthart for the support and feedback they gave me during this period. I would never have been able to complete this research without their cooperation.

Not only the teachers at school helped me a lot, but also the interviewees. They wanted to share their time and knowledge with me, for which I am very grateful. Finally, I would like to thank my friends, boyfriend, sister and mother for their moral support during this whole process.

I wish you a lot of reading pleasure.

Lotte Vredegoor

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Abstract

Innovation is an interesting topic, because firms need to adjust continuous to new developments in the market. There are different ways to innovate and employee-driven innovation (EDI) is one of them. However, not every organization is aware of the effects and influences employees can have on the innovation processes within an organization. Therefore, this research is focusing on the effect of EDI on process and product innovation.

The goal of this study is to specify the innovative impact of employee-driven innovation (EDI) in order to contribute to greater exploration of unused innovation potential within organizations, for product and process innovation. To achieve this research objective, the following main question is established: *"To what extent and in what way can non-R&D employees affect technological innovativeness of firms?"*

In order to answer the research question, a mixed method study has been carried out, which consists of a survey and interviews. The survey consists of 139 Dutch companies and is used to test the following five hypothesis:

H1: EDI has a positive impact on process innovation within an organization

H2: EDI has a positive impact on incremental product innovation

H3: EDI has no positive impact on radical product innovation

H4: EDI positively strengthen the effect of R&D on incremental product innovation

H5: EDI positively strengthen the effect of R&D on radical product innovation

The results of the quantitative analysis showed that EDI has a positive impact on process innovation and radical product innovation. The analysis from incremental product innovation showed that EDI was not significant and that only R*D has a significant positive influence on incremental product innovation. With regard to the relationship between EDI and R&D they both came out non-significant for incremental and radical product innovation. However, while adding the interaction variable it turns out that for radical product innovation both R&D and EDI were significant and positively related to radical product innovation, but the interaction variable was not.

However, the qualitative part of this research is not in line with all the results of the quantitative analysis. The qualitative part consists of three interviews, with three different companies. These results show that employee involvement, interplay and autonomy, which are all items of EDI, are positively influencing process and product innovation. However, for internal interplay it is still in it's infancy and autonomy can have a positive influence if the employees also get more time to be autonomous. Training, which is also an item of EDI, could not influence process or product innovation. Finally, R&D was most of the time related to big changes and radical product innovation, while non-R*D employees were involved in

incremental product innovation according to the organizations. This indicates that EDI can positively influence process and product innovation, but not in all areas.

Based on this, it is recommended to involve the employees in the innovation process of the organization, because they can bring new knowledge and insides that can result in new innovations within the organization. Finally, possible follow-up research could focus on non-technological innovations or to look deeper into the results that came out of this research.

Content

General information

This chapter consists of the personal information, names of the supervisors and the title of the research project.

Personal information

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Title of research project

"Non-R&D employees; the effect(s) on your innovation process."

1. Introduction

This chapter starts with a brief introduction to the topic of employee-driven innovation. It also addresses the motivation and cause and relevance of the problem. This chapter also describes the objective and research question for this research. Finally, an outline of the thesis is added.

This research is about non-R&D or employee-driven innovation (EDI). This subject explains how R&D is not the only source of knowledge and innovation. A firm can innovate through a diverse range of activities (Radboud University, 2017). To innovate, firms need to use all drivers (sources), and employees are one of these sources (Høyrup, 2010). So an alternative for firms to innovate is taking advantage of the creativity and knowledge of non-R&D employees in the company.

Innovation is an interesting topic, because firms need to adjust continuous to new developments in the market. Employee-driven innovation is a kind of innovation. It is also a fascinating topic because the effects of the innovative capabilities of non-R&D employees are under researched and also difficult to visualize. Therefore, it can be really helpful to know how firms can make these capacities visible, because a lot of authors, like Høyrup (2010), Aaltonen (2014) , Amundsen (2014), Gressgård (2014) and Kristiansen (2010), claim that every employee has the potential for innovation. It does not matter which educational background or function the employee has within the organization, they are all suitable for EDI (Høyrup, 2010) (Gressgård, Amundsen, Aasen, & Hansen, 2014). This makes EDI even more interesting as a subject, since it goes along with high expectations for strengthening the firms' innovative performances.

Some studies already confirm the expectations of strengthening the firms' innovative performances. For example, research from Rolf Alter (2016) shows that engaged employees for innovation allows more opportunity to contribute to improvement and innovation. In the same study, Gallup (2016) also shows that 59% of the 284 companies indicated that employees who are engaged said that their job brings out more creative ideas. Simultaneously, 49% of the respondents claim to have a lack of knowledge about EDI. These figures suggest large untapped innovation potential in organizations. So, in the dynamic world we live in and the ongoing developments, EDI can become a solution for firms to become or stay successful and to exploit the innovation potentials within the organizations. This is all because EDI suggests that employees have capacities that can exploit innovation potentials within organizations (Halvarsson Lundkvist & Gustavsson, 2017). This means that employees can have considerable skills and are capable of acquiring significant knowledge, in the form of experience-based knowledge. Which can cause them to be the center of the flow of information in the firm (Høyrup, 2010). However, their knowledge, ideas and innovations are intangible and organizations do not see the value of it most of the time (Halvarsson Lundkvist & Gustavsson, 2017). Also at the same time, for an employer it is hard to determine the quality output of an employee (Halvarsson Lundkvist & Gustavsson, 2017).

So, as already indicated, the effects are most of the time unexplored (Hasu, Honkaniemi, & Saari, 2013). For example, since innovation is a multiple faced concept, it is not systematically analyzed empirically which dimensions or types of innovation, if at all, are affected by EDI (Hasu, Honkaniemi, & Saari, 2013). Equally, empirical literature fails to speak out clearly how EDI is related to R&D-driven innovations. Overall, R&D is known for the use of the scientific method, which is conducted by scientific educated researchers, that results in radical product innovation most of the time (Beyerlein, Martin, & Kennedy, 2006) This means that R&D is more science-driven. EDI however, is more experience-driven, because it is conducted by non-R&D employees, which most of the time results in innovation in smaller steps. So an important question in this research is: "can EDI substitute for R&D-driven innovation, and or to what extent does it complement or strengthen R&D-driven innovation?"

Overall, EDI is a kind of innovation, but there are multiple types of innovation. According to Kinkel, Lay and Wengel (2004) multiple distinctions can be made, see figure 1. The first one is about technological and non-technological innovation. Technological innovation is represented by process and product innovation. Non-technological innovation is represented by organizational innovation and product-service innovation. This research focuses on technological innovation, and therefore process and product innovation. Product innovation can be divided into: incremental and radical product innovation. This is chosen because, Høyrup (2010) explains that product and process innovation at any level of intensity is the concern of EDI. Also, because EDI encourages employees to bring new ideas for new products or improving processes (Teglborg-Lefevre, 2010). Finally, because product innovation and process innovation can create quality improvements for the firm, which contribute to their competitive advantage (Hoonsopon & Ruenrom, 2012).

Figure 1. Different types of innovation *(Armbruster, Kirner, & Lay, 2006)*

	Technical	Non-technical
Process	Process Innovation	Organisational Innovation
Product	Product Innovation	Product-Service Innovation
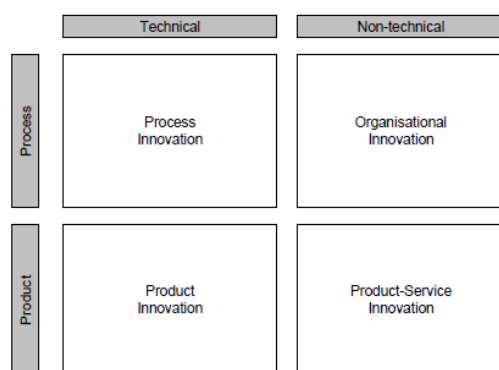
However, EDI is not the only concept who says that employees can be a driver for firm innovation. The resource based view (RBV), which is about the resources of an organization, also explains that managerial experiences and employee skills can contribute to firm innovation. The resource based view sees firms as a bundle of tangle and intangible resources that can create competitiveness. The RBV explains that different types of "assets" can also have different competitive advantages for an organization. Barney (1991), however, did not divide "resources" into finer categories and defined all intern assets as resources for an organization, unless they are valuable, rare, inimitable and non-substitutable (Barney & Arikan, 2001). This is the difference with EDI. For EDI the employee is a specific resource who can add value to the innovation processes within a firm. Also, another difference is that the RBV has the limitation of not being able, as a manager, to identify which of their resources actually generates the competitive advantage (Barney & Arikan, 2001). With this research, EDI can show if and how the employees contribute to the competitive advantage via process and product innovation. So, overall this research will contribute to gaining specific insights into how employees contribute to unused innovation potential within organizations.

Therefore, the goal of this study is to specify the innovative impact of employee-driven innovation in order to contribute to greater exploration of unused innovation potential within organizations, for product and process innovation.

To achieve this research objective, the following main question is established:

> *"To what extent and in what way can non-R&D employees affect technological innovativeness of firms?"*

To answer this main question, three sub-questions will be used:
1. To what extent can EDI autonomously effect technological process innovation?
2. To what extent can EDI autonomously effect incremental and/or radical product innovation?
3. To what extent does EDI strengthen the effect of formal R&D on incremental and/or radical product innovation?

Reading guide

In the next chapter the most important theoretical concepts will be defined, which are justified with the help of several scientific publications. The attention is paid to the different independent and dependent variables of this research. This chapter also contains the hypothesis for this research and the conceptual model that fits these hypothesis.

Chapter three describes the methodology that is used to conduct this research. There has been chosen for a mixed method study, which includes a questionnaire and three different interviews.

After describing how the analysis will be done, chapter four consists of the quantitative analysis. The quantitative analysis consists of an univariate, bivariate and multivariate analysis.

Chapter five describes the qualitative analysis. The qualitative analysis is done via the concepts that are described in the theoretical framework.

Chapter six consist of the conclusion of this research. This chapter gives an answer to the research question of this thesis.

Finally, chapter seven includes the discussion. This chapter contains: a reflection on the theory, the practical and managerial recommendations, the recommendations for further research and the limitations of this research. The document is closed by the bibliography and several appendices.

2. Theoretical framework

This chapter will explain the core concepts of this research and also the relations between these core concepts. Section 2.1 starts with explaining the comprising concepts of this research and then section 2.2 will explain the explanatory variable and paragraph 2.3 will explain the interaction variable. After explaining the basic concepts, it explains the (causal)relationships between the concepts in this thesis. This chapter also consists of hypotheses, which are merged in a conceptual model.

2.1 Innovation

Innovation is a popular term used nowadays. It is derived from ´innovatio´ which refers to renovation, which means renew, regenerate and/or revive (Lewicka & Misterek, 2013). According to Beyerlein (2006) innovation is required in everything within an organization; products, services[1], processes, systems and strategies (Beyerlein, Martin, & Kennedy, 2006). Also, according to Atalay (2013) innovation is seen as one of the most important sources of competitive advantage, which leads to product and process improvements and makes it possible for a firm to survive the increasingly changing environment (Atalay, Anafarta, & Sarvan, 2013). So, nowadays, innovation capabilities are not only a success factor for the organization (Christensen, 2008), but it is also noticeable as the engine for survival and growth within the competitive landscape of the organization (Gressgård, Amundsen, Aasen, & Hansen, 2014). While, at the same time, in a growing number of industries, innovation is disrupting existing patterns of competition (Christensen, 2008).

Overall, innovation can be seen as the process of creating or modifying an idea and also the development and implementation of the idea within the organization (Gressgård, Amundsen, Aasen, & Hansen, 2014). Amundsen (2014) uses the following quote to explain innovation: *"Innovation is increasingly understood as a result of the exchange of knowledge between, as well as within, organizations* (Amundsen, Aase, Gressgård, & Hansen, 2014).*"*

However, there is a lot of misunderstanding about the concept innovation (Kahn, 2018). According to the article of Kahn (2018) innovation should be seen as three things: as an outcome, as a process and as a mindset. First, by innovation as an outcome is meant which output is sought, which for example could be process innovation or product innovation. Secondly, innovation as a process can be seen as the way in which innovation could and should be organized. Finally, innovation as a mindset should be seen as the internalization of innovation by the individual employees of the organization (Kahn, 2018).

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[1] Services is not part of this research

The layout from Kahn (2018) already shows that there are different types of innovation. The first distinction can be made between technological and non-technological innovation. According to Schramm (2017) technological innovation can be defined as: *"the conversion of ideas and knowledge into new and commercially successful products, processes, and services[2]* (Schramm, 2017)."* While technological innovations are typically characterized by new technologies, non-technological innovation does not necessary involves a change in technology, but can rest on the use of for example new business methods or new organizational concepts (Schmidt & Rammer, 2007). In this research the focus is on technological innovation. Given this diversity of different types of innovation, innovation can also be further categorized in this research as product or process innovation. The next section discusses these types of innovation, whereby product innovation is divided into incremental and radical product innovation.

2.1.1 Process innovation

The Organization for Economic Co-operation and Development (OECD) (2015) defines process innovation as followed: *"a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software* (Hullova, Trott, & Don Simms, 2016)."* According to Davenport (1993) process innovation combines the adoption of a process view with the application of innovation to key processes. However, most of the time it is about changes in a methodology or process to achieve efficiency and profitability within the organization (Kahn, 2018). Overall, process innovation is aimed at finding new process technologies in order to produce more cheaply, faster and with a higher quality (Kahn, 2018).

Process innovation can help an organization deal with its competitive pressures within the market (Hullova, Trott, & Don Simms, 2016). Process innovation is not only helpful to the competitive pressures of an organization, it can also be used for the desire to appear legitimate to the external stakeholders of an organization (Tsinopoulos, Sousa, & Yan, 2017). Therefore, process innovation frequently takes place in collaboration with suppliers and manufacturers within the company.

Researchers, like Hullova (2016) and Kahn (2018) suggest that product and process innovation are often interrelated to each other. They suggest that product innovation creates a need for process innovation and process innovation creates a need for product innovation (Hullova, Trott, & Don Simms, 2016) (Kahn, 2018). However, where product innovation is associated with job creation, process innovation could destroy employment, because the processes become more efficient and therefore less people are

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[2] Services is not included in this research because the model of Ambruster (2006) has been used to make a distinction between technological and non-technological innovation.

needed (Edquist, Hommen , & McKelve, 2001). Finally, process innovation entails less risk than product innovation, because it is focused on cost efficiency instead of differentiation.

2.1.2 Product innovation

As section 2.1.1 describes, process innovation and product innovation can be related, even if one is different from the other. Product innovation is namely defined as: *"the development of new products or technologies"* which can be supported by the research and development activities of the company (Armbruster, Kirner, & Lay, 2006). Product innovation can help an organization with its competitive pressures within the market, because new products can beat the competition (Hullova, Trott, & Don Simms, 2016). Many academics and researchers also recognize the importance of product innovation to increase quality of a firms' financial performance (Hoonsopon & Ruenrom, 2012). Still, there are many different definitions of product innovation. For example Govindaiajan and Kopalle (2006) consider product innovation in terms of customer opinion, while Gatignon and Xueieb (1997) describe product innovation in terms of technology (Hoonsopon & Ruenrom, 2012). However, successful organizations, regardless of how they see product innovation, understand that innovation has an interaction with small incremental and major radical innovations (Kahn, 2018). Product innovation overall, in comparison to process innovation, contains more risk and is focused on differentiating the company and their products from their competition.

Incremental product innovation

One form of product innovation is incremental product innovation. Incremental product innovation is often developed to attend to the needs of the customers (Hoonsopon & Ruenrom, 2012). It both improves the original performance standards of the product and technology used and modifies the inputs, outputs and processes in response to changing inputs and product markets. The changes in technology and product are relatively minor changes, because most of the time it is used to extend the product lifespan (Hoonsopon & Ruenrom, 2012) (Vyas, 2016) (Robertson, Casali, & Jacobson, 2012). Overall, incremental product innovation balances the innovation efforts within an organization by tolerating sometimes small wins over big wins (Kahn, 2018).

Incremental product innovation entails less risk than radical product innovation (Brettel, Heinemann, Engelen, & Neubauer, 2011). This is because incremental product innovation uses existing routines to improve existing benefits (Hoonsopon & Ruenrom, 2012). Incremental product innovation can be used to gain an advantage over the competitors of the firm, or it can be used to respond to changes in the environment of the firm. Overall, the changes are only new to the firm and not new for the market (Robertson, Casali, & Jacobson, 2012).

Radical product innovation

The other form is radical product innovation. Radical product innovation can be defined as: "*the tendency of a firm to introduce new products that are incorporating substantially different technologies from the existing products and that can fulfill the needs of the key customers better than the existing products (Chandy & Tellis, 1998).*" According to Hoonsopon & Ruenrom (2012) radical product innovation is defined as: "*the development of products that have a different set of features and performance attributes that create a set of benefits different from that of existing products from the customer's perspective.*" So, radical product innovation leads to advantages, which can be the attributes or benefits that are previously unknown to the market, that customers cannot find yet in the products of the competitors (Hoonsopon & Ruenrom, 2012). Overall, radical product innovation, which is new to the market and new to the organization, can be a source of competitive advantage for the organization (Chandy & Tellis, 1998).

However, a lot of organizations fail to do radical product innovation. There is a bigger risk to radical product innovation then there is to incremental product innovation and process innovation (Brettel, Heinemann, Engelen, & Neubauer, 2011) (Kahn, 2018). This is because radical product innovation, which is very challenging and requires special resources, can ruin the fortunes of the firm. The new product has the change of not selling as much as expected which causes that organizations fail to earn back the money they invested in the product (Chandy & Tellis, 1998) (Kahn, 2018). So, therefore organizations need valuable information, that comes from the market, to succeed in developing radical new products (Hoonsopon & Ruenrom, 2012).

2.2 Employee-driven innovation

In the previous section, section 2.1, the dependent variables are described. This section will elaborate more on the topic of employee-driven innovation, which is an explanatory variable in this research. The importance of employee involvement in innovation started in 1871. In this year the exploitation of the ideas from the employees were not only seen to increase the quality of the product, but were also used to lower the costs (Amundsen, Aase, Gressgård, & Hansen, 2014). A century later, this concept is still important, because they discovered that employee involvement has a result in increased innovation capacity (Amundsen, Aase, Gressgård, & Hansen, 2014).

Nowadays, within scientific literature there are a lot of definitions given about the concept of employee-driven innovation (for example, Aaltonen 2014; Amundsen 2014; Gressgård 2014; Halvarsson 2017; Hasu 2013; Kristiansen 2010; Laviolette 2016; Reed 2012; and Høyrup 2010). These definitions are most of the time corresponding, but there are also some differences. Some are incoherent and do not specify specifically what employee-driven innovation is. To specify what EDI exactly means, the most

important elements, that are part of the concept of EDI, need to be explained. These elements are: competence building, employee involvement, continuous interplay between different actors and autonomy. These elements are partly matched to Smith et al. (2008) who identifies four main factors, in his research, that influence the success and potential of EDI. These factors are: leader support, autonomy, cooperation and innovation culture (Amundsen, Aase, Gressgård, & Hansen, 2014).

The elements of EDI

As said, there are four important elements that describe EDI. These elements are: competence building, employee involvement, interplay between different actors and autonomy. All these elements are described below.

Element I: Competence building

The first element of EDI is competence building. Competence building is about the learning process of the employees within the organization. Competence building is important because, before an organization should engage in the conditions of EDI, they need to make sure that all employees have the essential competencies to contribute to EDI, which is also the essence of EDI (Amundsen, Aase, Gressgård, & Hansen, 2014). Also, competence development activities can trigger learning in the day-to-day activities of the employees, which can also make sure that the employees have the essential competencies (Halvarsson Lundkvist & Gustavsson, 2017).

Albaladejo and Romijn (2000) say that: *"A substantial part of learning within organizations may not take the form of well-defined R&D programs (Hervas-Oliver & Albors-Garrigos, 2011)."* This is where EDI comes in. EDI can be seen as a learning process, which is defined as a process in which individuals expand their capacity through experiences, actions and social interactions (Høyrup, 2010) (Laviolette, Redien-Collot, & Teglborg, 2016). This learning process leads to absorptive capacity, which according to Gressgård (2014) is: *"a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability (Gressgård, Amundsen, Aasen, & Hansen, 2014)."* When the absorptive capacity of an employee is increased, it can lead to better innovations, because employees are able to process more knowledge.

Element II: Employee involvement

Learning itself is not sufficient. Employees also need to be involved in the innovation process within an organization. So, when firms want to conduct EDI, it places emphasis on a new driver of innovation, namely the employees of the firm. All drivers of innovation need to be used and employees are a very important and effective resource for innovation (Høyrup, 2010). The research from Yang and Konrad (2011) also shows that when employees are involved in the innovation process, an organization has access to a wider variety of knowledge resources, which makes the organization a more effective innovator (Yang & Konrad, 2011). This is because employees make a wider variety of knowledge

resources available within the organization, which c auses that organizations become more diverse and become more innovative (Yang & Konrad, 2011).

When involving the employees, EDI represents an opportunity for them to contribute to the competitiveness of the organization (Teglborg-Lefevre, 2010). Every employee in the organization has the potential to contribute to innovation, something that EDI encourages, no matter of their educational background, sector or function (Kristiansen & Bloch-Poulsen, 2010) (Laviolette, Redien-Collot, & Teglborg, 2016). They can contribute to the competitiveness of the organization by tapping into external and internal knowledge sources, which can be integrated into new ways of working (Laviolette, Redien-Collot, & Teglborg, 2016). However, employees need to be encouraged for realizing these new ways of working. According to Smith et al. (2008) leader support is the single most important condition for the succes of employee involvement and one of the items that causes employees to be encouraged. This is because EDI wants the participation of the employees to innovate, to be entirely free (Teglborg-Lefevre, 2010). When participation is encouraged, it is a sign of comittment to the organization for the managers within the firm (Teglborg-Lefevre, 2010). However, EDI will be demanding different leadership skills (Halvarsson Lundkvist & Gustavsson, 2017). This means that in an early stage of innovation, support and protection are the most important things for the leaders within the organization (Amundsen, Aase, Gressgård, & Hansen, 2014). This is consistent with Amundsen (2014) who also points out that top management needs to identify the importance of innovation by employees. Overall, EDI in general is characterized by high involvement of the part of employees (Høyrup, 2010).

At the same time, the long-term survival of an organization can also be explained by a high level of involvement of the employees within an organization, because structured approaches to EDI can be linked to the overall strategy of the organization to such a level that the organization is dependent on it for staying competitive (Teglborg-Lefevre, 2010).

Element III: Interplay between different actors
When an organization got the employees to involve in EDI, another important elements appears, namely interplay. Smith et al. (2008) identifies the interplay between different actors as cooperation, which is a factor for EDI. Innovation overall is a social process, it brings together a range of resources (Smith, 2017). Innovation is driven by the employees' resources, which are: creativity, ideas, competences and problem solving skills. There are two different kinds of interplay: within the organization and outside the organization.

Kristiansen and Bloch-Poulsen (2010) explain the collaboration within the organization. They say that innovation is not only about the sum of creative members of an organization. It is also described as an interactive process between employees (Kristiansen & Bloch-Poulsen, 2010). This is because all employees within the organization have important skills and for them to interact with each other, makes

it an important factor for contributing to EDI (Aaltonen & Hytti, 2014). However, employees cannot act alone. They are always related to organizational policies and procedures that govern their work (Smith, 2017). Following this line of argument, Gressgård (2014) claims that people, processes and tools are together responsible for innovation and for a successful innovation it also requires the elements to integrate (Kristiansen & Bloch-Poulsen, 2010).

Amundsen (2014) agrees with Kristiansen and Bloch (2010) about the fact that the interaction between employees is a key factor for EDI. However, he also explains that the interplay between employees and people outside the organization is a key factor for EDI. This is because employees inside an organization can work together with other companies to achieve an innovation success (Amundsen, Aase, Gressgård, & Hansen, 2014). Overall, there needs to be a collaborative climate within the organization for EDI to succeed, which means that people can work together within or outside the organization . Smith et al. (2008) explains that: *"collaborative groups are generally more creative than individuals when it comes to the generation and exchange of new ideas* (Amundsen, Aase, Gressgård, & Hansen, 2014).*"* EDI is therefore fundamental, and should be understood as a continuous process that harnesses the skills and imagination of employees at all levels in and outside the organization. Therefore EDI should not been seen as the work of a few specialized employees (Gressgård, Amundsen, Aasen, & Hansen, 2014).

Element IV: Autonomy
The last important element of EDI is also identified by Smith et al. (2008). Autonomy is seen as an enabler of innovation, especially in the stages of idea generation and idea refining (Amundsen, Aase, Gressgård, & Hansen, 2014). Autonomy means personal independence for the employees. Establishing autonomy can be done by decentralizing and creating a relaxed atmosphere, where employees are given more freedom and flexibility to participate in the idea generation and implementation processes (Rangus & Slavec, 2017). However, employees can get this freedom from the organization, but at the same time it is also important that they accept the role they get (Hallgren, 2009). According to Fieldman (1989) innovation in an organization not only requires control, but also autonomy. Autonomy can promote creativity and experimentation by employees, while at the same time still produces results that matter to the organization (Feldman , 1989). Overall, when an employees' desire for autonomy is satisfied, it causes greater commitment to implementing new decisions and also a stronger desire to successfully accomplish these decisions (Choy, McCormack, & Djurkovic, 2016).

Overall, EDI can be described according to these four elements. However, Smith et al. (2008) and Ellström (2011) could not define any "best practices" for EDI (Halvarsson Lundkvist & Gustavsson, 2017), because EDI can be implemented and executed in different ways. This is because learning and innovation can be a consequence of the workplace design within an organization. Also, Halvarsson (2017) concludes that it is essential to consider that EDI can take different forms, which asks for different conditions.

2.3 Research and development (R&D)

Although the focus in this research is on non-R&D innovation, R&D cannot be ignored. This is because this research wants to explore if EDI in interaction with R&D can add value to product innovation. Therefore, R&D is an interaction variable in the relationship between EDI and product innovation.

As mentioned before, R&D is science-driven, which means that a scientific method, by scientific educated researchers, is used for innovating. Overall, research and development is also a source for knowledge and innovation (Radboud universiteit, 2017). Nowadays, investments in R&D plays an important role as a (main)driver of innovation and growth within a company (Rodriguez & Martinez, 2014). R&D investments can contribute to the development of new products and/or the adaptation of new technologies (Damianova, 2005).

However, the impact of the research and development investments are highly unforeseeable, because they are affected by market conditions and technology (Damianova, 2005). Not only the impact of R&D investments are highly unforeseeable, also the relationship between R&D and EDI is unforeseeable, because little is known about this relationship in literature. So, can EDI (which is experience driven innovation) substitute for R&D-driven innovation (which is science driven innovation), and or to what extent does it complement or strengthen R&D-driven innovation?

2.4 Linking the concepts

After describing the individual concepts, this section will elaborate more on the causal relationships that are applicable in this research. There are five causal relationships described below. These relationships are all related to the topics that are described earlier. It starts with the causal relationship that contains the least risk and will then work up to the causal relationship with the most risk included. This means that the causal relationship between EDI and process innovation, which is most of the time focused on cost reduction and efficiency, will first be described. The causal relationship between EDI and incremental product innovation already consists of more risk because the innovation will be new to the company. The highest risk is achieved with the causal relationship between EDI and radical product innovation, because it is completely new to the company and the market.

2.4.1 EDI and process innovation

The first causal relationship is the relationship between EDI and process innovation. As described before, process innovation contains less risk than product innovation, because process innovation is most of the time about cost reduction and efficiency. To achieve process innovation, employees need to be willing to involve in EDI (Davenport, 1993). The motivation levels of the employees are determinants of the performances of the processes within the organization (Davenport, 1993), because employees should be encouraged by the firm to seek out ways of improving the processes (Laviolette, Redien-Collot, & Teglborg, 2016).

An orientation towards process innovation cannot guarantee this kind of motivation, but can make it more likely, so it could evolve in (more) EDI (Davenport, 1993). However, as pointed out by McKelve (2001) process innovation could destroy employment, because the amount of labor needed per unit of output decreases when there is more process innovation. So, this should make it less likely that employees are willing to involve in EDI (Edquist, Hommen , & McKelve, 2001).

However, a research that is conducted by Inauen (2014) suggest that the intensity of participation of the employees is positively (.30) and statistically significant (p<.005) related to process innovation, which indicates that a higher amount of participation of employees has a more positive impact on process innovation. Also, process innovation is often associated with learning-by using or learning-by doing, which can cause the introduction of for example new machinery. This means that employees who also perform the processes are the ones that can bring the most contribution to process innovation (Haneda & Ito, 2018). Zwick (2004) explained in his study that employee participation significantly increased the total productivity of an organization, because teamwork and involvement provide a productivity advantage. The study of Amah (2013) also showed positive results with regard to employee involvement and process innovation (process efficiency). This study contains 338 managers from banks in Nigeria. These managers are interviewed and are asked to fill in a survey. The results of this study showed a Rho=0.13, with a significance smaller than .05, which means that there is a positive relationship (Amah & Ahiauzu, 2013). A third study also found a positive relationship between employee involvement and process innovation (Alter, 2016). Harter, Schmidt and Hayes (2002) conducted a meta-analysis, at which 36 companies and 7939 business units were collected, in which they also found a positive relationships between EDI and process innovation. This study especially showed a strong link (p<.05) between employee involvement and productivity. Harter, Schmidt and Hayes (2002) explain that engaged employees not only perform more efficient, but are also willing to look for solutions to become even more efficient. All these empirical results from former studies lead to the following hypothesis (H1):

H1: EDI has a positive impact on process innovation within an organization

2.4.2 EDI and incremental product innovation

EDI and incremental product innovation already contain more risk than EDI and process innovation. The relationship between EDI and incremental product innovation is an one-way relationship. According to Edquist (2001) product innovation tends to be more incremental in nature. Also, innovations overall are often less than radical, mainly with regard to approaches that are oriented towards EDI (Teglborg-Lefevre, 2010).

Amundsen (2014) explains in his study that EDI has a direct effect on product quality, which means that EDI can contribute to new product improvements, that are new for the organization. He explains that employee involvement with regard to innovation will result in incremental product innovation, because employee involvement ensures that small improvements will be made constantly because they are the ones working with the product. This is according to his study in which they conducted qualitative interviews with employees and leaders from 20 Norwegian enterprises (Amundsen, Aase, Gressgård, & Hansen, 2014). Zhoa and Chadwick (2014) agree with this view. In their research, where they send out 105 surveys to automotive firms, they found that employees' willingness to work collaboratively and to develop new ideas, were strongly associated with incremental product innovation. Employee willingness scored a .80 in correlation with incremental product innovation (Shipton, Sparrow, Brown, & Budhwar, 2017). Also, according to Høyrup (2010) much of employee involvement in product innovation is focused on incremental changes, especially when it comes to the contribution of individual employees.

The study of Inauen (2012), in which a questionnaire is send to 783 companies in German speaking countries, also shows that companies who focus on the exploitation of in-house resources, such as employees, create better incremental product innovation (Inauen & Schenker-Wicki, 2012). The outcome showed a strongly positive effect of "in-house exploitation", with a value of .35 and a $p<.001$, on the dependent variable product innovation. However, the effect of "in-house exploitation" was only visible at incremental product innovation (.09 and $p<.001$). This leads to the following hypothesis (H2).

H2: EDI has a positive impact on incremental product innovation

2.4.3 EDI and radical product innovation

The last relationship is the one between EDI and radical product innovation. According to the literature, this relationships contains the most risk. In the book of Hervas-Oliver and Albors-Garrigos (2011) they write the following about employee-involvement in innovation: *"R&D is not the only method of innovating. Other methods include technology adoption, incremental changes, imitation, and combining existing knowledge in new ways. With the possible exception of technology adoption, all these methods require creative efforts on the part of the firm's employees and consequently will develop the firm's in-house innovative capabilities. These capabilities are likely to lead to productivity improvements, improved competitiveness and to new or improved products and processes that could be adopted by other firms* (Hervas-Oliver & Albors-Garrigos, 2011)*."* This statement suggest that EDI overall is relevant in all areas of innovation, whether it is product or process innovation.

All the individual employees, who develop limited incremental product innovations, together can have a major impact (Høyrup, 2010). However, Tidd and Bessant (2009) point out that when taken into account a longer period it could become an even more significant factor in the development of an organization (Høyrup, 2010). So, although EDI can depart from existing resources and procedures (incremental), the outcome can also become unique (Kesting & Ulhøi, 2010). Kesting (2010) also agrees that radical innovations are employee-driven. He explains this by given examples that were very radical such as the Walkman from Sony and the world wide web, which are all developed by employees of an organization. Finally, the case study of Teglborg (2010) involves 20 case studies from which six of them are described in his research. This research describes that all six case studies are convinced that the development of an innovative new product could not been developed without the influences of the employees' experiences.

On the other hand, there are also authors who prove the opposite. Inauen (2012) is one of these authors. The study of Inauen (2012), which involves 2000 Slovenian companies, shows a standardized coefficient of .28 with a $p<.001$. These values support hypothesis four of her research, which is about a positive effect of employee involvement on product innovation. However, this hypothesis only accounts for incremental product innovation because the effect of "in-house exploitation" of the capabilities of the employees, was not visible at radical product innovation ($p=n.s$). The study of Massimo (2014) also explains that the causal relationship between exploitation of employees and the probability of introducing new products that are new to the market is negative. His study, where 149 alliances involving European ASOs are investigated, explains that there is a marginal effect on the negative relationship, with a significance of $p<.001$ (Colombo, Doganova, & Piva, 2015). Finally, Kesting (2010) who is also positive about EDI and radical product innovation, is also explaining that the decisions that precede radical product innovations are very complex. Ordinary employees can participate in this process but it is very hard for them. A lot of research has been done on this point and it is still not clear

if employees are able to nurture their innovation (Kesting & Ulhøi, 2010). So, empirical evidence is not very convincing.

Overall, there a discrepancy between what is stated by EDI authors and what is empirically measured. The reason for this is because EDI authors claim that there is a positive relationship between EDI and radical product innovation, but empirical evidence does not prove the positive impact of EDI on radical product innovation. Therefore, the following hypothesis (H3) is determined:

H3: EDI has no positive impact on radical product innovation

2.5 The interaction effects of EDI and R&D

In section 2.4 the autonomous effects are described. This paragraph will look at the interaction effects. The study of McAdam (2002) already describes that often the people who have an idea, for example a R&D department or the employees, are not the once that can turn the idea into a successful innovation. A technological innovation needs to be supported by other departments, to work together and bridge the gap between an idea and the actual implementation of the idea. Therefore, this section will add the interaction variable R&D to the autonomous effects of EDI and incremental product innovation and EDI and radical product innovation. Then it can be examined if EDI improves or deteriorate the relationship, when combined with R&D.

2.5.1 Effect EDI and R&D on incremental product innovation

While R&D is an important input for innovation, nowadays there is a growing awareness that a significant share of innovation is not from the R&D departments within organizations (Lee & Walsh, 2015). Also, a lot of research is done on managing R&D to achieve dramatic, new innovations, while the success of everyday business depends more on incremental improvements on products. Overall, 90% of the 'new' products are in fact reworked versions of existing ones (Arieh, Grupp, & Maital, 1998).

According to the research of Edquist, Hommon and McKelve (2001) there is also expected to be more product innovation in R&D intensive sectors of manufacturing. This product innovation tends to be more incremental in nature (Edquist, Hommen , & McKelve, 2001). Cooperation and coordination across business units and/or divisions, such as R&D with manufacturing and marketing, which could be horizontal or vertical, can successfully manage product innovation (Haneda & Ito, 2018).

Zedtwitz et al. (2014) argues that decentralization of R&D, which means that research and development happens not only in one department, is more successful for incremental product innovation (Haneda & Ito, 2018). Besides the decentralized R&D department there are also four types of management practices that are positively related to product innovation. These management practices account for incremental as well as radical product innovation (Haneda & Ito, 2018). The management practices according to

Hanedo (2018) are: the use of interdivisional cooperation's, having board members with a research and development background, personnel assessment reflecting the R&D outcomes and the relocation of the R&D departments within an organization.

Not only the decentralized R&D department with the management implications are positively linked to product innovation, also empowerment of employees with regard to innovation is positively linked to product innovation (Haneda & Ito, 2018). Haneda and Ito (2018) conducted a study in which they used the Japanese National Innovation Survey of 2003, 2009, 2012 and 2015 in which 3.837 companies took part. Haneda and Ito (2018) suggest that implementing organizational R&D and human resource management practices (employee involvement) at the same time can significantly improve product innovation altogether. This is because the results indicate that implementing one or two management practices at the same time, so collaboration of employees, leads to a marginal effect of 5% more success on product innovation. Also, the study of Inauen (2012), in which 738 different companies in German speaking countries took part, agrees with Haneda (2018), because the study of Inauen (2012) points out that exploiting in-house resources, such as employees and R&D, create better incremental product innovation (Inauen & Schenker-Wicki, 2012). These data lead to the following hypothesis about the influence of EDI on the effect of R&D on incremental product innovation (H4).

H4: EDI positively strengthen the effect of R&D on incremental product innovation

2.5.2 Effect EDI and R&D on radical product innovation

EDI cannot only influence R&D on incremental product innovation, but also on radical product innovation. It starts when the scope of product innovation becomes radical through the restructuring of the production arrangements within an organization. Then there will be a greater emphasis on systematic research and development (Edquist, Hommen , & McKelve, 2001). Empirical research in the study of Rammer (2009) shows a positive impact (coefficient = 0.34, t-value = 3.81 and p<.001) of in-house R&D on innovation success in terms of a new product (Rammer, Spielkamp, & Czarnitzki, 2009).

However, there are also a lot of small- and medium-enterprises according to the research of Rammer (2009), in which he studied 2841 companies in Germany, that make use of sophisticated innovation management methods that can achieve similar results with product innovation as R&D ($X^2 = 11.87$). In his research, innovation management methods are seen as: *"facilitating the internal process including organizational skills of employees for identifying product innovation ideas and also providing incentives to co-operate among business units and departments* (Rammer, Spielkamp, & Czarnitzki, 2009).*"* Krupat (2014) also talks about collaborative innovation teams to achieve new product development innovations. This means that there are different functional and/or technical managers within the team, besides the R&D employees, to allocate resources to the product innovations (Hutchison-Krupat &

Chao, 2014). Also, when the R&D department gets the right resource support from other employees within the organization, it leads to better innovation performance with regard to new products (Huang & Lin, 2006). Overall, to increase the probability of a successful new product introduction, organizations need to make use of the different information sources they have available within the organization, suggesting that employees of other departments can also become very useful (Gordon, Schoenbachler, Kaminski, & Brouchous, 1997).

Krupat (2014) and Zedtwits et al. (2014) both agree with involving other departments in the innovation process. However, Krupat (2014) is describing that new product developments should be done in collaborative innovation teams, while Zedtwits et al. (2014) suggest that radical product innovation should be conducted with a centralized R&D department within an organization. However, even if these two researchers are not agreeing with each other, both are saying that R&D influences radical product innovation in a positive way.

Whatever the place of the R&D department within the organization is, Tether (2002) found that organizations that are interested in radical product innovation are more likely to establish R&D collaborations with others, such as employees. This is evident from the study he conducted in 2002, where 1275 companies were investigated and radical product innovation scored a .40 with a significance of p<.001 on collaborations (Tether, 2002). Within these R&D collaborations, the ease of access to new knowledge is an important driver for the collaborations on product innovation (Annique Un, Cuervo-Cazurra, & As, 2010). This is because the environment of the firm needs to facilitate the integration of the different types of knowledge. Especially the tactic knowledge of the employees needs to be integrated, because it can be used for the creation of new products (Annique Un, Cuervo-Cazurra, & As, 2010). Tether (2002) also explained that in particular, the companies that introduced products that where 'new to the market' were more likely to have arrangements with their employees. This is because employees brought other knowledge that they for example gained within their day-to-day activities. Annique (2010) also points out in her theoretical framework that R&D collaborations arise because individuals within the firm have the knowledge that can be used for designing a new product. Finally, another example of how EDI can strengthen the effect of R&D is described by the study of Iverson (2006), in which he describes that high-involvement of employees leads to the development of distinct capabilities, which together with the capabilities of R&D leads to superior firm performance. Overall, organizations can use the knowledge of the employees to collaborate with the R&D department within the organization for radical product innovation. This conclusion will lead to the following hypothesis.

H5: EDI positively strengthen the effect of R&D on radical product innovation

2.6 Conceptual model

In figure 2 the conceptual model of this research is presented. The model starts with the control variables, which are: firm size, sector, education and R&D. The explanatory variable in this research is employee-driven innovation, which consists of multiple items. The dependent variables are: process innovation, incremental product innovation and radical product innovation. There are one way relationships and one way relationships with an interaction effect (H4 and H5), from the explanatory variables to the dependent variables, because this is where the research is interested in.

Figure 2. Conceptual model
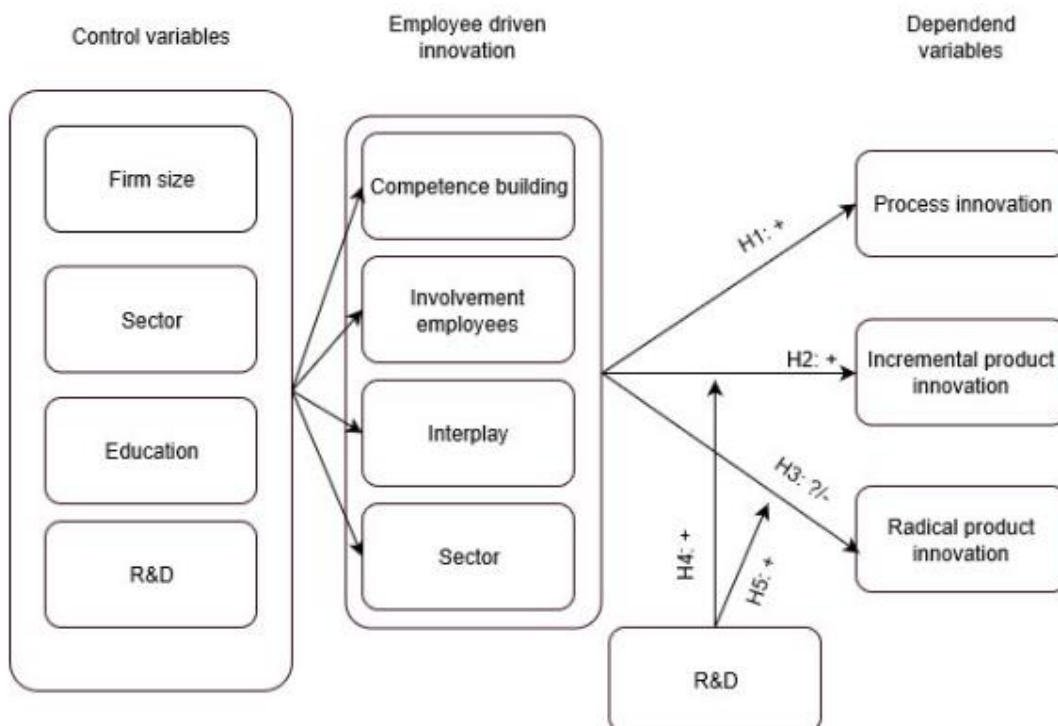
For hypothesis 1 expects a positive effect from EDI on process innovation. Hypothesis 2 expects a positive relationship between EDI and incremental product innovation. While, hypothesis 3 not expects EDI to have a positive effect on radical product innovation. Hypothesis 4 and 5, which both are expected to be positive, are about the interaction effect of EDI and R&D on incremental and radical product innovation.

3. Methodology

This chapter explains the methodology used in this research. Topics that are covered are: accountability of the research method, operationalization of the concepts, validity, reliability and ethics. Finally, the limitations of this research are described.

3.1 Accountability of research method

The methodological approach of this research is a mixed methodology based on quantitative and qualitative methods. The quantitative method consists of a survey and the qualitative method consists of interviews. Both give meaningful results that are analyzed and integrated. Erzberger and Kelle (2003) distinguish three types of integrating the research results, namely: convergence, complementarity and divergence. The results of this research are complementing to each other. This mean that the qualitative results will complement the quantitative results, which eventually leads to a more complete picture of the reality about employee-driven innovation within companies (de Boer, 2016). Bleijenbergh (2016) also explains that the use of a mixed method study can be used to complement results. The quantitative method can conduct a test under a large amount of employees within an organization, while the qualitative research, through open interviews with a small amount of employees, can clarify if the patterns really do exist within a company (Bleijenbergh, 2016). Therefore, the quantitative method is first applied, and during the analysis the interviews are scheduled to gain more insight.

The research is deductive, because this research is theory driven. According to Bleijenbergh (2016) a deductive study starts with a clear defined theoretical framework and with clear expectations (hypothesis) about the empirical reality. In this research the scientific literature is translated into measurable concepts and hypothesis and is the starting point of this research. The research units for this research are Dutch industrial firms and the data sources for this research are: documents, books, employees, management and the participants of the survey.

3.2 Quantitative method

As mentioned in section 3.1, this research consist of a quantitative method. The quantitative method consists of a survey. This survey is enabled by the European Manufacturing Survey (EMS) 2012. This study is conducted every three years and organized by research institutes and universities from and across Europe. Radboud University Nijmegen is one of the European research institutes that participates in this study. The study overall is coordinated by the German Fraunhofer Institute for Systems and Innovation Research (ISI). In this study, 18 countries have participated. However, for this thesis, only the EMS's distributed under Dutch industrial manufacturing firms will be used. Therefore, the unit of analysis consists of Dutch industrial firms with 10 or more employees, who are economic active and registered in the Chamber of Commerce database. This Chamber of Commerce database consists of 8195 industrial factories. This survey was sent to 6146 industrial firms, via letter and two reminders to

participate in the survey online. The survey is published online, which makes it suitable for quantitative analysis. It is important to note that only specific and single offices were targeted, which means that for a firm with multiple offices, only one is take into consideration in this survey. The survey can be found in appendix I.

The goal of the EMS is to gain more insights in the efforts of industrial firms to modernize their production and processes. The survey focuses on the adoption of new manufacturing technologies, the use of innovative organizational and managerial concepts as well as on various performance indicators such as productivity, quality and/or flexibility of companies (Ligthart et al., 2013). This quantitative research concerns a research that tests different theories from the literature that are empirically tested by means of the five hypothesis that are formed within this research. In addition, no comparable research on this specific theme was found at any level.

Operationalization

To test the hypothesis of this research, the concepts are operationalized. The quantitative operationalization is done via a table, which can be found in appendix II. This table consists of all the variables important for this research. It starts with the dependent variables, followed by the explanatory variable and finishes with the control variables. All these different types of variables are described by the following information: the question who is testing the item, the measurement level and how they are tested in the survey. The operationalization table can be found in appendix II.

Methods for analyzing

After operationalizing, the variables are tested. The statistical calculation within this research is done via the program SPSS Statistics. This is a software program that can be used to do quantitative analysis. To start with the analysis, the program will be used to make frequency tables. This procedure can produce summary measures for the categorical variables within this research. Univariate analysis are used to describe scores. After the univariate analysis, the bivariate analysis is done. This analysis explains the correlation between the explaining variables and the dependent variables. The third test is the multivariate analysis. The multivariate analysis is used to test all hypothesis. For hypothesis 1 a linear regression is used. This method tests whether one independent variable has an influence on a dependent variable and also if this effect is positive or negative (SPSS handboek, 2017). Hypothesis 2 to 5 are tested via a multinomial regression analysis. This analysis is used because it can predict a nominal dependent variable, with one or more independent variables.

3.3 Qualitative method

Besides the quantitative part of this research, there is also a qualitative part. Within this research the qualitative method consists of three interviews, which is small-scaled. These three interviews are conducted at the moment of analyzing to gain deeper insight into EDI within companies. All the companies are approached through the network of the researcher. The interviews are held with the non-R&D employees of an organization. They all have a different function within the organizations.

Before conducting the interview, they are asked if they want to participate in an interview that will take approximately 45 minutes of their time. The companies are first approached via telephone and after the phone call an e-mail is send to the company. According to Bleijenbergh (2016) this is the best way to gain access to an organization for an interview. The reason for choosing three different companies is that it can contribute to the understanding of the quantitative results.

The interviews are semi-structured. This means that the interviewer has a list with question, but can also ask other open ended questions, depending on the discussion with the interviewee (Doyle , 2017). Semi-structured interviews have the advantage that the researcher can determine which topics are certainly discussed (Bleijenbergh, 2016). Semi-structured interviews makes it also more easy to ask for clarification when things that are not clear for the interviewer (Bleijenbergh, 2016). The interview questions can be found in appendix III.

The primary goal of the qualitative study in this research is to contribute to the results of the quantitative study. Which together can give a realistic overview of EDI within organizations.

Operationalization

According to Bleijenbergh (2016) the researcher needs existing literature for operationalization, when conducting a deductive research. Employee-driven innovation is measured before in different studies and also with different dimensions. The literature framework is used to conduct tree structures for EDI, process innovation, product innovation and R&D, which can all be found in appendix IV.

According to the literature framework (chapter 2), EDI has four different elements, namely: competence building, employee involvement, interplay between different actors and autonomy. EDI is the concept and these four elements are the dimensions of EDI. Secondly, process innovation cannot be described in dimensions such as EDI. However, process innovation also has factors that describe process innovation, namely: new techniques, new equipment, efficiency and new software. Thirdly, product innovation can be described with two dimensions, incremental and radical product innovation. These dimensions both have factors that describe them. The factors for incremental product innovation are: minor changes, new to company, response to change in the market and small/medium risk. Radical

product innovation has almost the same factors: major changes, new to the company and the market and big risk. Finally, R&D is the same as process innovation, it is described by factors. These factors are: science-driven, productivity and profitability.

Methods for analyzing

For analyzing the interviews, a qualitative content analysis is used. The researcher has transcribed the interviews literally. The reason for literally transcribing is because it tells exactly what is asked and answered, but also if there were hesitations and silences. This way the transcript not only represent the content of the conversation, but also represents the social interaction which increases the quality of the research (Bleijenbergh, 2016). These transcripts are placed in the attachments of the research. After transcribing the interviews, the interviews are coded. This means that codes have been assigned to the answers given. This is done via the tree structures, see appendix IV, for the different concepts. After coding all the answers, the same codes are merged together into one category. This has led to a clear overview of the answers of the respondents, which made it easier to interpret the results and to draw conclusions (Dingemanse, 2017).

3.4 Validity and reliability

In this research validity and reliability are important, because to give a proper answer to the research question the research needs to be valid and reliable. Validity is about measuring what you want to measure (Field, 2014). So the survey and the interviews need to actually measure what it sets out to measure. Reliability is about whether an instrument can be interpreted consistently across different situations. So, a valid instrument leads to accurate outcomes. Reliability is about conducting the same research under the same circumstances, which leads to the same results (Field, 2014). So, reliability is the degree to which the research method produces stable and consistent results (Field, 2014).

For the quantitative part of this research, Cronbach's alpha is used, which is a measure of the reliability of a scale (Field, 2014). A Cronbach's alpha of .05 is used when analyzing the results, this means that there is a 95% reliability during the analysis. A Cronbach's alpha of .05 is most of the time used when doing research (Field, 2014). This research is also aware of construct validity. The research makes use of concepts that are harder to measure in reality (Boeije, 2014). Therefore these concepts are explained in literature, which should make the definition of the concepts clear. So, the validity of the quantitative part of this research can be found in the questions asked.

For the qualitative part of this research, the interviews are semi-structured, which made it sure that the topics the researcher is interested in are discussed. Also, to ensure that validity is reached, interview questions are constructed after the literature framework was finished. The literature framework ensures that there is a good overview of the most important concepts and indicators of these concepts, which

made it possible to really ask about what needs to be measured. The semi-structured interviews also give the opportunity to measure wat needs to be measured. However, the interview questions also give extra input that could be necessary for the research. So, overall the semi-structured interviews have increased the validity of the research. After conducting the interviews, they are transcribed. These transcribes are send back to the interviewee, to verify if everything that is written down is in accordance with what the interviewee wanted to convey. This increases the reliability of the interviews (Bleijenbergh, 2016).

3.5 Ethics

To address the research ethics for this research, the ESRC Framework for Research Ethics is used. This is a framework from the Economic and Social Research Council (ESRC), which facilitates innovation and high quality research (Economic and Social Research Council, 2015). This framework consists of six key principles.

First, research should be designed, reviewed and undertaken to ensure integrity, quality and transparency (Economic and Social Research Council, 2015). All chapters of this research are reviewed multiple times in collaboration with the supervisor. Also, the design has changed multiple times after things were reviewed. In this way the integrity, quality and transparency should be ensured.

Second, research staff and participants must normally be informed fully about the purpose, methods and intended possible uses of the research, what their participation in the research entails and what risks, if any, are involved (Economic and Social Research Council, 2015). There is no research staff, this research is conducted by one person. However, every interviewee is fully informed about the purpose, methods and possible outcomes of this research. This is told at the beginning of every interview. The participants of the survey are not told about the purpose of this research, because the survey was already conducted. To deal with this problem, the researcher only got the variables that it needed to been working with, so other information stayed private. This also counts for the third key principle, namely: the confidentiality of information supplied by research participants and the anonymity of respondents must be respected (Economic and Social Research Council, 2015). Not only the purpose is told at the beginning of the interview, the interviewee is also asked if he/she wants to stay anonymous with regard to his/her name and/or company name. With respect to the confidentiality of the information supplied by the interviewee, the researcher has asked for permission to record the interview. The recorded interviews are saved in a private environment, so the records cannot be found by people outside the research. Overall, the researcher meets the wishes of the interviewees.

The fourth principal is that research participants must take part voluntarily, free from any coercion (Economic and Social Research Council, 2015). This is the case for this research. Organizations are approached and were free to refuse to participate in the research. Also, when they choose to participate,

they are informed at the beginning of the interview that he/she can withdraw at any time when they feel uncomfortable. This is also written in the invitation mail.

The fifth principal is that harm to research participants must be avoided in all instances (Economic and Social Research Council, 2015). By meeting the wishes of the interviewees, the possibility to harm the participants was very small. Also, for the participants of the survey, their privacy is guaranteed by working only with the variables that are necessary for this research.

Finally, the independence of research must be clear, and any conflicts of interest or partiality must be explicit (Economic and Social Research Council, 2015). There are no conflicts of interest within this research. Organizations and the researcher were both able to speak free within the interviews. Also, all the participants of the interviews are informed with the results via e-mail or a hardcopy of the research, if that was desirable.

3.6 Limitations

The most important limitation is the fact that the survey used in this research is conducted by other researchers and therefore the information that comes with the dataset cannot be changed anymore. So, missing data cannot be added to the database. Also, the survey only has 179 valid questionnaires, which is only 5% of the total questionnaires.

Another important limitation is with regard to the qualitative analysis of this research. There could be change of interviewer bias. This means that the interviewees are influenced by the interviewer. Also, with regard to the interviews there is a possibility that interviewees have given socially desirable answers.

4. Quantitative research

This chapter explains the quantitative analysis of this research. The quantitative analysis consist of several steps: response data, univariate analysis, bivariate analysis and multivariate analysis.

4.1 Introduction

As said, this chapter consists of multiple analysis. The first step is to describe the response data, which describes the data. Then, before analyzing, the variables are constructed. Which means that the operationalization table is used to explain how the variables are constructed and if applicable which items are merged into one new variable. After describing the variables, the first analysis is done. The first analysis is the univariate analysis. It gives an overview of the continues variables and the dichotomous variables. After the univariate analysis, the bivariate analysis follows. In this analysis the multicollinearity is investigated. Finally, the multivariate analysis is described. This analysis consists of multiple analysis. The analysis between EDI and process innovation can be done via a linear regression analysis, but the analysis between EDI and product innovation is done via a multinomial logistic regression analysis. The reason for this is, because this analysis consists of one independent variables with multiple categories.

4.2 Response data

The dataset consists of 149 respondents (N=149). The mode is 20 to 49 employees, which can be seen in table 1. The second most answered is less than 20 employees. Table 1, column 5 shows that more than 50% of the respondents has a company with 49 or less employees. This means that more than 50% of the respondents has a company with 49 or less employees. The histogram is showing a left sided skewness, which also shows that there are more small companies than big companies involved in his this survey. However, this is also the case in real life within the Netherlands and therefore a good representation of the population (P. Ligthart, personal announcement, 23 April 2018).

Table 1. Overview firm size

	Frequency	Percent	Valid percent	Cumulative percent
Less than 20 employees	39	26,2%	26,2%	26,2%
20 to 49 employees	47	31,5%	31,5%	57,7%
50 to 99 employees	29	19,5%	19,5%	77,2%
100 to 249 employees	22	14,8%	14,8%	91,9%
250 or more employees	12	8,1%	8,1%	100,0%
Total:	149	100,0	100,0	

However, a condition for the research population is that there should be at least ten people working in the organization. This means that organizations with less than ten people are not suitable for this research. Therefore, another analysis is done, which can tell exactly how many employees an organization has. This analysis shows that there are nine organizations that do not meet the criteria. This is because they are either have a missing on this question or they have less than ten employees working in the organization. This means that these companies should be deleted from the data file, because they can distort the image. The missing values will also be deleted, because it is not sure how many employees the company has. This has the consequence that N=149, now has become N=140.

Not only the number of employees is important, but also the industry the organization is working in is important. In this research there is one company that does not meet the requirements for industry. It is a service company. This survey is not focused on service companies and therefore this company should be deleted from the dataset. When not deleted, the image would not be representative. This means that the total dataset now has a N of 139 (N=139). This is the number of respondents the analysis will include.

Table 2. Overview industry

Industry	Frequency	Percentage
Metals and metal products	34	24,5%
Food, beverages and Tobacco	10	7,2%
Textiles, Leather, Paper and Board	16	11,5%
Construction, Furniture	10	7,2%
Chemicals (energy and non-energy)	27	19,4%
Machinery, Equipment Transport	27	19,4%
Electrical and Optical equipment	15	10,8%

In table 2, you can see the industries the companies are working in. The industry that is best represented is the metal industry, followed by the chemicals and machinery industry. However, when you look at the distribution of the branches in the Netherlands in 2013, there is a difference. In this research, the metal industry is the best represented, however according to CBS (2013) the metal industry consisted of 32.685 companies in 2013, which brings them on a sixth place, when looking at only these seven industries. The construction industry is the biggest one according to CBS (2013), while this is the lowest represented in the survey. The last thing that is noticed is about the food industry. In this survey they are represented really poor, but CBS (2013) shows that this industry was the third largest industry in 2013. All the other industries are good represented.

4.3 Variable construction

In this paragraph the construction of the variables is described. The same sequence is used as the operationalization table, see appendix II, therefore the dependent variables are first described.

4.3.1 Construction dependent variables

The dependent variables consist of process and product innovation.

    1. Process innovation

Process innovation is tested via one question in the questionnaire. This question asks which technologies the organization already has implemented. The question consists of 18 items, see question three in appendix I. Therefore, a scale analysis is done for the items, to determine the consistency between them. The Cronbach's alpha is .982. This is a really good value.

However, there were two items that could increase the Cronbach's alpha, with a value of .001. According to Field (2014) an increase of .001, is not sufficient. Also, the value of Cronbach's alpha is higher than .80, which means that the consistency between the items is really good (Field, 2014). Therefore, the items of question three can be added together into one variable, which will be process innovation. This variable tells something about the technological innovation within an organization. The more technologies an organization has present in his organization, the more it is technological innovative.

    2. Product innovation

Product innovation is split into incremental product innovation and radical product innovation. In the survey, incremental product innovation is measured as introducing new products, that were new to the company only, see question 11.1 in appendix I. On the other hand, radical product innovation is measured as introducing new products that were not only new to the firm, but also new to the market, see question 11.2 in appendix I. Both product innovations consist of one question, that could only be answered via: yes or no. This means that there are no items for each variable that need to be checked on the consistency between them. So, therefore a scale analysis is not necessary.

4.3.2 Construction explanatory variables

The explanatory variable in this research is EDI. EDI consists of multiple dimensions, namely: competence building, employee involvement, interplay extern/intern and autonomy. After constructing all the items, they need to be added together for the variable EDI.

    A. Competence building

Competence building consists of three items, namely: job enrichment, training and talent development programs. All these items are related to question 8.1 in the questionnaire, see appendix I. Also all three items could only be answered with yes or no. However, these items need to be added together into one

new variable and therefore should be checked on the consistency between them. The scale analysis shows a Cronbach's alpha of .65, which is not bad, but it can increase when the item job enrichment is deleted. Then Cronbach's alpha will increase till .75. An increase of .05% or bigger is according to Field (2014) the rule of thumb for deleting an item. Cronbach's alpha can increase by .10 %, so therefore the item job enrichment is deleted. Also, from a theoretical view, job enrichment can be deleted because it can be interpreted in different ways by the respondents, because job enrichment is about getting more responsibilities and being able to decide about the way of working for yourself as an employee (Talent management, 2014). However, when an organization is trying to do it, it can stuck at task widening, which is about getting more tasks. This can been seen as job enrichment, but it is not. So, therefore, the item job enrichment can be misunderstood.

B. Employee involvement

Employee involvement consists of one item, which is measured by question six in the survey, see appendix I. This item is about utilizing knowledge and initiatives from non-R&D employees for realizing innovation. The question can be answered with three options: zero, which means that employees were never involved, one, which means that employees are once involved and two means employees are involved multiple times. However, the variable only consists of one item and therefore it is not necessary to check the consistency.

C. Interplay

Interplay with different actors is split into: inside the organization and outside the organization. Inside the organization consist of only one item, which is asked in question 8.1, see appendix I. This item is about a meeting with employees. Outside the organization also consists of one item, which is tested in question 6. This item is about external participation for innovation. Just like employee involvement they both consist of one item and therefore a scale analysis is not necessary.

D. Autonomy

Autonomy consists of two items: standardized working instructions and autonomous task groups. Standardized working instructions can be answered with yes or no. This item must be recoded. The reason for this is, because yes (=1) now means that there is no autonomy and no (=0) means that there is autonomy. The other variable could only be answered via yes or no, see question 8.1 appendix I.
To check the consistency between the items, a scale analysis is done. The scale analysis shows a Cronbach's alpha of .43, this is poor. However, deleting one of the variables will not increase the Cronbach's alpha. This is because deleting one of the items means that only one item is left and this item cannot be added with another item. Therefore, the decision is made to keep them separately in the analysis.

E. EDI

After constructing all the different dimensions of EDI, they now need to be added together into one variable. Therefore a scale analysis is done to see how the internal consistency is between these items. The scale analysis shows a Cronbach's alpha of .50, which is not good. However, when deleting one of the items, the Cronbach's alpha can increase till .66, which is acceptable, see table 3.

Table 3. Cronbach's alpha EDI

Item	Cronbach's alpha if item deleted
Competence building	.31
Employee involvement	.41
Meeting with employees (interplay intern)	.43
Interplay extern	.34
Autonomous task groups (autonomy)	.42
Standardized working instructions (autonomy)	.66

When deleting the item standardized working instructions, the Cronbach's alpha will be acceptable. This increase is more than .05% and therefore, the item should be deleted. This means that a new scale analysis needs to be done. This analysis shows a Cronbach's alpha of .66, which is acceptable. There are also no other items that can be deleted for increasing Cronbach's alpha. Therefore, EDI will consists of the items: competence building, employee involvement and internal/external interplay and autonomous task groups, which represents autonomy.

4.3.3 Construction control variables

There are also four control variables in this analysis. These control variables are: R&D, educational attainment, firm size and sector.

1. R&D

The first control variable is also an interaction variable in this research. This is because this research wants to find out if R&D and EDI, can strengthen each other. So, this variable is about research and development within an organization. Question 14.2 measures the percentage of employees working at the R&D department within an organization, see appendix I. There are six missing answers on this question, which should all be deleted pairwise.

2. Educational attainment

Educational attainment is about the percentage of employees that has a higher education (HBO and WO) within the company. This is measured in question 14.1 and consists of only one item, see appendix I. Therefore, a scale analysis is not necessary.

3. Firm size

Paragraph 4.2 already showed that an organization needs to have at least 10 employees to fit into the research population. The number of employees is measured in question 20 and consists of only one item, see appendix I.

4. Sector

The sector the organization is working in is also important. In paragraph 4.2 it is already mentioned that this research does not include service companies. Question 1.2, see appendix I, asks in what industry the company is operating in. It does not need a scale analysis, because only one item is measured.

4.4 Univariate analysis

This paragraph gives an overview of the variables included in the analysis. All variables are described via: mean, median, mode, standard deviation (sd), min and max, kurtosis and skewness. In table 4 a summary is given for all the variables and their different values.

Table 4. Summary univariate analysis

Variable	Mean	Median	Mode	Sd	Min	Max	Kurtosis	Skewness
Process innovation	2,32	2,00	0	2,41	0	9	,36	1,12
Incremental product innovation	,66	1,00	1	,48	0	1	-1,58	-,67
Radical product innovation	,37	,000	0	,49	0	1	-1,75	,52
EDI	3,44	3,00	4	2,12	0	7	-,90	,05
R&D	7,62	5,00		9,77	0	70	14,29	3,12
Education	16,74	10,00		16,84	0	100	7,01	2,42
Firm size	2,56	2,000	2	1,23	1	5	-,77	,46
Sector	3,91	4,000	1	2,14	1	7	-1,43	-,15

There are three dependent variables. The first dependent variable is *process innovation*, which consists of 18 different technologies. However the maximum number of technologies that are actually applied in an organization is nine. This is only half of all the possible technologies an organization can apply. Also, the mean is only 2.32, this means that on average only 2.3 technologies are applied in an organization, which seems quite low.

Another dependent variable is *incremental product innovation*. The mean of incremental product innovation is .66, which means that more than half of the respondents (66%) has introduced a new product since 2009, that was new to the company. The frequency table shows that this 66% is around 90 companies, that introduced a product since 2009, that was new to the company. See table 5, for the frequencies.

Table 5. Frequency table incremental product innovation

	Frequency	Valid percentage
0 - no	47	34,3%
1,0 - yes	90	65,7%
Total	137	100,0%

The last dependent variable is *radical product innovation*. The mean of radical product innovation is .37, which means that only one third of the respondents (37%) has introduced new products that were not only new to the company but also new to the market, since 2009. Table 6, shows the same valid percentages. This means that out of 90 companies that introduced new products which were new to the company, 48 of them also introduced products that were not only new to the firm but also new to the market.

Table 6. Frequency table radical product innovation

	Frequency	Valid percentage
0 - no	80	62,5%
1,0 - yes	48	37,5%
Total	128	100,0%

The explanatory variable in this analysis is *EDI*. EDI runs from zero to eight, see table 7. However the minimum and maximum of this variable are zero and seven. This means that none of the organizations has the maximum score of eight on EDI. So, no one did perform perfectly on EDI, but 15 companies were really close with a score of 7. The mean is 3.44. This means that on average a company is almost half the perfect score and can still improve a lot with regard to EDI.

Table 7. EDI

Category	
0	No EDI practices
1	One EDI practice
2	Two EDI practices
3	Three EDI practices
4	Four EDI practices
5	Five EDI practices
6	Six EDI practices
7	Seven EDI practices
8	Eight EDI practices

Finally, there are four control variables in this analysis, *R&D* is one of them. The skewness and kurtosis of R&D does not fit the criteria. According to Field (2014) the value of skewness and kurtosis needs to be between -3 and 3. The kurtosis of R&D is 14.29, this is really high and it means that there is a lack of symmetry. Also the skewness, with a value of 3.12, is a little bit too high. Which means that the distribution is also pointless. Therefore, the variables needs to be transformed. According to Field (2014) deciding which transformation to use is by trial and error. Several transformations were done, namely: log transformation, reciprocal transformation and square root transformation. Square root transformation delivered the best results. So therefore, the variable R&D is square rooted. The new values of skewness and kurtosis fit the criteria according to Field (2014). The new values can be found in table 8.

Table 8. Skewness and kurtosis R&D

	Skewness	Kurtosis
Old value	3,12	14,29
New value R&D_squareroot	,62	,93

However, R&D also acts as an interaction variable in this research and therefore it needs to be centered. This means that the mean is subtracted from each score. The same is done for EDI. After centering both variables, they are multiplied by each other. The skewness and kurtosis of the interaction variable are: 1.24 and 1.81.

The second control variable is *educational attainment*. It has a mean of 16,74. Which means that on average 16% of a companies' employees has a higher degree (WO +HBO). However, the variable does not fit the criteria Field (2014) sets for kurtosis. The kurtosis of educational attainment is way too high, namely 7.01. Therefore, a transformation is needed. The same transformations were applied as with R&D. Square root transformation was the one that helps the best.

Therefore, the variable educational attainment is square rooted. After transforming the variable, the new skewness and kurtosis fit the criteria. The new values can be found in table 9.

Table 9. Skewness and kurtosis educational attainment

	Skewness	Kurtosis
Old value	2,42	7,01
New value Edu_squareroot	,69	1,48

The third control variable is *firm size*. The mean of firm size is 2.56. This means on average the company size is between category 2 and 3, which is between 20 to 99 employees. However, the mode is also 2, which means that category 2, 20 to 49 employees, is the most frequently answered category. See table 1 in paragraph 4.2 for an overview of all the categories.

The last control variable, *sector*, has a mode of 1, because category 1, the metal sector, is the most frequently answered category. All sectors and their frequencies are summarized in table 2, within paragraph 4.2. As can been seen, there are seven different industries presented in this survey and the service company is taken out of the data set, which brings the total to N=139.

4.5 Bivariate analysis

This paragraph investigates the extent to which multicollinearity exists. This means that the explanatory variables must be associated as closely as possible with the dependent variables, but as little as possible with each other. The criteria that needs to be checked is normality, which is about small samples. The sample consists of 139 observations, which is reasonably large, and large enough for the central limit theorem to relieve us of concerns about normality, according to Field (2014).

Table 10. Bivariate analysis

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Process innovation	1	,26**	,14	,44**	,07	,12	,47**	-,05	,06	-,02	,06	,01	-,03	-,001
2. Incremental product innovation		1	,47**	,27**	,34**	,23**	,15	,12	-,09	,14	-,03	-,12	,06	,14
3. Radical product innovation			1	,26**	,13	,19*	,13	,25*	,04	,01	-,14	-,13	-,06	,04
4. EDI				1	,35**	,36**	,34**	,08	,11	,03	,04	-,01	-,18*	,03
5. R&D					1	,59**	,08	,17	,05	,11	,03	,01	-,12	,27**
6. Education						1	,22**	,13	-,02	,15	,06	-,04	-,05	,27**
7. Firm size							1	,10	,02	-,01	,04	-,07	-,07	,01
8. Metal								1	-,16	-,20*	-,16	-,28**	-,28**	,19*
9. Food									1	-,10	-,08	-,14	-,14	,10
10. Textile										1	-,10	-,18*	-,18*	,12
11. Construction											1	-,14	-,14	,10
12. Chemical												1	-,24*	,17*
13. Machinery													1	,17*
14. Electrical														1

Table 10 shows the values that belong with the different variables. However, appendix V gives a better overview of the table. The table gives an overview of the Pearson correlation values that belong to the different variables. R-values that are bigger than .85 are multicollinear. This means that if there is perfect multicollinearity, value of 1 or -1, it becomes impossible to obtain unique estimates of the coefficients. This bivariate analysis does not show any R-values that are bigger than .85. The highest R-value, that is significant, in this analysis is .59. According to Field (2014) less than perfect collinearity is unavoidable. However, this value is still far from .85 and therefore acceptable. So, therefore the R-values in this analysis are acceptable, because low levels of collinearity pose little threat to the model estimates.

After checking for multicollinearity in the analysis, this analysis can also be used to see to what extent the expected relations, in anticipation of the multivariate analysis, already appear in the analysis. Field (2014) is used to determine the effects. According to Field (2014) Pearson's correlation coefficient is a standardized measure of an observed effect. There are different ranges for what kind of effect it is: +/- .1 represents a small effect, +/- .3 is a medium effect and +/- .5 is a large effect.

First of all, hypothesis 1 expects that EDI has a positive association with process innovation. Table 10 shows that the Pearson correlation coefficient between these two variables .44 is. This is a positive relation and according to Field (2014) a medium effect. So, up to now, this is in accordance with hypothesis 1. The second hypothesis is about EDI and incremental product innovation. Hypothesis 2 expects that EDI also has a positive influence on incremental product innovation. According to the bivariate analysis, this is the case, because Pearson's correlation coefficient is .27. When looking at the criteria that Field (2014) describes, it is a small/medium effect. The third hypothesis is about EDI and radical product innovation. The hypothesis does not expect a positive relationship between the two. However, the bivariate analysis explains something else. The Pearson correlation coefficient is a positive significant value of .26, which is a small effect. This is in conflict with what was expected in paragraph 2.4.3.

However, there are also other things that are important to mention. First, process innovation and firm size have a strong positive effect on each other, namely .47. This shows that the bigger the size of the company, the more process innovation an organization is conducting. This is expected because when organizations grow they also have more resources to do process innovation. Secondly, incremental product innovation and radical product innovation have a strong positive effect (.47) on each other. This is because when it is new to the market, it is also new to the company. Thirdly, incremental product innovation also has a small positive effect (.23) with educational attainment, this means that the more higher educated employees an organization has the more incremental product innovation is done within the organization.

Finally, radical product innovation and the metal sector also have a positive effect on each other. This effect is small (.25), but it means that in the metal industry more radical product innovation is conducted.

Employee driven innovation is also related to other variables in this analysis. First, employee driven innovation and R&D have a medium positive effect (.35) on each other. This means that they have a positive relation with each other. Another point to mention is that EDI and educational attainment are positively related to each other. This effect is also medium, with a value of .36. It shows that when an organization has more highly educated employees, it also will conduct more employee driven innovation. This could be expected, because higher educated people have a lot of knowledge and therefore also more ideas for EDI. Finally, EDI has a medium positive effect (.34) with firm size. This can be because more employees can mean more EDI. However, when conducting EDI big organizations possibly have procedures for conducting EDI[3].

Research and development has a strong, positive effect (.59) with educational attainment, which mean that the more higher educated employees, the more R&D is performed. At the same time, research and development has a small positive effect (.27) with the electronic sector. Finally, the control variable educational attainment is positively effect by firm size (.22) and the electronic sector (.27) . However, both are with a small effect. For firm size the relation can be logical because the bigger the firm, the more higher educated employees an organization can have. However, it is not sure if this relation is a linear relation.

4.6 Multivariate analysis

This paragraph consists of two analysis. The first analysis will look into the relationship between EDI and process innovation. The second analysis is focused on the relationship between EDI and product innovation. In this analysis, product innovation is split into incremental and radical product innovation. Overall, this chapter will end with a summary about which hypothesis are rejected and which hypothesis are accepted.

4.6.1 EDI and technological process innovation

In this paragraph a linear regression analysis is conducted to look into the relationship between EDI and technological process innovation. To conduct the analysis a few other steps are taken. First of all, the model assumptions are described. Secondly the model statistics are discussed. After discussing the model statistics the hypotheses are tested and finally, other findings are described.

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[3] There should be taken into account that small companies maybe conduct EDI, but they don't have formal procedures for it and are therefore they are not aware of the fact that they are doing EDI.

Model assumptions

There are four assumptions: linearity, homoscedasticity, independent errors and normally distributed errors. The figures that belong to these assumptions, can be found in appendix VI. The first assumption is about linearity. The scatterplot can tell if the regression model is linear, which it should be. There is a linear relationships when the dots do not form a clear pattern. The scatterplot, which can be found in appendix VI, is not showing a pattern, so therefore it can be seen as a linear model. The scatterplot is also used to check for homoscedasticity. It is homoscedastic, if there is no pattern in the residuals. The scatterplot shows that there is no clear pattern, such as a triangle, so the data is homoscedastic. For the third assumption, the independents of errors, the residuals statistics table is used, see appendix VI. Looking at the Standardized Predicted Value within this table, the mean should have a value of ,000 and the standard deviation needs to have a value of 1,000. This is the case for both. This means that the errors do not correlate with the independent variables and therefore do not influence the regression model in a significant way. Finally, the assumption about the normally distributed errors. The histogram and P-P plot both show a normal distribution, which means that the errors are normally distributed, see appendix VI.

Also, before the description of the model, the multicollinearity needs to be assessed. The VIF values should be below 10 and the tolerance statistics should be above .02, when this is the case there is no collinearity in the data. Appendix VI, shows that all values of VIF are far below 10 and all tolerance statistics are above .02. Therefore, we can safely conclude that there is no collinearity within the data.

Model statistics

After checking the assumptions, the model statistics can be interpreted via table 11. The first analysis is between the control variables and process innovation. The second analysis is between the control variables, EDI and process innovation.

First of all, the F statistics are important. ANOVA tests whether the model is significantly better at predicting the outcome than using the mean as a 'best guess'. The F statistic tests the null hypothesis. The first analysis has a F-statistic of 3.94, with $p<.001$. The second analysis shows a F-statistic of 5.42, with $p<.001$. Both are significant, which means that the variables in the analysis are significant predictors of process innovation. The second analysis also shows a significant F-change of 14.74 ($p<.001$).

Other important statistics to look at are the R and R^2. The R value is the value of the multiple correlation coefficient between the predictors and the outcome. When only the control variables are included as predictors, this is the correlation between them and technological process innovation. In this case the R =.47. However, when also EDI is added to the analysis (analysis 2), the correlation between EDI, the

control variables and technological process innovation increases to .56. The other value that is important is R^2. This value shows how much of the variability in the outcome is accounted for by the predictors. For analysis 1, R^2 = .23. This means that the control variables account for 23 percent of the variation in process innovation. When EDI is added, this value increases to .31 (R^2 =.31). This shows that, if the control variables account for 23% of the variation, it tells that EDI accounts for an additional 8%. The next step is the adjusted R^2, which is about how well the model generalizes. Ideally, this value is the same as, or very close to, the value of R^2. In analysis 1, the difference is small (.23 - .19 = .04 or .04%). This means that if the model was derived from the population rather than a sample it would account for approximately 4 percent less variance in the outcome. This differences becomes a little bit bigger in analysis 2. The adjusted R^2 = .25, which lead to a difference of .06 (.31-.25 =.06). So model 2, would account for approximately 6 percent less variance in the outcome. Finally, the R^2 change is for analysis 1 .23 and for analysis 2 .08. This .08 refers to the 8 percent extra variation that can be explained when EDI is added to the analysis.

Table 11. Linear regression analysis technological process innovation

Technological process innovation		Analysis 1	Analysis 2
Control variables	R&D	,18	,05
	Educational attainment	-,01	-,02
	Firm size	,,93**	,75**
	Metal	,41	,43
	Electrical	,02	,23
	Machinery	-,20	-,39
	Chemicals	-,31	-,31
	Construction	-,45	-,37
	Food	-,18	-,35
Explanatory variables	EDI		,38**
Model statistics			
F-statistic		3,94**	5,42**
F change			14,74**
R		,47	,56
R^2		,22	,31
Adjusted R^2		,19	,25
R square change		,23	,08
N		132	132
*p<,05; ** p<,01			

Hypothesis testing

Now the model statistics has been described, the hypothesis can be tested. For process innovation the following is expected, **H1: EDI has a positive impact on process innovation within an organization**. When looking at the analysis, EDI is significant and has a positive value of .38. This shows that when EDI is improved by one practice, the amount of technological process innovation within an organization will increase with .38. This means that an organization has to improve EDI with three practices, before they have one more process innovation within the organization. Overall, EDI and process innovation have a positive relation within an organization and therefore the hypothesis can be accepted.

Other findings

Besides testing the hypothesis, there are also other things that stand out. First, there is another variable that is significant, which is firm size. Firm size also positively influence technological product innovation. This means that the bigger the organization, the more process innovation will be conducted. Therefore, every unit increase in the firm size is associated with an extra .75 activity in technological process innovation. The other thing that needs to be noticed is the fact that there are no differences between the sectors with regard to the different processes they perform. This is because they all show a non-significant relation. So, overall, firm size and EDI influence process innovation positively, just as the bivariate analysis also has shown.

4.6.2 EDI and product innovation

In this paragraph a multinomial regression analysis is conducted to look into the relationship between EDI and product innovation. This specific analysis is used because the regression analysis will consist of a nominal variable with three categories. To conduct the analysis a few other steps are taken. First of all, the model assumptions are described. Secondly the model statistics are discussed per hypothesis. After discussing the model statistics the hypotheses are tested and finally, other findings are described.

Model assumptions

There are six assumption with regard to multinomial logistic regression. The first assumption is about the dependent variable. The dependent variable should be measured at a nominal level. This is the case because product innovation consists of three categories: 0 – no product innovation, 1 – incremental product innovation and 2 – radical product innovation. Assumption two is about the independent variables. The analysis should consist of one or more independent variables that are continuous, ordinal or nominal, which may include dichotomous variables. This analysis consists of six independent variables, which are all nominal or continuous variables. So, this also fits the criteria that belong with multinomial logistic regression.

The third assumption is about independence of observations and the dependent variable must contain categories that are mutually exclusive and exhaustive. This is the case for this analysis. The categories are divided in such a way that they are mutually exclusive and exhaustive. The fourth assumption is about multicollinearity. Multicollinearity can be checked via a linear regression analysis. Via the table coefficients, the tolerance and VIF can be analyzed. The same as with linear regression, the VIF should not be bigger than 10 and the tolerance should be as close to one as possible. Appendix VII shows the coefficient table with the values that are important. All tolerance values are quite high. The lowest tolerance value is .60, which is still really good. The same holds for the VIF values. The highest value is 1.66 and is still a good value that fits the criteria. This means that assumption four is also met. The fifth assumption is about linearity. According to Field (2014) there needs to be a linear relationship between the continuous independent variables and the dependent variable, that is logit transformed. The assumption of linearity of the logit has been met when the values of the interactions are greater than .05. See appendix VII for the values that belong with the different variables. The table shows that almost all variables have a significance bigger than .05, namely: size (.69), R&D (.61), educational attainment (.49), EDI (.53) and the interaction variable EDI*R&D (.54). This means that industry violates the assumption of linearity. Therefore the log variable of industry needs to be taken into the analysis, which gets a significance bigger than .05, namely .38. The last assumption is about outliners. This can be checked via the partial regression plots, see appendix VII. There are no outliners that have such a high value that they can influence the analysis. So, therefore, this assumption is met.

Model statistics

After checking the assumptions, the model statistics can be described. Table 12 gives an overview of the model statistics. As can be seen, the model statistics are the same for incremental and radical product innovation per analysis, there is only a difference between analysis one, two and three. The model statistics will be described according to the hypothesis that belongs with it.

The first analysis does not contain any hypothesis. It is an analysis between the control variables and product innovation. However, it is still important to look at how well the model fits the data. This can be done via Pearson, which can be found in the goodness of fit table, see appendix VIII. A statistical significant result (i.e., $p < .05$) indicates that the model does not fit the data well. However, in this case the p-value is .26, which is not statistically significant. Based on this measure, the conclusion can be made that the model fits the data well. Another option to get an overall measure of this model, is to look at the statistics presented in the table model fitting information, see appendix VIII. The final row shows information on whether any of the coefficients are statistically significant. So, whether the variables, that are added to the analysis, statistically and significantly improve the model compared to the model when no variables are added (intercept alone). The significance column shows that $p = .002$, this means that the full model statistically significantly predicts product innovation better than the intercept alone.

The model statistics of this analysis can be found in table 12. It shows that $X^2 = 39.55$ and that Nagelkerke $R^2 = .29$. This means that the control variables explain 29% of the variance in the model.

The second analysis has two hypothesis that can be tested. The first one is, **H2: EDI has a positive impact on incremental product innovation** and the second one is, **H3: EDI has no positive impact on incremental product innovation**. First, the model fit needs to be checked. In appendix VIII, the goodness of model fit table is included. This table shows that Pearson has a value of .18, which is good, because it is not significant. This means that the model fits the data well. The other option to get an overall measure of this analysis, is to look at the statistics represented in the table model fitting information, see appendix VIII. The final row is important here. The table shows that p=.001, which means that the full model is statistically significant. This means that it predicts product innovation better than the intercept alone, or the model with only the control variables, because the X^2 has increased from 39.55 to 45.27. After checking the model fit, the model statistics can be described. The value of model $X^2 = 45.27$. This is an increase in comparison to analysis 1 ($X^2 = 39.55$). Also, with regard to multinomial logistic regression, there are measures that are similar to R^2 in linear regression analysis. In this analysis Nagelkerke R^2 is the one that is used to look at the proportion of variance that can be explained by the model, see table 12. Nagelkerke R^2 has a value of .33, which means that 33 percent of the variance can be explained by the control variables and EDI. This shows that when EDI is added to the analysis, the variance that can be explained increases with 4 percent, because .33 - .29 = .04 percent.

Finally, analysis three consists also of two hypothesis, namely: **H4: EDI positively strengthen the effect of R&D on incremental product innovation** and **H5: EDI positively strengthen the effect of R&D on radical product innovation**. So, first the model fit needs to be checked. The Pearson value, which can be found in appendix VIII, is not significant (p >.05). It has a value of .23. This means that the model, with the control variables, EDI and EDI*R&D, fits the data well. Secondly, the table model fitting information, see appendix VIII is used to look at the overall measure of this analysis. The table shows that p=.001, which means that the full model is statistically significant. The value that belongs with this significance is X^2 , which has a value of 48.54. This means that this model predicts product innovation even better, than the last two analysis, which showed a X^2 of 39.55 and 45.27. After checking the model fit, the model statistics can be described. The value on model $X^2 = 48.54$. This is an increase in comparison to analysis one and two. Secondly, Nagelkerke R^2 is used to look at the proportion of variance explained by the model. Nagelkerke $R^2 = .35$. This means that 35 percent of the variance can be explained by the control variables, EDI and EDI*R&D. This shows that adding the interaction variable EDI*R&D to the analysis, leads to an increase in the explained variance. The increase is not high, because the variance that can be explained increases with 2 percent, because .35 - .33 = .02 percent.

Table 12. Multinomial regression analysis product innovation

	Incremental product innovation			Radical product innovation		
	1	2	3	1	2	3
Control variables						
R&D	,72**	,65**	,99**	,40*	,31	,83**
Education	-,12	,65	-,11	,15	,09	,13
Firm size	,34	,29	,27	,34	,22	,21
Metal	-,84	-,83	-,85	-1,86	-1,98	-2,04
Textile	-2,29	-2,32	-2,38	-1,34	-1,45	-1,58
Machinery	-1,92	-2,02	-2,09	-1,42	-1,69	-1,82
Chemical	-,76	-,78	-,86	-,30	-,38	-,54
Construction	-1,41	-1,33	-1,34	-,35	-,29	-,35
Food	,64	-,74	,63	-,15	,14	-,29
Explanatory variable						
EDI		,14	,35		,32*	,63**
Interaction variable						
EDI*R&D			-,12			-,16
Model statistics						
Model X^2	39,55**	45,27**	48,54**	39,55**	45,27**	48,54**
Nagelkerke R^2	,29	,33	,35	,29	,33	,35
N	131	131	131	131	131	131
*p<,05; ** p<,01						

Hypothesis testing

After describing the model statistics, the hypothesis can be tested. There are multiple hypothesis for these analysis. The first hypothesis is: **EDI has a positive impact on incremental product innovation.** In both analysis: two and three, the effect from EDI on incremental product innovation is positive. However, these are both not significant, which means that there is no significant relation between the two. So, the hypothesis needs to be rejected.

The second hypothesis is about EDI and radical product innovation, namely: **EDI has no positive impact on radical product innovation**. This analysis also needs to be rejected, because both in analysis two and three, EDI has a significant and positive influence on radical product innovation. Analysis two shows a value of .32, with a significance that is smaller than .05, this means that a significant contribution is made. However, the contribution is not that big in comparison with analysis three. This analysis shows a value of .63, with a significance smaller than .01. So, overall, this hypothesis can also be rejected because the analysis show that EDI does positively influence radical product innovation.

The last two analysis of this research are about the relationship between EDI and R&D on incremental and radical product innovation. For incremental product innovation, the following hypothesis is determined: **EDI positively strengthen the effect of R&D on incremental product innovation**. This relationship is not significant (-.12, p=n.s) in analysis three and it also is negative. However, note that this effect may be superseded by the variable R&D, because this variable is constant significant in all three analysis. The same holds for the hypothesis with regard to radical product innovation: **EDI positively strengthen the effect of R&D on radical product innovation.** This hypothesis can also be rejected because the b-value of the interaction variable is negative and also not significant (b=-.16, p=n.s). This means that there is no significant relation between the variables. However, also for this hypothesis there is a possibility that this interaction is suppressed by the variables: R&D and EDI, because both turn out to be significant and positive with regard to radical product innovation. This can be seen in the last analysis, in which R&D: b=.83, p<.05 and EDI: b = .63, p<.01 is. An explanation for this can be that EDI is not only for the non-R&D employees, but also for the R&D employees, which ensures that the common variance is filtered out. To see if R&D filters out the common variance within the relationship between ED and product innovation, another analysis has been done without the variable R&D in it. This analysis shows that without R&D, EDI becomes also significant for incremental product innovation (b=.237, p<.05). This shows that without R&D, EDI could have a positive relation with incremental product innovation, see appendix VIII for the table with all the values of the analysis.

Other findings

Finally, there are a few other things that stand out. First, with regard to incremental product innovation. Educational attainment is once positive in all three analysis. Also, the bivariate analysis described a positive relation between EDI and incremental product innovation, but this relations turns out to be non-significant in the multivariate analysis. The bivariate analysis also described a positive relation between R&D and incremental product innovation and the multivariate analysis also shows that this relationships is significantly positive. For radical product innovation it is noticed that R&D is once in the analysis not significant. The reason for this is unclear. Also, the bivariate analysis described a positive relation between radical product innovation and educational attainment. This value was always positive, but never significant in the multivariate analysis. Finally, all industry sectors are not significant in all three analysis.

Summary

Overall, table 13 shows which hypothesis are accepted and which ones are rejected. It shows that non-R&D employees affect process innovation and radical product innovation in a positive way. While, at the same time R&D affects incremental product innovation is a positive way, but also radical product innovation.

Table 13. Overview hypothesis

Hypothesis	Status
H1: **EDI has a positive impact on process innovation within an organization**	Accepted
H2: **EDI has a positive impact on incremental product innovation**	Rejected
H3: **EDI has no positive impact on radical product innovation**	Rejected
H4: **EDI positively strengthen the effect of R&D on incremental product innovation**	Rejected
H5: **EDI positively strengthen the effect of R&D on radical product innovation**	Rejected

5. Qualitative research

After analyzing the quantitative part of this research, this chapter will analyze the qualitative part. The qualitative part consists of three interview. The transcripts of the interviews can be found in appendix IX and the coding of the interviews can be found in appendix X. The analysis will start with describing what all three companies understand with regard to process and product innovation. Then it will describe the items of EDI and what they already do with regard to the item and how they think these items are related to either process or product innovation.

5.1 Process and product innovation

According to all the companies, process innovation is about efficiency. Which is all about producing more in the same time, or producing against lower costs. One of the companies said the following about it: *"There are some international teams that look at the best practices and trying to put it in a standard process for improvement. So they are trying to make the things that are working today, become better."* So, process innovation overall is about doing things that work today, tomorrow even better/ even more efficient. Overall, all the companies describe process innovation almost the same.

With regard to product innovation, one company really described how they saw and understand the differences between incremental and radical product innovation. They described both definitions as follow: *"Incremental, I think is about the current process. It is the reason for trying to discover flaws in the processes and products of today and to optimize these. With radical product innovation, it is possible, that you work out an idea that has nothing to do yet with the organization. You are not even sure if it fits the organization."* This quote tries to tell that incremental product innovation is about trying to find whether the products of today can be optimized and that radical product innovation is sometimes about designing products that you are not even sure about if it fits the organization, but you try to develop it, to see if it is a possibility for your organization. Another company described incremental and radical product innovation as follow: *"We try to make the product better or to make new products, if possible."* They did this by focusing on what the competition is doing and whether there is a change for them to produce better or newer products. Overall, the companies agreed that incremental product innovation is about making products better or newer for you as an organization and radical product innovation is about making products that are completely new, even for the market.

5.2 EDI and R&D

After describing how the organizations think about process and product innovation, this paragraph describes what the organizations do with regard to the different components of EDI and to R&D. This paragraph also describes how the interviewees think these items are related to process and/or product innovation. The first one asked about is competence building. Competence building is followed by: employee involvement, interplay, autonomy and R&D. All their tree structures can be found in appendix IV.

Competence building

First of all, within all companies the employees get training. However, these trainings can differ quite a lot. For example, it can be done in-house or outside the organization. One of the organizations has an academy in-house, which means that a lot of training can be done in-house. Also, the training itself can differ. An example is that two companies also did a training on how to drive a forklift, because it is a production company and they need to drive a lot on a forklift in this organization. Another example of a training in a company is the following: *"One of the most important trainings, at least that is what I really like, are the once that involve the culture of the organization. When you are going to work here, you get in your first month a kind of onboarding program in which you get to see and get to know all the facets of the organization."* This organization is really offering different courses and trainings. Not only do they give a training when your new in the company, they also do job/department trainings, product focused trainings and training focused on the soft skills of the employees. Another good example of this organization is: *"We work with Insides, that means red, green, blue or yellow. Red means: employees who continue, that have enough information and make a decision. Yellow means: the creative employees. Blue: employees that bring a lot of structure into work and that really want to know all the details before making a decision. Green: those are the people, people. They do not change that much."* It is a good example of knowing what kind of employees the organization has and also knowing what kind of training fits with these different employees. However, this organization has a portfolio that offers all kinds of job related trainings, which is really important according to them, because they need to stay up to date. Stayin up to date is also important in the other companies. One of these companies also offers the craftsman education: *"This year we started with the (name of company) Vakman education. This training is for technicians and should ensure that there is a better attraction on the labor market and well-trained technical staff."*

So, staying up to date is what all organizations agree on. For example: *"A colleague of my is not doing any courses, but wants to follow a master, which can bring us new knowledge inside the organization."* Not only masters are used to get new knowledge inside the organization, but also two out of three organizations is talking about knowledge session. One organization has knowledge sessions with the same kind of companies, while the other company has knowledge sessions with completely different

organizations and functions. They both try to develop new knowledge. An example of one of the companies is the following: *"Myself, is really active in networks that have nothing to do with the branch we are working in. This is because I sometimes think that the hairdresser maybe asks the question that can send me in a certain direction."* This shows that both companies find it successful to sometimes go outside the organization for new knowledge, especially for the job of tomorrow. Overall, one of the interviewees said the following: *"Trying to create a field of tensions. I am somebody that always want to stir things up, to cause some unbalanced feeling. This is because, from within this unbalanced feeling, you get change."* This change is needed to get, or do even more, process and product innovation.

Overall, all companies do a lot of training, but most of these companies did not saw a connection between the trainings (competence building) they did and product or process innovation. They both thought that creativity was more important than the training itself. The only effect that maybe could be see, was an indirect effect for training and process innovation. However, one organization explained: *"There are definitely trainings that we facilitate that have an important interface with innovation. And that is both on product and process innovation."* So, the opinions are divided, because some do not see an effect, some see an indirect effect and one sees for some trainings an important interface with innovation.

Employee involvement

Besides competence building, employee involvement is also an item of employee driven innovation. This item is about involving employees in the innovation processes of the company. First of all, all companies agreed on the fact that an organization is nothing without the employees working for it. The following quote confirms this: *"You are as a company nothing. A company consists of people, so finally it is about the people that together try to achieve the best."*

However, for the organizations to get the employees involved, different instruments are used in practice. To communicate about the state of affairs of an ongoing innovation process within the company different instruments are discussed. For example, multiple companies told that they are using TV-screens and a newsletter to communicate. An example of this is the following: *"We have a newsletter which comes once in the 2 months in your e-mail. This letter will always describe which projects are currently running."* Even one of the employees that has been interviewed said the following: *"In my contract was written that it would be appreciated and asked to think in terms of the company."* When thinking with/for the company, the employees also really feel that they are involved in the company. One of these companies find it really important that new products are tested before it goes to the market. They do this via the employees. *"They get a change to tasted it, because we want to know what they think about the new product, before we bring it to the market. So, they taste it and fill in a small survey about what they thought about the label, the bottle and the taste."*

However, one of the organizations also said that most of these instruments are really focused on operational things with regard to innovation. He proposed to create something new, that could be more useful. He suggested the following: *"But for this theme, innovation, we need to create something new. I think we need a kind of forum, or interactive space."* This interactive space, would bring the employees together online, in which they are able to share their ideas and to react on each other's ideas. This could also ensure that employees understand the decisions, managers are making. Another company also explained that there should be something else to get employees more involved, but this company did not had any idea about what it should be. However, this shows that this kind of co-creation is very encouraged in multiple companies, because it can bring out new ways of thinking.

For this co-creation, employees need to be really involved. One of the companies said the following about involvement: *"The second value is: engaged. Which means involvement. It is involvement based on people, planet, profit."* This organization has four core values and one of these core values is about involvement. Engagement based on the planet, the profit, but most importantly involvement based on people. This means that employees are involved in projects, when they have knowledge that can add value to the project. Open communication is really important for this, because when communicating openly inside the organization you can reach people, that you otherwise would never had approached for help. An example of this is a 3d-printing project one of the companies started. There is a lot of fear about it, because of the competition and the things that can be done with 3d-printing. This meant that the communication for this project was not as open as usual, with the result that an employee, with a background of 3d-printing, got involved much later into the process then desirable. Another organization also has a core value that belongs with employee involvement, namely trust. *"One of our values is trust. This means not only trust in the product we make, the things we do, but also trust in our employees. That they try to perform as optimally as possible every day. This also means that when they have some good idea etc., they need to get the possibility to explain these ideas to us."*

Overall, the organizations see the value of involving employees, also when they do or do not have the knowledge that is needed for the innovation project. This is because these employees can also add value in terms of new ways of thinking or asking a question that can send them in the right direction. However, one of the companies is also a bit skeptical, because: *"I hardly think that only involving employees can be the one thing that can establish innovation, I think there is more needed then that."* He explains that there is more than only involving the employees for new innovation projects. However, the same person also thinks that it is really important to give the employees a voice. So that they can tell the company if the new products are good or not. This shows that most organizations see potential in involving employees in their process and product innovations, but that some of them are still divided.

Interplay

The third item of EDI is about interplay. This interplay can be intern or extern, which means collaboration between employees or collaboration between the company and another organization. All organizations agree that collaborations are important, inside and outside the organization. The following quote shows that collaborations are important for organizations, because it will bring them further: *"Look at society, with collaboration you can come a lot further. Collaborations in all industries is what is happening now."* Also, one of the companies specified this a little bit more, by saying the following: *"I think both can be really important. For new ideas the internal collaboration is important I think, but when the idea is there and the organization needs to develop it, the collaboration with external is really important."* This shows that internal collaboration is important for the start of a new innovation idea and external collaboration is necessary for the success of the innovation idea, according to this organization.

However, the organizations say that they think that both collaborations are important, but in practice, the internal interplay is still not happening that much for these companies. According to one of the organizations there should be multidisciplinary systems, in which employees from different departments can form a really good team. Yet, little is done about it. They said the following about it: *"We need to focus more on multidisciplinary systems, because the right creatives, the right technical people and sales people, when brought together can become a pretty good team. But, when you talk about actively working together inside the organization, we do not do that a lot for innovation, but it should be more."* The only thing they achieved so far is: *"The continuous improvement program, which tries to connect these departments with each other, by having conversations, which should create a different dynamics, which causes new ideas for process innovations."*

Another organization already did some things about internal collaboration. For example, every Monday they keep a meeting, in which commerce, the business developers and production employees come together. This meeting looks at the question the customers have and they talk about which questions can be achieved immediately and which questions take more time. They do this because: *"I think that it is good that different people sit together, also because a lot of requests can come from different places within the organization. So, bringing these people together on Monday, makes it easier to look at a request and make sure we handle it in the right way."* This organization is already trying really hard to use the knowledge they have inside the organization as much as possible. An example of their attempts to bring knowledge together is the following: *"Building the new factories: because there is already a lot of information, because three factories are already build from the ground up, which brought quite a lot of new knowledge into the organization. We try to involve these people, who already build a factory before."* The third organization that has been interviewed also did somethings about internal

collaboration: *"Different employees for example one from sales, one from finance and me work together when I have created a new idea, because I cannot work out the idea by my own."*

So, some of these organizations are really in its infancy with regard to internal interplay, while others are trying really hard to do at least a few things. However, the most common collaboration is those between the organization and other companies. This external interplay means for some companies that they work really close with the suppliers and customers, so they can create an open relationship with these parties. One of the companies told the following example: *"The example of Zeewolde, we bought a washing line for PET, which is 25 years ago, which was kind of a "gamble". This worked out really well, the reason therefore is because they tried to develop together with the machine supplier a process. That is what is happening in Heerenveen now. Multiple parties are involved, from which we know that they have the right knowledge, about how we want to have it. So this is a really close and intensive collaboration."* Another organization explained that they did work really close with the suppliers, but they had a strict policy for which suppliers they work with: *"We work really close with our partners and suppliers for every part of the chain. We have a very strict suppliers policy. This policy demands from every supplier that they fulfill the relevant national environmental legislation."* This way they only work with suppliers that follow the same rules about environmental legislation as them, something they find very important.

These relationships can also be between business partners and consultants. An example is: *"We have a lot of business partners and consultants who we work together with when we talk about processes, they are the once that need to deliver burden of proof to make strategic decisions. So, in that way we work together a lot with different actors."* An important party for one of the organizations is the government, because they have to deal a lot with regulations. Therefore: *"What is really interesting for us is the government, we cannot do anything without the government. So that is something we are working on. A colleague is a lobbyist, which is a member of the same board that talks with Den-Haag etc. Via, via is the way you sometimes need to take, otherwise you won't make it."* While some organizations have to deal with the government a lot, other organizations are trying to achieve great things with start-ups. For example: *"There are a lot of startups, who have a really nice dream, with a nice product, but they cannot tell you which problem they solve and when we help them, it can become useful for us."* Overall, new collaborations are mostly focused on external parties. The reason for this is because the information is most of the time quite new, which means that the organizations have a lack of experience with it. Also, most of the organizations do not want to reinvent the wheel. Finally, one of the organizations said: *"I think it starts intern within the company, that is important. However, at the same time it also comes from extern. So, I think that the foundations needs to be laid within the company and the you need the right companies that support you in this."* This also almost corresponds to what another company is saying in the beginning of this paragraph.

Overall, all organizations show that both collaborations are important and can also be successful with regard to process and product innovation. The examples given are also all about either process or product innovation. They all talk about co-creation, which can bring new ideas for new innovation projects. However, internal collaborations is less developed within some company in comparison to external collaborations. All these collaborations try to add something to the innovation processes within the organization, with regard to process and product innovation.

Autonomy

Autonomy is about the responsibilities an employee gets. Each, organization is asked to give it a number, from zero to 10. One company gives their autonomy an eight, while the other organization gives it a 6.5 and the third company gives their autonomy a seven.

This are all really different numbers and they also give different reasons for it. The organization that gives their autonomy an eight, gives the following reason: *"We have a lot of freedom but at the same time also a lot of responsibility. In this company is it possible to follow your own plan, but you need to make sure that you can take responsibility for when it goes wrong."* One of the employees that has been interviewed, was quite new at the company (something longer than a year) and she said that: *"At the office, how I experienced it as a new employee, was that my function was new. I got all the freedom to determine my own function and to focus on what I think is important. Once a month I had a conversation about what I already did, what I want to do and what I think is going really well."* Also, with regard to the production employees this organization do not steer on numbers, but on quality. Therefore, an eight was given.

However, the other organization, that gave their autonomy a 6.5, named other reasons. The following reason is described for this number: *"The reason for this is because, people get a lot of freedom, but whenever a customer is calling, they always go first."* According to this company: on a daily basis, everybody is busy with the daily job. So, in practice there is no freedom to be autonomous, and to think about other stuff then your daily job. When you want to be more autonomous, the following needs to be done: *"Employees need to say: hey I am doing for 70% my job for what I get paid and for 50% I do what I think is important for the organization, but then you ask your employees to also put time of their own into the process."* However, this organization is already giving employees the possibility to make their own proposal for a certain kind of training, because they are the once that want to develop their selves. Because, overall the employer should take responsibility to stimulate and support the employees. However, at the same time, they are not the only once responsible for it. The employee also has a responsibility to itself.

The third organization gives on average a seven to their autonomy. This is because he gives the production employees a 6.5 and the management employees a 7.5. However, according to the interviewee: *"Yes, I think it is a fair number (7) to give to autonomy in this organization."* He gives the production employees a lower number, because: *"For product employees we have written instructions, because for the brewery to work perfect, a good and precise process needs to be followed, so for them I would give a 6.5."* The interviewee explains that quality is everything for the organization and therefore a strict process needs to be followed. On the other side, the non-production employees get a 7.5 for their autonomy. The interviewee explains why: *"Every employee is encouraged to think for the organization. However, I think we are in the middle of it with a 7.5, because whenever a customer is calling, they always go first, so then they are too busy with making the current situation better for the customers, instead of looking at new products or processes."* She gives almost the same reason as the organization that gives it's autonomy a 6.5, because they both said they get a lot of freedom, but the customer always will go first.

So overall, the numbers are different, but sometimes the same reasons are given. This shows that most organizations give the employees a lot of autonomy, but whenever a customer is calling, they always go first. Finally, this shows that all organizations think that autonomy can lead to more/better innovation projects, but that in most situations there is not enough autonomy. So, more autonomy does not automatically mean more innovation, because the employees then also need more time, otherwise there will not be an effect.

R&D

In this research, the relationship between EDI, R&D and product innovation is also investigated. The interviews showed that R&D is on a daily basis busy with improvements. One of the organizations told the following: *"I think every test of trial I do, is important for the business developers. These tests and trials can check whether something can be made or can be employable."* This quote explains that R&D employees do a lot of tests and trials to see whether something can be made or not.

However, some organizations did not have specific R&D departments, they give it another names. While at the same time, others have multiple R&D departments: *"Well, we have different R&D departments. We have technical R&D department, they are in the same building as the Academy we have. We also have, the Hub. The Hub is occupied with the developments of the online techniques, they are occupied with the techniques in the broader sense of the word, who eventually are used by the organization."* This shows that this organization has multiple R&D departments, who are engaged in developing all kinds of stuff.

With regard to the role of R&D in an organization, two companies both explain that R&D is most of the time involved with big/new projects. One of the organization explains: *"I think it is most of the time R&D, when it is about a new project, maybe 1 or 2 non-R&D employees, so around 75/25."* This shows that whenever it is about a new product, more R&D employees are involved than non-R&D employees. However, this organization is saying that there are sometimes more non-R&D employees (75/25) involved. Another organization is not totally agreed with this, because they say: *"I think that R&D employees are involved in phase one, which is the idea generation till the phase of minimal viable product. Then, the moment we as non-R&D employees say: yes, that is a really good idea! It can work out really well for us, than then non-R&D employees need to pick up the idea and integrate it into the company, only this way the idea can get ownership."* This organization is explaining that R&D and non-R&D employees are acting in different stages of the development of a new product.

Overall, when the organizations are talking about big changes, new products, they also talk about R&D. However, when they talk about small changes, they also talk about more non-R&D involvement. The following quote: *"So, in summary I say that R&D is more on the radical product innovations and non-R&D is more on the incremental product innovations"* explains that most organizations see a strong relationship between R&D and radical product innovation and a less strong relationship between R&D and incremental product innovation. However, when looking at the involvement from EDI and R&D, multiple companies explain that non-R&D employees have something good to say about existing products and less about radical new products.

6. Conclusion

This chapter will bring the results of the quantitative and qualitative part together and draw a conclusion. It will also give an answer to the main question of this research.

To start, the theoretical part of this research made a distinction between technological and non-technological innovations. The choice was made to focus on technological innovations, which consists of process and product innovation. Different books, articles and other scientific resources has given definitions to these terms. For product innovation a distinction was made between incremental and radical product innovation. Incremental product innovation means new to the company, while radical product innovation means new to the company and the market. After describing the dependent variables, the theory was also used to describe EDI. The theory described four items that are part of EDI: competence building, employee involvement, interplay and autonomy. Finally, scientific resources are used to describe R&D and the relationships between all these different variables, which brought five different hypothesis.

These five different hypothesis are tested via a mixed method research. This means that the research consists of a quantitative and qualitative part. This method is chosen to give an answer to the following research question: *"To what extent and in what way can non-R&D employees affect technological innovativeness of firms?"* A survey and multiple interviews are used to give an answer to this question. The survey consisted of 139 participant and 3 interviews are conducted, which all contribute to testing the hypothesis and/or the results of this study. Table 13 in chapter 4 gives an overview which hypothesis are accepted and which ones are rejected.

The research question is supported by various sub-questions in order to arrive at the correct answer. The first sub-question is: *"To what extent can EDI autonomously effect technological process innovation?"* Hypothesis 1: **EDI has a positive impact on process innovation within a firm**, belongs with this question and can be accepted, which means EDI has a positive impact on technological process innovation. The hypothesis is accepted with a value of .38. This means that when an organization goes up with one EDI practice, technological process innovation will increase with .38. But, EDI is not the only one that effects technological process innovation. The results show that also firm size has a positive influence (.75) on process innovation, which means that the bigger an organization, the more process innovation will be conducted. However, this is quite logical. The qualitative part of this research also shows results with regard to EDI and process innovation. For the item competence building, the organizations were divided and they: either see an indirect effect, an effect for some trainings or not an effect at all. Another item of EDI that is analyzed in the qualitative part is employee involvement. For employee involvement, all organizations are positive and see the potential for involving employees with regard to process innovation. The third item is interplay, in which both internal and external interplay

are seen as a positive influence for process innovation. Finally, autonomy is less effective for production employees than for management employees, because in production strict rules need to be followed. Therefore, this does not have an effect on process innovation.

However, the relationship between EDI and process innovation is not the only relationship that is tested. This research also wants to know: *"To what extent can EDI autonomously effect incremental and/or radical product innovation?"* This question contains two different hypothesis, H2: **EDI has a positive impact on incremental product innovation** and H3: **EDI has no positive impact on radical product innovation**, which are both rejected. The first hypothesis is about the expectation that EDI has a positive influence on incremental product innovation. The quantitative results show a non-significant value of .14. This means that there is no significant relation between the two variables. However, the control variable R&D is significant (p<.001), with a value of .65. This shows that R&D has a positive influence on incremental product innovation. However, according to the qualitative analysis EDI has a positive effect on incremental product innovation. This is because employee involvement, interplay and autonomy are all seen as positive influencing items for incremental product innovation. Only competence building did not show, according to the organizations, much effect on incremental product innovation. The other hypothesis did not expect a positive effect from EDI on radical product innovation, but it turns out to be the opposite. This is because EDI is significant (p<.01), with a positive value of .38. This means that according to the quantitative analysis EDI positively influences radical product innovation. The qualitative analysis agrees with these results, because involvement of employees, interplay and autonomy all seem to be positively related to radical product innovation according to the organizations that are interviewed.

The final relationship that is investigated is about EDI strengthen the effect of R&D on product innovation. This research wants to know: *"To what extent does EDI strengthen the effect of formal R&D on incremental and/or radical product innovation?"* This sub-question also consist of two different hypothesis, **H4: EDI positively strengthen the effect of R&D on incremental product innovation which are both rejected** and H5: **EDI positively strengthen the effect of R&D on radical product innovation**, which are both rejected. The first hypothesis is about EDI positively strengthen the effect of R&D on incremental product innovation. It is rejected, because the interaction variable EDI*R&D is non-significant, with a negative value of -.12. However, R&D is still significant (p<.001) in this analysis and also increased to a value of .99. This shows that even after including the interaction variable, R&D still remains significant positive with regard to incremental product innovation. The qualitative analysis also looked at the relationship between EDI, R&D and incremental product innovation. This analysis shows that when an organization is focusing on incremental product innovation, more non-R&D employees are involved then when focusing on radical product innovation. So, this analysis shows that organizations do see a positive role for non-R&D employees in combination with R&D employees.

The second hypothesis is about EDI positively strengthen the effect of R&D on radical product innovation, which is also rejected. The multivariate analysis showed two significant and positive values, for R&D and EDI. R&D has a significant (p<.001) positive value of .83, which means that it positively influencing radical product innovation. EDI also has a significant (p<.001) positive value of .63. While at the same time, the interaction variable EDI*R&D was not significant with a value of -.16. The same as with hypothesis four, the qualitative analysis also looked at the relationship between EDI, R&D and radical product innovation. This analysis shows that when focusing on radical product innovation, more R&D than non-R&D is involved. Even for some of the organizations they never involved non-R&D employees at all. So, the qualitative part did also not see a positive effect from EDI on R&D for radical product innovation.

To conclude, the quantitative study shows that employee driven innovation and therefore the non-R&D employees of an organization affect process innovation and radical product innovation in a positive way. However, with regard to incremental product innovation, the quantitative part did not saw a significant effect. On the contrary, the qualitative study shows that three out of four items of EDI are positively influencing incremental product innovation in the work field. The same holds for process and radical product innovation. They also came out to be positively affected by EDI, when looking at the qualitative analysis. Finally, both relationships that involved an interaction between EDI and R&D, were not significant in the quantitative analysis. The qualitative analysis did saw a positive relation between EDI and R&D for incremental product innovation, not for radical product innovation, because for radical product innovation most of the time only R&D employees were involved.

7. Discussion

The final chapter evaluates the conducted research. The evaluation contains: a reflection on the theory, limitations and recommendations. The reflection on theory looks at the differences and similarities that can be found in the theoretical part of this research and the analysis that are done. After looking at the similarities and differences, the limitations are described. Finally this chapter will give recommendations that are focused on research.

For this research an already existing survey is used to investigate the influence of EDI on process and product innovation. This survey is send to 6146 industrial firms, of which 139 were suitable for this research. This research also consists of three interviews. The interview questions are written down. Based on the fact that the survey is an existing one and the criteria for the population is clearly written down, just like the interview questions, the results of this research are valid.

First of all, the analysis shows that EDI has a positive influence on process innovation within an organization. This result is in accordance with the theory about EDI and process innovation. The theory also expected that EDI has a positive influence on process innovation because of several reasons. First of all, process innovation is associated with learning by using and/or doing (Inauen & Schenker-Wicki, 2012). Also, according to Zwick (2004) teamwork and involvement provides productivity in an organization. Finally, engaged employees perform more efficient and are more willing to look for solutions within the processes (Schmidt & Rammer, 2007).

Secondly, with regard to product innovation the analysis shows different results than expected from theory. The theory expected that EDI would be positively influencing incremental product innovation, because Høyrup (201) explained that employee involvement in product innovation is mostly focused on incremental changes. Also, because Amundsen (2014) explained employees are the once that are working with the product on a daily basis. However, the results show that only R&D is significant and positively influencing EDI. A possible explanation of this result is the research of Beers and Zand (2013) that concludes that investing in internal R&D and training for employees both add value to the absorptive capacity of the firm. This is helpful to build up a strong and knowledge base that is advantageous for the innovation processes with regard to product innovation. This shows that the effect of EDI can be hidden for a part in R&D, because training is part of EDI and is according to this research also successful for product innovation. Finally, Armbruster (2006) also explained that product innovation overall can be supported by R&D activities.

With regard to radical product innovation, the analysis shows results that differ from the expected outcome. The analysis shows that EDI positively influence radical product innovation, while the expectation was that EDI would not positively influence radical product innovation. A possible explanation of this result is the study of Engelman (2017). He found out that knowledge acquisition and

exploitation are influenced by human capital. Both have an intense influence on radical product innovation. Subramaniam (2005) confirmed this theory of Engelman (2017) in his research. He found a strong connection between the social capital of the organization and radical product innovation, which means that the social networks with unexpected and unusual combinations transform knowledge into innovation. Hoonsopon (2012) also explained that radical product innovation needs valuable information from the market, which employees own. Finally, there is already evidence that EDI and radical product innovation are positively related, but it was never statistically substantiated.

Finally, this research expected a positive influence of EDI on R&D for incremental and radical product innovation. However, the analysis showed that both relationships are not significant. For incremental product innovation only R&D remains significant after adding the interaction variable. This could have the same explanation as before, that R&D is embedded with EDI and that EDI counts for all employees, also the R&D employees. Also, it could be because R&D can have an impact that is unforeseeable (Damianova, 2005). For radical product innovation R&D and EDI are significant, while at the same time the interaction between these two is not significant. The interaction variable also causes the autonomous effect of EDI to increase significantly. Overall, this means that in combination they not add any value because it is not significant, while separated they are both significant and positively influencing radical product innovation. A possible explanation could be that the common variance is filtered out, because EDI is not only for non-R&D employees but also for R&D employees.

Overall, this research makes several scientifically contributions. First of all, this study advances the understanding of employee driven innovation. In particular, this research shows that EDI consists of several items. Secondly, this current research complements the existing literature on employee-driven innovation, because previous research has almost not given any conclusions about the influence of employee-driven innovation on process and product innovation. Finally, this research complements to the existing literature with regard to the relationship between EDI, R&D and product innovation, because this relationship has not been studied very often.

This research provides not only scientific contributions, but also managerial contributions. First of all, organizations should do more internal collaborations. The quantitative analysis shows that 56,8% of the organizations does not work internally for innovation. The interviews also show that organizations struggle to make internal collaborations useful for innovations. They should be provided with leader support for successfully setting up internal collaborations. This can help the organizations to start up collaborations inside the organization that are focused on innovation processes. Secondly, when organizations are involving employees in their innovation processes, time must be made available. This means that part of the time spend on their daily activities needs to be exchanged for the innovation processes. This is because otherwise they are always busy with their daily activities, instead of trying to

work on innovation initiatives. Finally, the interviews show that organizations should involve their employees in innovation projects, especially for process and incremental product innovation, because these people can add new insights and knowledge that can help an organization grow with regard to their innovations.

However, for this study the reader should bear in mind that this research consists of several limitations. These limitations are in various phases of the research. The first limitation is with regard to the theoretical background. The independent variables of this research are all very much described in several studies, but, so far, not much research is done about the relationships between employee-driven innovation and process and product innovation. Therefore, I think some of the explanations in the theoretical background of this thesis could have been more comprehensive when more literature would be available with regard to this relationship. The next limitation is with regard to the quantitative part of this analysis. During this research the quantitative part consisted of second hand data. This means that the survey that is used, already existed and was made for another research. Therefore there is a lack of control about the quality of the data. This means the reliability of the survey is less and there can be inappropriateness of the data. However, at the same time the interviews are used to improve the lack of validity. Another limitation is with regard to the qualitative study in this thesis. The interviews have been held in Dutch and translated into English. This may have affected the validity of the research. Finally, it must be taken into account that this research focuses exclusively on technological innovations. Once the focus is on non-technological innovations, the results might be different. For this reason, no general statements can be made about the effects of EDI on innovations that do are not focused on technological innovations.

Finally, this research gives multiple opportunities for further research. First, the advice for follow-up research is to carry out a similar study to find out whether the effects of EDI has the same influence when focusing on non-technological innovation instead of the technological innovations. Secondly, a recommendation for further research is also to look deeper in the results of some of the analysis, because there can be underlying reasons for it, which are not investigated in this research. In addition, the research could be expanded with more interviews to assess whether the findings will generalize to most of the companies.

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Appendices

Overview appendices

Appendix I: Questionnaire survey

Appendix II: Operationalization concepts quantitative method

Appendix III: Interview questions

Appendix IV: Tree structures

Appendix V: Bivariate analysis table

Appendix VI: Figures assumptions linear regression technological process innovation

Appendix VII: Figures assumptions multinomial regression analysis product innovation

Appendix VIII: Figures multinomial regression analysis product innovation

Appendix IX: Transcripts interviews

Appendix X: Coding interviews

Appendix I. Questionnaire survey

1.1 Maakt uw bedrijfsvestiging deel uit van een onderneming met meerdere vestigingen? ☐ Nee ☐ Ja

Bij ondernemingen met meerdere vestigingen hebben de vragen betrekking op de aangeschreven vestiging en niet op de totale onderneming.

1.2 Bedrijfstak (bijv. textiel, chemische industrie, machinebouw, enz.):

hoofdproductgroep

aandeel van hoofd-product (groep) in omzet

ca. ____ %

1.3 Is uw bedrijfsvestiging gelet op uw hoofdproduct(groep) hoofdzakelijk een leverancier van eindfabrikaten of een toeleverancier van onderdelen/materialen of bewerkingen? (Kruis slechts één optie aan)

producent van eindfabricaten

☐ voor consumenten ☐ voor bedrijven

toeleverancier

☐ van systemen/installaties ☐ van halffabricaten/onderdelen

aanbieder van bewerkingen

☐ aanbieder van bewerkingen (draaien, coaten, lassen, vermalen, e.d.)

1.4 Als u uw hoofdproduct(groep) levert aan andere bedrijven (als eindfabrikant of toeleverancier), aan welke bedrijfstak levert u dan **hoofdzakelijk?** (Kruis slechts één optie aan)

Machinebouw ☐ Chemische industrie ☐ Automotive industrie ☐ Elektrotechniek ☐ andere bedrijfstak, nl.: _____

2 Hoe belangrijk zijn de volgende factoren voor de concurrentiepositie van uw bedrijfsvestiging? (geef de volgorde van belangrijkheid aan met een score van 1 tot 6; 1 is het belangrijkst, gebruik elke score slechts één keer)

productprijs ◯ productkwaliteit ◯ innovatieve producten ◯ aanpassing producten aan klantenwensen ◯ tijdige levering/korte levertijden ◯ dienstverlening en service ◯

3 Welke van de volgende technologieën worden momenteel in uw bedrijfsvestiging toegepast?

Toepassing gepland voor 2015	Nee	Technologieën toegepast in uw bedrijfsvestiging	Ja	Voor het eerst gebruikt (Jaar)[1]	upgrade sinds 2009 Ja	upgrade sinds 2009 Nee	Omvang van het toegepaste potentieel (g=gering; m=midden; h=hoog)[2]
		Robots en automatisering					
☐	← ☐	Industriële robots (voor hanteren van gereedschap en werkstukken) in fabricage en assemblage	☐ →	19/20 ___	☐	☐	g m h
☐	← ☐	Gebruik van geautomatiseerde warehouse managementsystemen (WMS) voor interne logistiek en orderverzamelen	☐ →	19/20 ___	☐	☐	g m h
☐	← ☐	Technologieën voor veilige mens-machine interactie (bijv. coöperatieve robots, open werkstations e.d.)	☐ →	19/20 ___	☐	☐	g m h
☐	← ☐	Intuïtieve, multi-modale programmeringsmethoden (bijv. spraakherkenning, herkenning van gebaren, bewezen trajecten)	☐ →	19/20 ___	☐	☐	g m h
		Bewerkings- en productietechnologieën					
☐	← ☐	Technieken voor verwerking van legeringen (aluminium-, magnesium-, titaniumlegeringen, enz.)	☐ →	19/20 ___	☐	☐	g m h
☐	← ☐	Technieken voor verwerking van composietmaterialen (bijv. carbonvezel, glasvezel)	☐ →	19/20 ___	☐	☐	g m h
☐	← ☐	Productietechnologieën voor micromechanische componenten (micromachinale bewerking, lithografie e.d.)	☐ →	19/20 ___	☐	☐	g m h
☐	← ☐	Nanotechnologische productieprocessen (bijv. oppervlaktebewerking)	☐ →	19/20 ___	☐	☐	g m h

Digitale fabriek / IT netwerken

	Nee		Ja						
☐	← ☐	Digitale uitwisseling van productieplannings-gegevens met supply chain managementsystemen van toeleveranciers/klanten (ERP)	☐ →	$\frac{19}{20}$		☐	☐	g	m	h
☐	← ☐	Virtual reality en/of simulatie bij (her)inrichting van het productieproces (bijv. production flows, single process steps)	☐ →	$\frac{19}{20}$		☐	☐	g	m	h
☐	← ☐	Virtual reality en/of simulatie bij productontwerp/ontwikkeling (bijv. digital prototyping, EEM)	☐ →	$\frac{19}{20}$		☐	☐	g	m	h
☐	← ☐	Product Lifecycle Management (PLM)	☐ →	$\frac{19}{20}$		☐	☐	g	m	h
☐	← ☐	IT sytemen voor opslag en management van ideeën (idea management systems)	☐ →	$\frac{19}{20}$		☐	☐	g	m	h

Energie en grondstoffenbesparing

☐	← ☐	Droge bewerking/minimum smering	☐ →	$\frac{19}{20}$		☐	☐	g	m	h
☐	← ☐	Controlesystemen die machines stilleggen bij onderbenutting	☐ →	$\frac{19}{20}$		☐	☐	g	m	h
☐	← ☐	Terugwinning van kinetische en procesenergie (terugwinnen afvalwarmte)	☐ →	$\frac{19}{20}$		☐	☐	g	m	h
☐	← ☐	Warmtekrachtkoppeling (Bi-/Trigeneratie)	☐ →	$\frac{19}{20}$		☐	☐	g	m	h

Technologieën voor het opwekken van duurzame energie

☐	← ☐	Technologieën voor het opwekken van zonne- of windenergie, waterkracht, biomassa of geothermische energie	☐ →	$\frac{19}{20}$		☐	☐	g	m	h
☐	← ☐	Technologieën voor warmte-opwekking door middel van zonne-energie, biomassa of geothermische energie	☐ →	$\frac{19}{20}$		☐	☐	g	m	h

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4 **Welke van de volgende redenen en welke van de genoemde barrières zijn van doorslaggevende betekenis voor het wel of niet invoeren van energie en warmte opwekkende technologieën op basis van hernieuwbare energie in uw vestiging?**

Redenen voor invoering	Energie	Warmte	Belangrijke barrières	Energie	Warmte
Verwachte ontwikkeling van de energieprijzen	☐	☐	Te grote investeringen of voordelen ontbreken	☐	☐
Strategische redenen (bijv. "groen imago")	☐	☐	Administratieve last (bijv. goedkeuringsprocedures)	☐	☐
Terugdringen broeikasgassen	☐	☐	Niet van toepassing in deze bedrijfsvestiging	☐	☐
Eigen energie-opwekking ter vergroting aantal energiebronnen	☐	☐	Vooralsnog geen relevant onderwerp in deze vestiging	☐	☐
Politieke of wettelijke bepalingen	☐	☐	Andere barrières	☐	☐

5.1 **Welk deel van uw actuele energie- en grondstoffenverbruik zou u kunnen besparen indien u alle beschikbare technologische mogelijkheden zou aanwenden?** (stel het huidige energie- en grondstoffenverbruik van uw bedrijfsvestiging op 100%. Indien u geen besparingsmogelijkheden ziet vul dan '0' in)

Potentiële besparing op energie (electriciteit, olie, gas, enz.)   ☐ %

Potentiële besparing op materialen en grondstoffen   ☐ %

5.2 **Indien in uw bedrijfsvestiging de mogelijkheden voor grondstoffenbesparing nog niet volledig worden benut wat is daarvoor dan de belangrijkste reden?**

Vereist te hoge investeringen of levert te weinig rendement op   ☐

Gebrek aan gekwalificeerd personeel (bijv. voor planning of project management)   ☐

Technologische oplossingen ontbreken of staan nog te zeer in de kinderschoenen   ☐

Andere redenen   ☐

5.3 **Welke van de volgende maatregelen heeft u de afgelopen drie jaar genomen om het gebruik van grondstoffen en materialen per eenheid product terug te dringen?**

Invoering gepland voor 2015

mate waarin toegepast (g=gering; m=midden; h=hoog)[1]

Nee		Besparing op grondstoffen, halffabrikaten en materialen ...	Ja			
☐	← ☐	door het optimaliseren van eerder toegepaste productietechnologieën (bijv. near net shape technieken, optimalisering van processen)	☐ →	g	m	h
☐	← ☐	door vervanging van bestaande technologieën door nieuwe technologieën (bijv nieuwe reactiemethoden of ponsen vervangen door vormen t.b.v. afvalvermindering)	☐ →	g	m	h
☐	← ☐	Operating materials (hergebruik, recycling van water, smeermiddelen e.d.)	☐ →	g	m	h

Verklaring:
[1] Daadwerkelijke toepassing ten opzichte van maximaal haalbare toepassing: omvang van het gebruikte potentieel is "gering" bij eerste aanzetten, "midden" bij gedeeltelijke toepassing en "hoog" bij omvangrijke toepassing

5.4 Indien u grondstoffen- en materialenbesparende maatregelen toepast of heeft gepland, welke van de volgende redenen zijn daarbij van doorslaggevende betekenis voor u? (maximaal drie redenen)

☐ kostenbesparing   ☐ beschikbaarheid subisidie   ☐ schaarste aan hulpbronnen   ☐ klanteisen   ☐ reputatie(bijv. "groen imago")

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6 Hoe vaak heeft uw organisatie vanaf 2009 de volgende activiteiten verricht?   (0=niet; 1=1 keer; 2=vaker)

		0	1	2
Spin-offs	Opstarten van nieuwe organisaties of activiteiten buiten de onderneming	0	1	2
Uitgaand intellectueel eigendom	Verkopen, of aanbieden van licenties/patenten aan andere organisaties	0	1	2
Werknemer-betrokkenheid	Benutten van kennis en initiatieven van niet-R&D medewerkers bij het realiseren van innovaties	0	1	2
Klantbetrokkenheid	Direct betrekken van klanten in uw innovatieprocessen	0	1	2
Extern netwerken	Het samenwerken met andere organisaties (niet klanten) voor innovatie	0	1	2
Externe participatie	Deelnemen (met bijv. vermogen, kennis) in ondernemingen om toegang te krijgen tot hun kennis of om andere synergieën te creëren?	0	1	2
Uitbesteden van R&D	Uitbesteden van R&D (diensten) aan andere organisaties, zoals universiteiten, publieke onderzoeksinstellingen, commerciële ingenieurs of leveranciers?	0	1	2
Inkomend intelectueel eigendom	Kopen of in licentie nemen van intellectueel eigendom van andere organisaties	0	1	2

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7 Werkt uw bedrijfsvestiging samen met andere bedrijven op de volgende terreinen? Welke zijn uw belangrijkste motieven voor samenwerking op deze terreinen? (samenwerking = vrijwillige samenwerking die verder gaat dan eenmalige transacties tussen bedrijven)

Nee		Ja	Locatie van de partners			Belangrijkste motieven voor samenwerking			
			regionaal (< 50 km)	nationaal (> 50 km)	Buiten-land	nieuwe kennis	toegang tot human resources	toegang tot nieuwe markten	kostenbe-heersing
☐	Samenwerking in onderzoek & ontwikkeling (O&O) met onderzoeksinstituten (bijv. universiteiten, TNO)	☐→	☐	☐	☐	☐	☐	☐	☐
☐	Samenwerking in O&O met afnemers of leveranciers	☐→	☐	☐	☐	☐	☐	☐	☐
☐	Samenwerking in O&O met andere bedrijven (afnemers en leveranciers uitgesloten)	☐→	☐	☐	☐	☐	☐	☐	☐
☐	Samenwerking in inkoop	☐→	☐	☐	☐	☐	☐	☐	☐
☐	Samenwerking in de productie (voor gezamenlijke systeemleveringen of capaciteitsuitbreiding)	☐→	☐	☐	☐	☐	☐	☐	☐
☐	Samenwerking in distributie/verkoop	☐→	☐	☐	☐	☐	☐	☐	☐
☐	Samenwerking in service	☐→	☐	☐	☐	☐	☐	☐	☐

8.1 Welke van de volgende organisatieconcepten en werkwijzen worden momenteel in uw bedrijfsvestiging toegepast?

Toepassing gepland voor 2015	Nee	Organisatieconcepten	Ja	Voor het eerst toegepast[1]	Omvang van het toegepaste potentieel (g=gering; m=midden; h=hoog)[2]
		Organisatie van de productie			
☐	←☐	In kaart brengen van logistieke knelpunten in de totale productieketen (Value Stream Mapping)	☐→	19/20	g m h
☐	←☐	Klant- of productgeoriënteerde inrichting van productie-eenheden (i.t.t. functionele indeling)	☐→	19/20	g m h
☐	←☐	Vraaggestuurde productie (afschaffen van tussenvoorraden, Kanban)	☐→	19/20	g m h
☐	←☐	Methoden voor het optimaliseren van omsteltijden (bijv. Single Minute Exchange of Die)	☐→	19/20	g m h
☐	←☐	Methoden voor vergroting machinebeschikbaarheid door onderhoud, training en veiligheid (TPM=Total Production Maintenance)	☐→	19/20	g m h
☐	←☐	Kwaliteitsmanagement op basis van het INK-model (bijv. EFQM, Zero Defects)	☐→	19/20	g m h
		Organisatie van het werk			
☐	←☐	Werkplekinrichting volgens 5s methode (aanblik werkplek en hygiëne)	☐→	19/20	g m h
☐	←☐	Gestandaardiseerde en gedetailleerde werkinstructies	☐→	19/20	g m h
☐	←☐	Taakverrijking (integratie van planning, uitvoering of controle)	☐→	19/20	g m h
☐	←☐	Continue verbeteren (Kaizen, kwaliteitscirkels e.d.)	☐→	19/20	g m h
☐	←☐	Autonome taakgroepen in fabricage en assemblage	☐→	19/20	g m h

Standaarden en audits

				19/20	g	m	h
☐	← ☐	Visueel management (grafische weergave werkprocessen)	☐→	19/20 ⎸	g	m	h
☐	← ☐	Kwaliteitsmanagement op basis van ISO 9000	☐→	19/20 ⎸	g	m	h
☐	← ☐	Six Sigma methode	☐→	19/20 ⎸	g	m	h
☐	← ☐	Milieucertificering volgens ISO 14031	☐→	19/20 ⎸	g	m	h
☐	← ☐	Energie-audit volgens ISO 50001:2011	☐→	19/20 ⎸	g	m	h
☐	← ☐	Total Cost of Ownership (TCO: planning van investeringen en activiteiten op basis van de totale, de gehele levenscyclus dekkende kosten)	☐→	19/20 ⎸	g	m	h

Human resource management

				19/20	g	m	h
☐	← ☐	Formele bijeenkomsten van medewerkers voor het genereren van ideeën	☐→	19/20 ⎸	g	m	h
☐	← ☐	Maatregelen voor het behoud van oudere werknemers of hun kennis voor uw bedrijfsvestiging (bijv. trainingsprogramma's, beloningsvormen e.d.)	☐→	19/20 ⎸	g	m	h
☐	← ☐	Tijd gereserveerd voor experimenteren (hetzij alleen of in groepen)	☐→	19/20 ⎸	g	m	h
☐	← ☐	Talentontwikkelingsprogramma's (bijv. promotie jong talent naar seniorposities, speciale trainingsprogramma's e.d.)	☐→	19/20 ⎸	g	m	h
☐	← ☐	Training van vaardigheden voor vergroting creativiteit en innovatie (bijv. technieken voor probleemoplossing, idee-ontwikkeling of brainstorming)	☐→	19/20 ⎸	g	m	h

8.2 Als u bij de vorige vraag heeft aangegeven dat in de productie (werkvoorbereiding, fabricage, assemblage en kwaliteitszorg) autonome taakgroepen zijn ingevoerd geef aan: (indien geen autonome taakgroepen, ga verder met vraag 9)

Hoeveel medewerkers werken er in een doorsnee taakgroep?   aantal ☐

nee ja

Zijn alle teamleden gekwalificeerd voor alle werkzaamheden van de taakgroep?   ☐ ☐

Worden de groepen vertegenwoordigd door een woordvoerder?

☐ nee   ☐ ja, gekozen door groepsleden   ☐ ja, aangewezen door het bedrijf

Vervullen de taakgroepen ook taken op het gebied van planning en kwaliteitszorg?   ☐ ☐

9 Elk van de volgende paren beschrijft tegengestelde principes voor de inrichting van de productie-organisatie. Welke van deze principes zijn het meest van toepassing op uw bedrijfsvestiging?

Optimale batchgrootte, stukproductie en centrale productieplanning	☐ of	☐	Korte doorlooptijden, continue productie (lopende band, flexibele productieplaats) en vraaggestuurde productie (Kanban)
Optimalisering van de productie in afzonderlijke projecten met individuele verantwoordelijkheid van elke betrokken afdeling/werkterrein	☐ of	☐	Bedrijfsbrede veranderingen, cross-functionele ontwikkeling van geoptimaliseerde oplossingen
Gestandaardiseerde methoden en werkprocessen met gedetailleerde richtlijnen	☐ of	☐	Individueel aangepaste werkprocessen zonder nauwgezet uitgewerkte werkplanning
Snelle, informele correctie van problemen zonder gedetailleerde analyse of documentatie van de oorzaken	☐ of	☐	Regelmatige, geformaliseerde knelpuntenanalyses om productiestandaarden te verbeteren

10.1 Welke van de volgende product gerelateerde diensten biedt u uw klanten aan? Welke afdeling van uw bedrijfsvestiging is hoofdzakelijk verantwoordelijk voor de dienstverlening?

Verantwoordelijke afdeling (per regel slechts één afdeling aankruisen)

Diensten/service	Nee	Ja	R&D/ engineering	Service	Productie/ assemblage	(technische) verkoop	Bedrijfsleiding	Andere
Ontwerp, advies projectplanning (inclusief O&O voor klanten)	☐	☐→	☐	☐	☐	☐	☐	☐
Technische documentatie (instellen, bediening, onderhoud)	☐	☐→	☐	☐	☐	☐	☐	☐
Software-ontwikkeling	☐	☐→	☐	☐	☐	☐	☐	☐
Leasing, verhuur, financiering	☐	☐→	☐	☐	☐	☐	☐	☐
Montage en opstart	☐	☐→	☐	☐	☐	☐	☐	☐
Training	☐	☐→	☐	☐	☐	☐	☐	☐
Onderhoud en reparatie (incl. teleservice)	☐	☐→	☐	☐	☐	☐	☐	☐
Bediening van het product/de installatie voor/bij de klant	☐	☐→	☐	☐	☐	☐	☐	☐

10.2 Indien u productgerelateerde diensten aanbiedt, hoe hoog schat u het aandeel daarvan in de totale omzet van 2011?

Aandeel in totale omzet van diensten die u direct, d.w.z. apart, in rekening heeft gebracht   ca. ☐ %

Aandeel van diensten die u in 2011 indirect in rekening heeft gebracht (via de productprijs)   ca. ☐ %

10.3 Indien u productgerelateerde diensten apart in rekening brengt, hanteert u dan een vast bedrag of de werkelijke kosten?

- ☐ uitsluitend een vast bedrag
- ☐ hoofdzakelijk vast bedrag
- ☐ hoofdzakelijk de werkelijke kosten
- ☐ uitsluitend werkelijke kosten

10.4 Heeft uw bedrijfsvestiging vanaf 2009 nieuwe productgerelateerde diensten aangeboden die geheel nieuw zijn voor uw bedrijfsvestiging of belangrijke verbeteringen bevatten?

☐ nee ☐ ja Hoe groot was het aandeel van deze vanaf 2009 aangeboden productgerelateerde diensten direct and indirect in rekening gebracht, in de omzet van 2011. ca.. ☐ %

10.5 Indien u productgerelateerde diensten aanbiedt: verricht u regelmatig onderzoek naar de tevredenheid van uw klanten?

☐ nee ☐ ja ➜ Hoe tevreden was men gemiddeld genomen bij de laatste meting?

Met de geleverde diensten waren de klanten...
- ☐ zeer tevreden
- ☐ tamelijk tevreden
- ☐ gedeeltelijk tevreden
- ☐ minder tevreden

10.6 Indien u reparatiediensten aanbiedt aan uw klanten, op welke momenten kunnen uw klanten die geleverd krijgen?

Werkdagen
- ☐ maandag - vrijdag
- ☐ maandag - zaterdag
- ☐ maandag - zondag
- ☐ 365 dagen per jaar (incl. vakanties)

Werktijden
- ☐ gebruikelijke werktijden (bijv. van 9:00 tot 17:00 uur)
- ☐ verruimde werktijden (bijv. van 6:00 tot 22:00 uur)
- ☐ 24 uur per dag

10.7 Indien u reparatiediensten aanbiedt buiten de gebruikelijke werktijden (bijv. nooddiensten), hoe worden de uren betaald van de betrokken werknemers stand-by?

- ☐ niet, alleen de werkzame tijd wordt uitbetaald
- ☐ op afroep, alleen bij aflevering
- ☐ volledige betaling zonder extra toeslagen (bijv. voor nachtdiensten)
- ☐ volledige betaling, incl. overwerk en extra toeslagen (bijv. voor nacht- en weekenddiensten)

11.1 Heeft uw bedrijf sinds 2009 nieuwe producten geïntroduceerd of producten die ingrijpend zijn vernieuwd (kleine verbeteringen buiten beschouwing laten a.u.b.)? (Bijv. door nieuwe grondstoffen of materialen te gebruiken, veranderingen in productfuncties e.d.)

☐ nee ☐ ja ➜ Hoe groot was het aandeel van deze producten in de omzet van het jaar 2011? ca. ☐ %

➜ Hoe lang duurde gemiddeld genomen de ontwikkeling van zo'n product? (van productidee tot lancering) ca. ☐ maanden

➜ Dragen deze productvernieuwingen ook bij aan verbetering van het milieu (bijv. milieuvriendelijker in het gebruik of minder milieubelasting bij verwijdering) ☐ nee ☐ ja

11.2 Bevonden zich daarbij ook producten, die niet alleen nieuw waren voor uw bedrijf, maar ook nieuw voor de markt (d.w.z. niet eerder door concurrenten op de markt gebracht)?

☐ nee ☐ ja ➜ Wat was hun aandeel in de omzet van 2011? ca. ☐ %

11.3 Heeft uw bedrijfsvestiging producten in het programma die u al langer dan 10 jaar aanbiedt?

☐ nee ☐ ja ➜ Welk percentage van de omzet hadden deze producten in 2011? ca. ☐ %

12 In de voorgaande vragen heeft u informatie gegeven over technologie, organisatie, productgerelateerde diensten en productvernieuwing. Rangorden deze activiteiten naar mate van belangrijkheid voor uw bedrijfsvestiging.
Geef met een score van 1 tot 4 de volgorde van belangrijkheid aan met 1 als het belangrijkst; gebruik elke score slechts één keer.

- Toevoegen van diensten aan uw producten ◯
- Organisatie-vernieuwing ◯
- Technologische vernieuwing in het productieproces ◯
- Ontwikkeling van nieuwe producten ◯

13.1 Van welke van onderstaande bronnen zijn belangrijke impulsen/ideeën afkomstig voor vernieuwing op de volgende vier terreinen van innovatie? (kruis maximaal drie vakjes aan per regel)

	intern				extern			
	R&D / engineering	Productie-afdeling(en)	Service afdeling	Leiding bedrijfsvestiging	Klant of gebruiker	Leverancier	Onderzoeks-instellingen, universiteiten	Conferenties, beurzen
Nieuwe producten	☐	☐	☐	☐	☐	☐	☐	☐
Nieuwe proces-technologieën	☐	☐	☐	☐	☐	☐	☐	☐
Nieuwe diensten	☐	☐	☐	☐	☐	☐	☐	☐
Nieuwe organisatie-concepten	☐	☐	☐	☐	☐	☐	☐	☐

13.2 Wie/welke afdeling in uw bedrijfsvestiging is hoofdzakelijk verantwoordelijk voor innovaties op de volgende gebieden?
(Kruis slechts één vakje aan voor elk gebied van innovatie)

	R&D / engineering	Leiding bedrijfsvestiging	Productie- management	Service afdeling	Verkoop, marketing
Nieuwe producten	☐	☐	☐	☐	☐
Nieuwe proces-technologieën	☐	☐	☐	☐	☐
Nieuwe diensten	☐	☐	☐	☐	☐
Nieuwe organisatie-concepten	☐	☐	☐	☐	☐

14.1 Wat is het opleidingsniveau van het personeel van uw bedrijfsvestiging?

Hoger onderwijs (WO+HBO)	ca. ☐ %	
MBO technische opleiding	ca. ☐ %	
MBO adminstratieve en commerciële opleiding	ca. ☐ %	=100%
LBO of ongeschoold	ca. ☐ %	
Personeel in opleiding (leerlingen)	ca. ☐ %	

14.2 Hoe is het personeel in uw bedrijfsvestiging verdeeld over de volgende werkterreinen:

Onderzoek en ontwikkeling	ca. ☐ %	
Ideevorming, ontwerp en vormgeving	ca. ☐ %	
Fabricage en montage	ca. ☐ %	=100%
Klantenservice	ca. ☐ %	
Overige (administratie, inkoop, logistiek/distributie, onderhoud, productieplanning enz.)	ca. ☐ %	

14.3 Indien uw bedrijfsvestiging personeel heeft voor de klantenservice: welke deel van deze medewerkers is hooggeschoold (universiteit of HBO) en welk deel heeft een technische opleiding?

Aandeel hooggeschoolden onder het service personeel	☐ < 10%	☐ 10-30%	☐ 30-50%	☐ >50%
Aandeel van technici en vaklieden onder het service personeel	☐ < 10%	☐ 10-30%	☐ 30-50%	☐ >50%

15.1 Heeft uw bedrijfsvestiging productie of R&D-vestigingen in het buitenland? Hoe zijn de activiteiten van uw bedrijfsvestiging verdeeld over de volgende regio's in %? (Ga uit van uw bedrijfsvestiging ook al is deze onderdeel van een groter concern)

	Nee	Ja	binnenland	EU	Oost Europa (buiten EU)	Azië	Noord- en Midden-Amerika	Zuid-Amerika	Andere gebieden	
Productie-activiteiten in buitenland (incl. assemblage)?	☐	☐	ca. ☐	+ ☐	+ ☐	+ ☐	+ ☐	+ ☐	+ ☐	=100%
R&D in het buitenland?	☐	☐	ca. ☐	+ ☐	+ ☐	+ ☐	+ ☐	+ ☐	+ ☐	=100%

15.2 Heeft uw bedrijfsvestiging sinds 2010 delen van de productie of delen van Onderzoek en Ontwikkeling (O&O) overgeheveld naar andere bedrijven (uitbesteding) of eigen vestigingen in het buitenland (verplaatsing)?
Overheveling:

nee	Ja:(meerdere opties mogelijk)				Redenen: (meerdere opties mogelijk)									
	Naar andere bedrijven in Nederland	Naar andere bedrijven in het buitenland	naar eigen vestigingen in het buitenland	Naar welk land (landen)	Arbeidskosten	Ontsluiting nieuwe markten	Nabijheid belangrijke klanten	Toegang tot innovatieve kennis/clusters	Belasting, heffingen, subsidies	Gebrek aan gekwalificeerd personeel in eigen land	Importbeperkingen	Nabijheid tot O&O of productie die reeds is overgeheveld	Toegang tot natuurlijke hulpbronnen, leveranciers	Aanwezigheid van concurrenten

Overheveling van **productie-activiteiten** sinds 2010

| ☐ | ☐ | ☐ | ☐ | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Verplaatsing **onderzoeks- en ontwikkelingsactiviteiten** sinds 2010

| ☐ | ☐ | ☐ | ☐ | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Terugplaatsing (repatriëring) vanuit het buitenland naar het thuisland

Nee	Ja	Vanuit eigen vestigingen in het buitenland	Vanuit andere bedrijven in het buitenland	Uit welk land/landen	Kwaliteit	Flexibiliteit, leversnelheid	Capaciteitsbenutting	Beschikbaarheid gekwalificeerd personeel	Arbeidskosten	Transportkosten/ logistieke kosten	Kosten van coordinatie en toezicht	Nabijheid tot binnenlandse O&O	Verlies van kennis/ -kopiëren/piraterij	Infrastructuur

Terugplaatsing van (delen van) de **productie** sinds 2010

☐ ☐ → ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

15.3 Heeft uw bedrijfsvestiging reeds vóór 2010 productie naar het buitenland verplaatst?

☐ nee   ☐ ja →   Zijn deze buitenlandse vestigingen herverplaatst naar andere landen in het buitenland sinds 2010?

☐ nee   ☐ ja, naar een eigen locatie in het buitenland   ☐ ja, naar een ander bedrijf in het buitenland

16 Geef a.u.b. de herkomst van uw toeleveringen (inputs) en de bestemming van uw producten in 2011?

Inputs
(onderdelen, materialen, diensten e.d.)
ingekocht in:

binnenland   ca ☐☐ %   ⎫
buitenland   ca ☐☐ %   ⎬ =100% van de inkoopwaarde

Producten verkocht in:

binnenland   ca ☐☐ %   ⎫
buitenland   ca ☐☐ %   ⎬ =100% van de omzet

17.1 Heeft uw bedrijfsvestiging onderzoek en ontwikkelingsactiviteiten (O&O) uitgevoerd of laten uitvoeren door externe partners?

☐ nee   ☐ ja →   O&O-uitgaven in procenten van de omzet in 2011   ca. ☐ %

17.2 Heeft uw bedrijfsvestiging van 2008 tot en met 2010 O&O uitgevoerd of laten uitvoeren door externe partners?
(meerdere antwoorden mogelijk)

☐ nee   ☐ ja, O&O in 2008   ☐ ja, O&O in 2009   ☐ ja, O&O in 2010

18 Welke van de volgende kenmerken is het meest van toepassing op uw hoofdproduct(groep)?

Productontwikkeling (kruis slechts één optie aan)

◆ Op specificatie van klant   ☐
◆ Voor een standaard programma waarbinnen klantspecifieke wensen gerealiseerd kunnen worden   ☐
◆ Voor een standaardprogramma, waaruit de klant kan kiezen   ☐
◆ Niet aanwezig in deze bedrijfsvestiging   ☐

Fabricage/montage (kruis slechts één optie aan)

◆ Na binnenkomst klantorder (make to order)   ☐
◆ Eindmontage van het product wordt uitgevoerd na binnenkomst klantorder (assemble to order)   ☐
◆ Op voorraad (make to stock)   ☐
◆ Niet aanwezig in deze bedrijfsvestiging   ☐

Seriegrootte (kruis slechts één optie aan)

◆ Enkelstuksproductie   ☐
◆ Kleine of middelgrote series   ☐
◆ Grote series   ☐
◆ Geen discrete productie (procesindustrie)   ☐

Productcomplexiteit (kruis slechts één optie aan)

◆ Eenvoudige producten   ☐
◆ Producten van middelgrote complexiteit   ☐
◆ Complexe producten   ☐

19 Welke van de volgende kenmerken is het meest van toepassing op uw hoofdproduct(groep) in 2011?

Wat is de gemiddelde productietijd van uw hoofdproduct(groep)?
(doorlooptijd vanaf moment dat opdracht binnenkomt bij productie tot gereed product)   ca. ☐☐ werk-dagen   of ☐☐ uren

Hoeveel varianten van uw hoofdproduct worden er per maand gemiddeld geproduceerd?   ca. ☐☐☐☐☐☐ aantal per maand

Met hoeveel procent kunt u het volume van de gemiddelde maandproductie verhogen op korte termijn?
(ga daarbij uit van de gegeven productielijnen)   ca. ☐☐ %

Met hoeveel procent kunt u het volume van de gemiddelde maandproductie van uw bedrijfsvestiging verlagen op de korte termijn, zonder verlies te lijden? (ga daarbij uit van de gegeven productielijnen)   ca. ☐☐ %

Hoeveel procent van de orders wordt op tijd afgeleverd (overeenkomstig de afgesproken levertijd)?   ca. ☐☐ %

Hoeveel procent van uw productie moet na kwaliteitscontrole nabewerking ondergaan of geheel worden afgekeurd?   ca. ☐.☐ %

Registreert u in uw bedrijfsvestiging de kwaliteitskosten?
(Kwaliteitskosten = kosten voor testen en evaluatie + foutenpreventie (volgens ISO-normen)

☐ nee   ☐ ja →   Aandeel kwaliteitskosten in de omzet in 2011   ca. ☐ %

20 **Hier worden enkele gegevens over uw bedrijfsvestiging gevraagd:**

Jaaromzet	2011		miljoen €	2009		miljoen €	
Aantal werknemers (excl. uitzendwerkers)	2011		aantal	2009		aantal	

Had uw bedrijfsvestiging uitzend- krachten in dienst in 2011? ☐ nee ☐ ja → Hoeveel uitzendkrachten waren gemiddeld in dienst bij uw vestiging in het jaar 2011? ca. aantal

Inkoop 2011 (ingekochte onderdelen, materialen en diensten)	, Miljoen €	Personeelskosten als percentage van de omzet in 2011 (incl. loonnevenkosten)	%
Afschrijvingen op machines en installaties 2011 (zonder grond en gebouwen)	, Miljoen €	Graad van capaciteitsbenutting (gemiddeld in 2011)	%

Rendement op de omzet (vóór belasting in 2011) ☐ negatief ☐ 0 t/m 2% ☐ > 2 t/m 5% ☐ > 5 t/m 10% ☐ meer dan 10%

Jaar van oprichting, c.q. inschrijving bij de Kamer van Koophandel jaar:

21 **Tussen 2009 en 2011, hoe heeft het jaarlijkse energieverbruik (kWh)in uw bedrijfsvestiging zich ontwikkeld?**

	gedaald	gelijk gebleven	gestegen
Energieverbruik sinds 2009	☐	☐	☐

Energieverbruik is.... gedaald met ca. ____ % gestegen met ca. ____ %

Appendix II. Operationalization concepts quantitative method

Type of variable	Variable name	Dimension(s)	Subdimension	Variable description	Min	Max	Measurement level	No. of question
Depended variables	Process innovation	Technology		The number of new technologies introduced out of a pre-coded list of 18	0	18	Ratio	3
	Product innovation	Incremental product innovation		Developed new products that are new to the firm	0	1	Nominal	11.1
		Radical product innovation		Developed new products that are new to the market as well as new to the company	0	1	Nominal	11.2
Explanatory variable	EDI	Competence building		Job enrichment	0	1	Nominal	8.1
				Training to enlarge innovation and creativity	0	1	Nominal	8.1
				Talent development program's	0	1	Nominal	8.1
		Involvement employees		Involve non-R&D employees for their knowledge and initiatives	0	2	Nominal	6
		Interplay between different actors	External	External participation for innovation	0	2	Nominal	6
			Internal	Meeting with employees	0	1	Nominal	8.1
		Autonomy		Standardized working instructions	0	1	Nominal	8.1

				Autonomous task groups	0	1	Nominal	8.1
Interaction variable / control variable	R&D	Number of employees		Percentage employees working at the R&D department	0	100	Ratio	14.2
Control variable	Educational attainment	Educational background		Percentage of higher education of the personnel	0	100	Ratio	14.1
	Firm size			Number of employees	0	10000	Ratio	20
	Sector			Industry the organization is working in	1	5	Nominal	1.2

Appendix III. Interview questions

<u>Interview</u>

First of all, thank you for your time. Before we start I would like to know if you would like to stay anonymous? And also, do you object being recorded during this interview? The file will be saved in a personal environment and when it is no longer needed, it will be deleted.

<u>Goal:</u> Before we start, I would like to talk to you about the goal of my interview. The goal of my research is to map out the effects of the contributions of the "regular" employees to innovation efforts. The focus is on two different types of innovations, namely: innovations with regard to products and innovation with regard to the processes within an organization.

To start, I would like to a couple things about u and the company.
1.   *How big is the company?*
2.   *How long are you working within this company?*
3.   *What is your position within this company?*
4.   *Can you explain what your position means with regard to your daily activities?*

<u>Competence building</u>
A part of innovating through the regular employee is the competence policy within the organization.
1.   Is training given within the organization?
     -   What kind of training is it? (on the job or all-round?) Are these trainings in house or at another location?
2.   Is there an annual budget for the employees with regard to training? Or how does the organization take care of the costs for training?
3.   Do you notice that the training has an effect on the introduction of new technologies? Do you see a connection?
4.   Is there also a connection with product innovation?
     - If so, in what way? Is this very innovative?

<u>Employee involvement</u>.
1.   How actively do you involve staff in innovation processes?
2.   In what way are the employees involved?
3.   To what extent do you think it is necessary to actively involve employees in innovation processes?

<u>Autonomy</u>
1.   Can you give a report grade for the freedom of action of the employees in this organization?
     - And why do you give this figure? Examples?
2.   Do you think that more freedom of action can lead to greater value for innovation processes within your organization?
     - If so, why?

<u>Interplay</u>
Most employees work together with others on a daily basis, both inside and outside the organization.
1.   How much effect do you think collaboration within the organization has on the innovation processes within the company?
2.   Do you think this has more or less effect than cooperation outside the organization?
     - And why?

<u>R&D</u>
Involving employees in innovation is not the only way to innovate. Many organizations also use a research and development department to innovate.
1.   Do you have R & D staff in house?
     - If so, how many% of the staff work in the R & D department?

2. How does the contribution of R & D and non-R & D relate to product innovation? Is this 50/50 or?
3. Do you think that it also makes a difference whether this small or large product is innovations?

Appendix IV. Tree structures

1. Tree structure EDI:
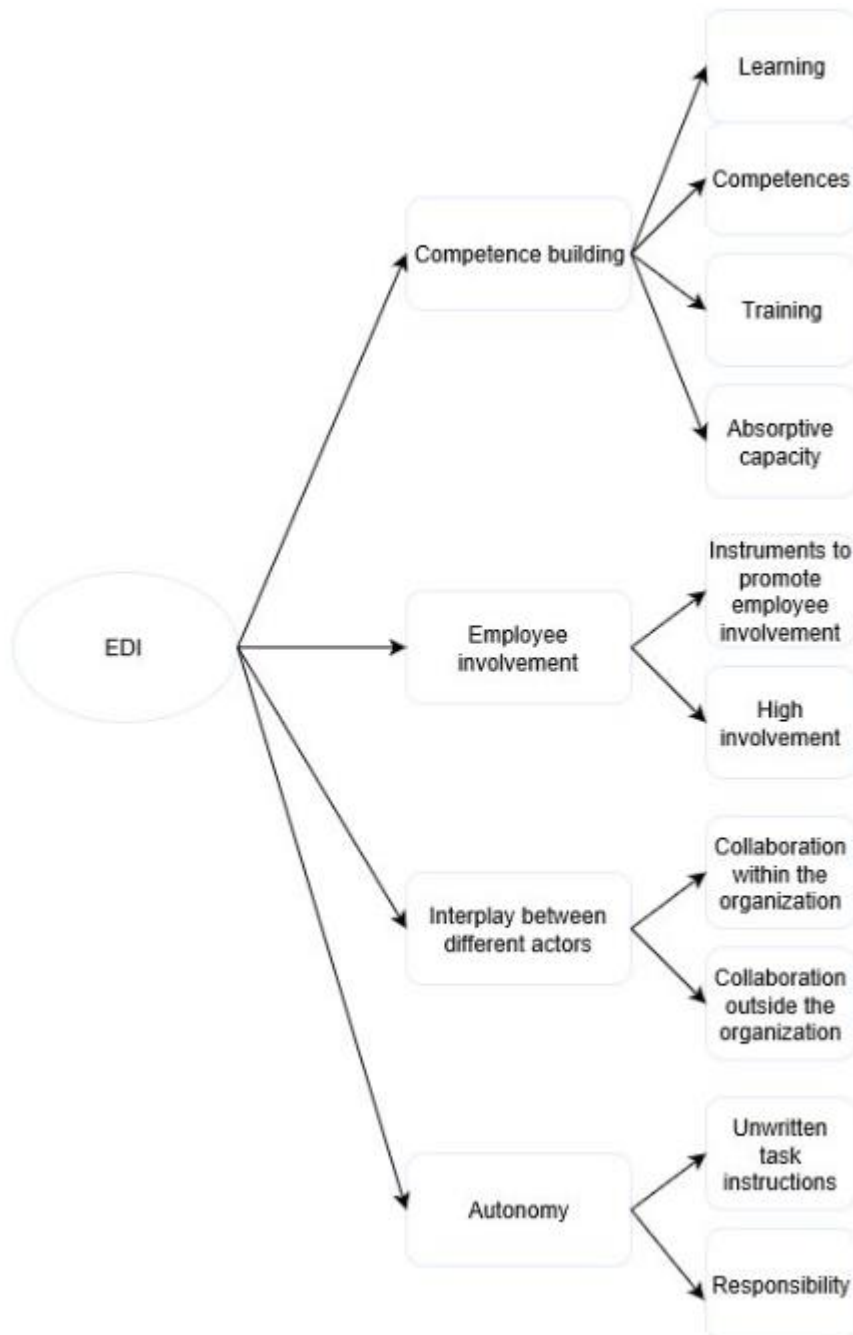
2. Tree structure process innovation:
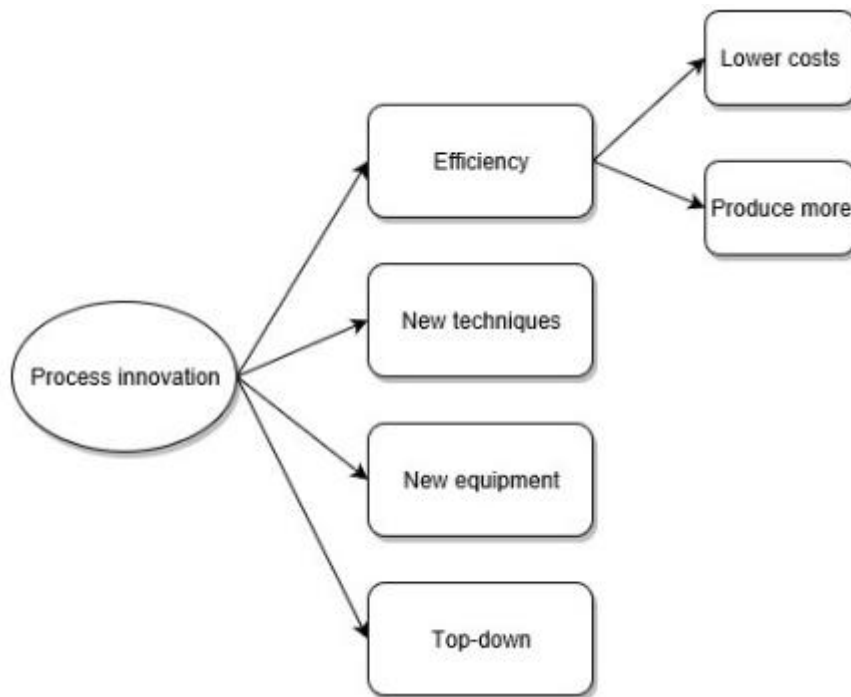
3. Tree structure product innovation:
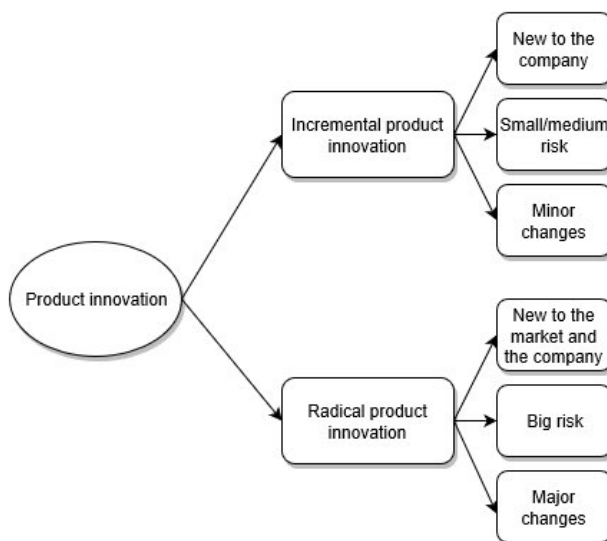
4. Tree structure R&D:
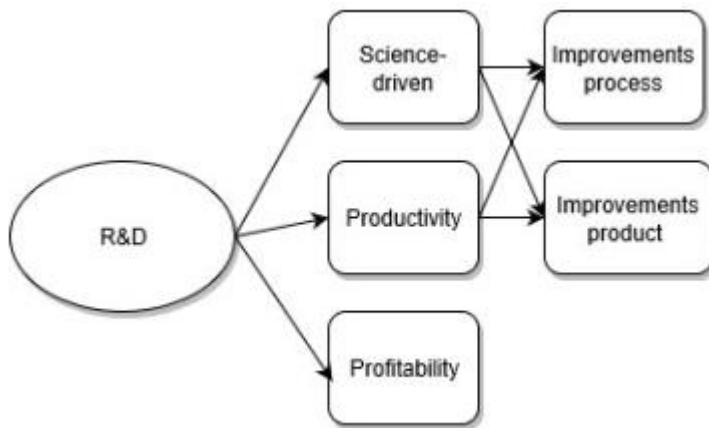
Appendix V. Bivariate analysis table

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Process innovation	1	,26**	,14	,44**	,07	,12	,47**	-,05	,06	-,02	,06	,01	-,03	-,001
2. Incremental product innovation		1	,47**	,27**	,34**	,23**	,15	,12	-,09	,14	-,03	-,12	,06	,14
3. Radical product innovation			1	,26**	,13	,19*	,13	,25*	,04	,01	-,14	-,13	-,06	,04
4. EDI				1	,35**	,36**	,34**	,08	,11	,03	,04	-,01	-,18*	,03
5. R&D					1	,59**	,08	,17	,05	,11	,03	,01	-,12	,27**
6. Education						1	,22**	,13	-,02	,15	,06	-,04	-,05	,27**
7. Firm size							1	,10	,02	-,01	,04	-,07	-,07	,01
8. Metal								1	-,16	-,20*	-,16	-,28**	-,28**	,19*
9. Food									1	-,10	-,08	-,14	-,14	,10
10. Textile										1	-,10	-,18*	-,18*	,12
11. Construction											1	-,14	-,14	,10
12. Chemical												1	-,24*	,17*
13. Machinery													1	,17*
14. Electrical														1

Appendix VI. Figures assumptions linear regression technological process innovation

1. Linearity and   2. Homoscedasticity:
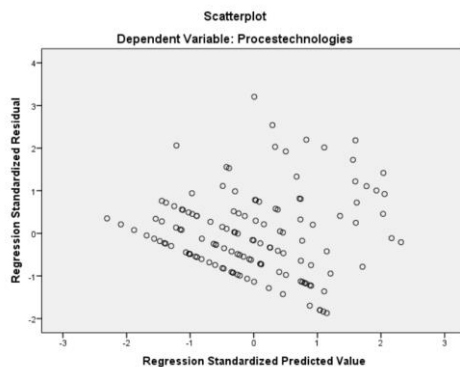
2. Independent errors:

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,7258	5,4327	2,3485	1,33227	132
Residual	-3,87724	6,64148	,00000	1,99130	132
Std. Predicted Value	-2,308	2,315	,000	1,000	132
Std. Residual	-1,871	3,205	,000	,961	132

a. Dependent Variable: Procestechnologies

3. Normally distributed errors:
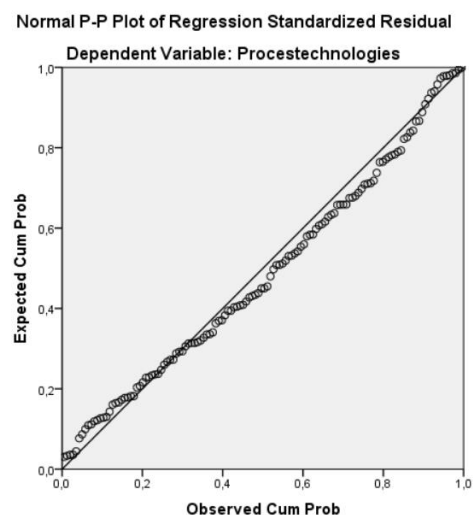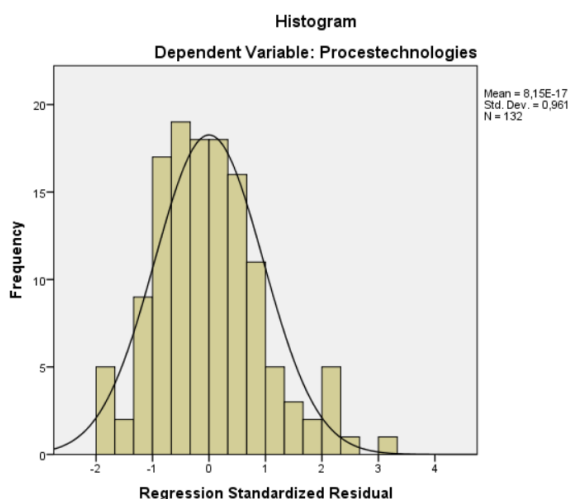
4. Multicollinearity

Analysis 1	Tolerance	VIF
Firm size	,906	1,104
R&D	,642	,1558
Educational attainment	,531	1,883
Metal	,426	2,348
Electric	,486	2,056
Machinery	,464	2,156
Chemical	,466	2,146
Construction	,662	1,511
Food	,727	1,376
Analysis 2		
Firm size	,835	1,198
R&D	,611	1,636
Educational attainment	,526	1,902
Metal	,426	2,348
Electric	,484	2,065
Machinery	,461	2,168
Chemical	,466	2,146
Construction	,662	1,511
Food	,727	1,376
EDI	,770	1,299

Appendix VII. Figures assumptions multinomial regression analysis product innovation

1. Multicollinearity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	,256	,206		1,243	,216					
	vSize5c Firm size	,052	,060	,076	,854	,394	,173	,077	,070	,844	1,185
	RD_square	,058	,055	,108	1,054	,294	,259	,094	,086	,635	1,575
	EDU_square	,036	,049	,078	,741	,460	,228	,066	,060	,603	1,658
	EDI1	,068	,037	,172	1,838	,068	,304	,163	,150	,757	1,322
	EDI1_RD	-,045	,021	-,181	-2,156	,033	-,206	-,190	-,176	,940	1,064
	Industry_log	,135	,095	,121	1,426	,156	,212	,127	,116	,917	1,090

a. Dependent Variable: productinnovation

2. Linearity

Variable	Sign.
Industry	.007
Size	.759
R&D	.525
Educational attainment (edu)	.591
EDI	.620
EDI*R&D	.523
Industry by industry (log)	.010
Size by Size (log)	.693
R&D by R&D (log)	.612
Edu by Edu (log)	.499
EDI by EDI	.531
EDI*R&D by EDI*R&D	.539

3. Influencing outliers

Firm size   *Industry_log*
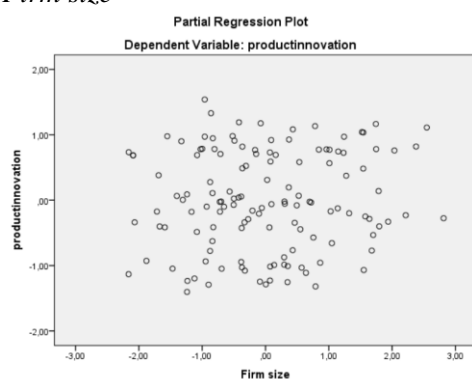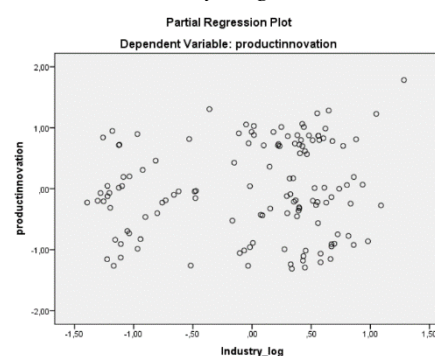
R&D
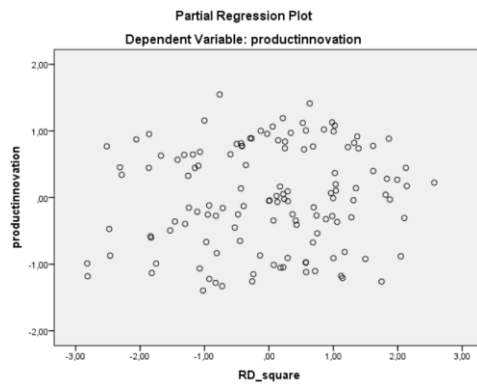
Partial Regression Plot
Dependent Variable: productinnovation

Educational attainment

Partial Regression Plot
Dependent Variable: productinnovation

EDI

Partial Regression Plot
Dependent Variable: productinnovation

EDI*R&D

Partial Regression Plot
Dependent Variable: productinnovation
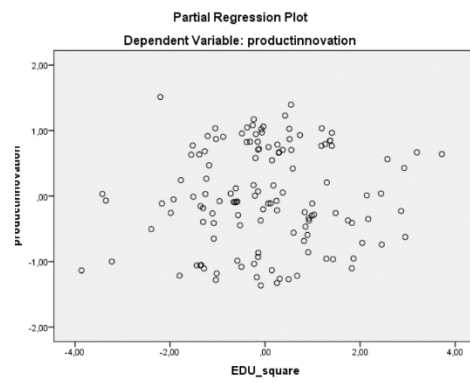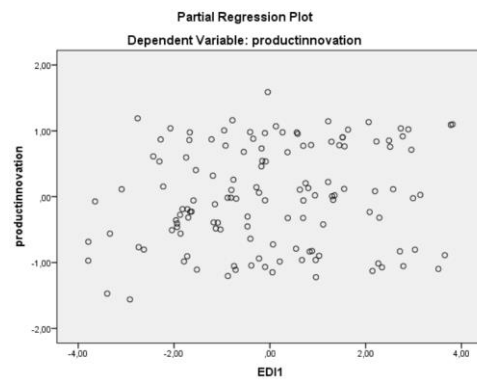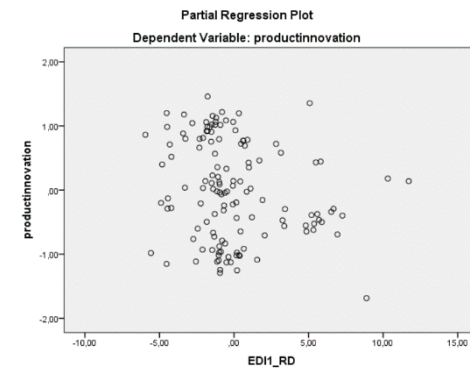
Appendix VIII. Figures multinomial regression analysis product innovation

1. **Analysis 1 – only control variables**

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	243,172	230	,263
Deviance	238,818	230	,331

Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	282,759			
Final	243,212	39,547	18	,002

Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	244,235	1,023	2	,600
RD_square	256,645	13,433	2	,001
EDU_square	245,725	2,513	2	,285
vSize5c	246,459	3,247	2	,197
Metal	246,653	3,441	2	,179
Food	243,857	,645	2	,724
Textiles	247,226	4,014	2	,134
Construction	244,676	1,464	2	,481
Chemicals	243,804	,592	2	,744
Machinery	246,878	3,666	2	,160

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

2. Analysis 2 – control variables and EDI

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	255,785	236	,180
Deviance	239,691	236	,421

Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	286,343			
Final	241,078	45,265	20	,001

Likelihood Ratio Tests

Effect	Model Fitting Criteria -2 Log Likelihood of Reduced Model	Likelihood Ratio Tests Chi-Square	df	Sig.
Intercept	242,583	1,505	2	,471
RD_square	252,031	10,954	2	,004
EDU_square	242,946	1,869	2	,393
vSize5c	242,866	1,788	2	,409
Metal	244,972	3,895	2	,143
Food	241,789	,711	2	,701
Textiles	245,280	4,203	2	,122
Construction	242,422	1,345	2	,511
Chemicals	241,666	,588	2	,745
Machinery	245,504	4,426	2	,109
EDI1	246,796	5,718	2	,057

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

3. Analysis 3 – control variables, EDI and EDI*R&D

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	249,831	234	,228
Deviance	236,414	234	,444

Model Fitting Information

Model	Model Fitting Criteria -2 Log Likelihood	Likelihood Ratio Tests		
		Chi-Square	df	Sig.
Intercept Only	286,343			
Final	237,800	48,543	22	,001

Likelihood Ratio Tests

Effect	Model Fitting Criteria -2 Log Likelihood of Reduced Model	Likelihood Ratio Tests		
		Chi-Square	df	Sig.
Intercept	240,905	3,105	2	,212
RD_square	247,659	9,859	2	,007
EDU_square	239,801	2,001	2	,368
vSize5c	239,344	1,544	2	,462
Metal	241,844	4,044	2	,132
Food	238,521	,721	2	,697
Textiles	242,155	4,355	2	,113
Construction	239,076	1,276	2	,528
Chemicals	238,430	,630	2	,730
Machinery	242,672	4,872	2	,088
EDI1	246,073	8,273	2	,016
RD_square * EDI1	241,078	3,278	2	,194

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Model Fitting Information

Model	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC	BIC	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	287,570	293,321	283,570			
Final	293,206	408,214	213,206	70,364	38	,001

Likelihood Ratio Tests

Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	293,206	408,214	213,206[a]	,000	0	.
v14b1	291,260	400,518	215,260	2,055	2	,358
vIndustry	290,054	370,559	234,054	20,848	12	,053
vSize5c	287,836	379,842	223,836	10,630	8	,224
EDU1	290,994	400,252	214,994	1,789	2	,409
EDI1	292,918	367,673	240,918	27,712	14	,016

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

4. Analysis 3 – control variables, EDI and EDI*R&D

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	239,432	206	,055
Deviance	202,299	206	,560

Model Fitting Information

Model	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC	BIC	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	287,570	293,321	283,570			
Final	290,458	411,216	206,458	77,112	40	,000

Likelihood Ratio Tests

Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	290,458	411,216	206,458[a]	,000	0	.
EDI1_RD	293,206	408,214	213,206	6,748	2	,034
v14b1	288,717	403,725	208,717	2,259	2	,323
EDI1	286,332	366,837	230,332	23,874	14	,047
vIndustry	288,866	375,122	228,866	22,408	12	,033
vSize5c	287,852	385,609	219,852	13,394	8	,099
EDU1	288,164	403,172	208,164	1,706	2	,426

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Additional analysis – without R&D

Variable	Value
Educational attainment	,08
Firm size	,235
Metal	-1,09
Textile	-2,43
Machinery	-1,84
Chemical	-,83
Construction	-1,38
Food	,03
EDI	,24

Appendix IX. Transcript interviews

Interview 1:

Organization: likes to stay anonymous
Date: 15-5-2018
Duration: 49.47 minutes

Speaker	Assigned character
Lotte Vredegoor	L
Lars	L1
Sanne	S

L: Can you tell me how big the company is?

S: Do you want to know how big the whole company is?

L: Yes, the number of locations and employees.

S: Well, we have seven different locations. In Lichtenvoorde, Emmen, Zeewolden, Laren and also in Germany, Belgium and Polen. I honestly don not know the exact amount of employees working within the company. I think it is around 350. From these people 150 are working in the Netherlands.

L: Okay, how many percent is working in the office?

S: Ehm..

L: Hard to tell or?

S: I think it is around 20 people.

L: Is this only for the Netherlands or?

S: Yes, 20 people only for the Netherlands. However, we have two different companies. *names are taken out of the interview because of privacy*.

L: What is the difference between these two companies?

S: One of them is working with hard plastics, which means crates, buckets, caps etc. that will be transformed into a regrind. This is not directly a new material for a new product.

L: Okay.

S: Ehm, the other company works with soft plastics. Which means foil, garbage backs etc. which will be transformed into a new material for a new product.

L: Okay.

S: It is a granulate, which can directly be used as a raw material for a new product. An example is for garbage backs.

L: Okay, I understand.

S: That is the most important difference.

L: Okay, so overall 2 companies work together with the same boss, but are different from each other. Can you tell me what your position within the company? And also which activities you do for the company?

S: I am a HR manager, and ehm, I am involved in the inflow and outflow of personnel. Which means that I am responsible for the right amount of employees within the organization. But also that these employees are working at the right place and get guidance whenever they need it. Examples of what I do daily are: performance interviews, which can be either good or bad, but also appraisal interviews.

L1: My position within this company is called junior business developer. Which means that I am involved in new projects with big customers, that are projects that take a long time to develop. These projects are very different and depend on what the customer (business) needs. So, it can be different products and companies. The purchase and sales department are sometimes close related to each other, which means that I can be working on both sides of the organization. Another thing that I am involved in is the internal developments, which most of the time is for the organization itself. That are projects such as: making working easier, making work more organized and efficient. The reason for these projects are because we had a huge growth the last couple of years, but we never really did something at the side of the employees.

L: Sanne, is this production and offices ?

S: No, now the focus is on production, for office I give my tips, but it is not directly where the focus is.

L: Okay, and how long are you both working at the company?

S: I am working here already a year, I think it is 14 months now.

L1: I am working here exactly one year.

L: Okay, okay, nice. Ehm.. to make a switch to a part of employee driven innovation, I would like to talk about competence building. This means for example training etc. I am curious to know about how competence building is handled within the organization. The first question I would like to ask is: if there are, within the organization, training sessions offered?

S: Yes, training is definitely organized within our organizations, but these courses are really divers. Examples are: forklift course, EHBO course, BHV courses, but also new courses. However, also training who is suitable for a position within the organization is possible. This can be: a training to learn to speak German or a course of labor law. Also, a lot of employees within this organization did the course NEN3140, which was very important for the employees to achieve.

L: Okay.

S: So, overall it is really divers. The training is determined at the demand and need of the employees. We do not have a standardized policy for training within the organization.

L: Okay. These trainings are they always in-house or at another location (extern)?

S: That depends, on the content of the course. For example, the NEN 3140 is given in-house because this way the employees could work with the machines they use daily. However, the other side of the story is for example the course German, I did it with another colleague of mine, at another location.

L: Yes, really clear.

S: The reason that I did the course German somewhere else is because of the amount of employees that are following such a course within the organization at the same time.

L: If I understand it clear, correct me if it is wrong, there is no annual budget a year for an employee.

S: Yes and of course the added value needs to be at a certain level. Another good example is an colleague of my is not doing any courses, but wants to follow a master, which can bring us new knowledge inside the organization.

L: Okay.

S: What is suitable and achievable within the organization.

L: How do you determine if it is suitable or not? Can you give an example?

S: Well, ehm, or employee wanted to do a master in polymeric technology. Don't ask me what is means exactly.

L: Smiles.

S: It is something that we do not know a lot about and as an organization we want to get to know more knowledge about into the organization.

L: Okay.

S: So then we a lot of added value and then we are prepared to pay a x amount of the costs.

L: Okay.

S: I hope this is a clear example for you, because this is real added value for us.

L: Yes, definitely. Okay, so within the organization you look at what does the organization need? Choose something that fits the needs of the organizations and then determine what is possible to spend?

S: Yes, exactly.

L: Okay, clear. Ehm, do you also notice that the courses you carry out, have an effect on the innovation processes within the organization? Which can be either based on product or process innovations?

S: Well, maybe a good example are our team bosses. In the past they regular needed to do a leading course. I think this could help with innovation, because it achieves that people are involved, working together and are able to tell each other something they can learn from. This can cause the effect that people are working and thinking in the same way, which may cause efficiency.

L: Okay, now you are talking about efficiency, you means efficient with regard to the process or to the product?

S: Yes I think this is all about the level of process innovation.

L: Okay, clear. But do you also see any effects on product innovation? Because I know this organization is really focused and a precursor in plastic.

S: I do not think our training and courses have effect on product innovation. I think it are mostly the people that are focused on it as their core business, which are our business developers, like Lars and Matthijs. They make the differences, because they are constantly focusing on what can be done better, to be better than the competition.

L: Okay, do you agree with this Lars?

L1: Yes I totally agree with what Sanne just told, because we are working with a really specific product and a few trainings cannot make a difference in that product, unless you are focused on it every day.

L: Okay, clear, thank you.

S: Yes, also they are focusing on the competition, to see if there are other ways to make the product better or to make new products possible. An example of this is a our new factory in Heerenveen.

L: Yes, ehm.

S: This is the first factory that will process post-consumer and eventually eh..

L: offer?

S: It will process into a granulate, which can be used as a raw material.

L: Okay, and do these business developers get any training or?

S: Ehm, they do net get direct training, but they go to a lot of knowledge sessions in which similar companies come together and talk about a lot of different things and share their knowledge about multiple subjects.

L: Okay, this subject fits good to another subject I would like to talk about, namely the interplay between different actors intern and extern. Because, if I understand it, the company offers a lot of different training material, but the business developers do not get any specific training but join knowledge sessions where they get information and knowledge from other parties involved in the plastic industry.

S: Yes, that is right.

L: So, do you guys work together with a lot of other parties or companies for product- and or process innovation?

S: Yes.

L1: Yes, definitely.

L: Okay, and in which way are you doing this as a company?

S: I find it hard to explain that to you, I think Lars can tell you more about this, but ehm we work eventually only with companies. We are a real b2b. So they are our customers and we work with them to see what can be done better.

L: Okay and inside the company then? Are there different departments that work together with each other to see what can be done better?

S: We do not really work with departments, so that make things different.

L: Okay and the different positions? Do they have projects where they work together with different positions?

S: Yes, every Monday we have meeting, where commerce, the business developers and production employees come together. In this meeting they look at the questions from the customers, which can be achieved immediately, which questions take more time, what can we do to make it faster etc.?

L: Okay, yes.

S: So that is something we do, where multiple people come together. When the process starts to run, then not only someone from commerce is working on it, but also a business developer is involved in the process.

L: Clear, so within small and big projects employees with different positions within the organization are involved.

S: Yes, exactly.

L: Okay and within the meeting on Monday are you mostly talking about process innovations or also product innovations?

S: I think it is mostly process innovations, because the product is already really good. It is more that we look at how can we attract more, or what can we offer as an extra to the customer which makes it possible to produce even more.

L: Okay, so small steps when it comes to product innovation.

S: Yeah, exactly small steps, baby steps.

L: Do you think that the collaboration within and outside the company effects has on the innovation processes within the organization?

S: I think there is one really big effect and that is the efficiency.

L: Okay, and does this come from intern or extern collaborations?

S: Extern, yes. Well, I also think that it is good that different people sit together, also because a lot of requests can come from different places within the organization. So, bringing these people together on Monday, makes it easier to look at a request and make sure we handle it in the right way. But what was your question again? I am sorry.

L: It does not matter. My question was if it has a big share in your innovation processes?

S: Yes, than the answer is yes. Because I think it starts intern within the company, that is the most important factor. However, I also comes from extern, but also intern. So I think the foundation has been laid intern and then you need the right companies to support you in this. Which means that both intern and extern have a 50/50 share.

L: Okay, clear. So, in brief you think that working together has a big influence on the innovation processes within the organization, whereby intern and extern both get a 50% share.

S: Yes, that is the way I think.

L: Okay, the next subject I would like to discuss is employee involvement. Which means that employees are actively involved the innovation processes of the organization. Can you tell me if the organization is actively involving employees and so, in what way?

L1: In my contract was written that it would be appreciated and asked to think in terms of the company. So this is also really stimulated. For my personal, if I think for the company it makes me feel involved in the company. Like one piece of it is mine. I always ask my direct colleague for an opinion.

L: yes, yes.

L1: But you get a lot of freedom, which is stimulated to do things that you otherwise would have never had done. Of course this is not at the start of the working experiences, but comes in a later stage.

L: Okay and do you discuss a lot with the employees at the office, or get employees from production also involved in the innovation processes?

L1: Ehm.. mostly employees from the office. Sometimes, production is also involved, but this depends on what needs to be explained. I think it is really important to show yourself if you need something from someone else.

S: I totally agree with Lars, however we also do other things to achieve this. We try to involve the employees. For example we have digital TV screens in the canteen, where we try to give an update about certain projects. We also help with the new building, whereby a few production employees help determine the lay out of the building.

L: Okay, so top down it gets determined who can bring information and will be actively involved to think with the whole group.

S: Yes, exactly.

L: Okay, and are their other things that are done than the TV screens?

S: Yes we do obviously mouth to mouth, but that is expected. We are also thinking about a flexible working staff representation.

L: Okay

S: This way you keep de organization flexible.

L: But this is still in it's infancy?

S: Yes, exactly. This idea is called multiple times now, but if it is going to be concrete, is still in question. However, I think it is a really good idea.

L: Okay, because this way you want to give the employees a voice?

S: Yes, because I think that it is important that when certain decisions are made, that there should always be understanding from the employees. Nowadays, some decisions are not understood by the employees.

L: Okay, but is this especially about decisions that involve labor or is this also about decisions that involve production processes or the office?

S: Yes, that is different for every employee. For my it would go about labor, but we can make it bigger after it we know it works well. Actually, we already do this, especially with the new factory we bought. A lot of people that have something good and smart to say about, will get involved.

L: Are these employees production employees or ?

S: Ehm, no yes. With this project it is almost only production employees, because they work in it 8 hours a day, but also logistic employees get involved, but overall the people that we think do have the knowledge get involved in the process.

L: So different levels will come together?

S: Yes, because a small example is that we decided to buy a traffic light for production, because an employee told us that he found it really dangerous to all drive around on these forklifts and sometimes were not fully able to see if someone is approaching you.

L: Oh, that sounds nice.

S: So, yeah, that kind of feedback from the production employees is really appreciated. It is something small, but makes their working space a lot safer, which makes it possible to work even more efficient.

L: Of course, they are the once that are working 8 hours a day in the same space. So, the organization is already trying to involve employees in the innovation processes, but do you think the more the employees are involved the more they have the possibility to influence the innovation processes?

L1: Yes I think so. Especially for plastic recycling, it is a really dynamic world and yes, if you look at the company, a company is a building with people in it. Those people make or break the company. So I think it absolutely not possible to separate it from each other. I think it is almost a direct relationship.

L: Okay.

S: Yes I agree with Lars, although I must be honest about the level of our employees in production, it is not that high. This makes it not possible to involve them in everything, but where ever it is possible, we always try it.

L: Mmm, I understand.

S: Eventually I think that for certain issues they can absolutely add value, because they face it everyday when working.

L: Allright, and at the office?

S: Mmm, yes I think unconsciously we already do it. We ask for each other opinions every day, because we think it is important what other people have to say about your idea. Also, this way everyone can look with a different, fresh view to an idea.

L: Okay, and do you guys think that this has an effect on process or product innovation?

L1: I think both, because the example of Zeewolde, we bought a washing line for PET, which is 25 years ago, which was kind of a "gamble". This worked out really well, the reason therefore is because they tried to develop together with the machine supplier a process. That is what is happening in Heerenveen now. Multiple parties are involved, from which we know that they have right knowledge, about how we want to have it. So this is a really close and intensive collaboration. But in this collaboration not only talk about the process, but you also talk about the product. How it needs to come out of the process. It is quite intensive. Another reason why we do it this way is because somewhere in the Netherlands there is already one factory that does the same that we are building in Heerenveen. However, they only told their suppliers what they needed to have and did not involved in it anymore, until it was totally finished. So, those have no idea what they are doing. The experience that is already in the company is very useful and important, because working really close to suppliers and customers, makes it possible to have an open relationships.

S: Yes, what Lars is telling I totally agree on.

L: Is this because the plastic industry is not that big, which makes it possible to get to know everybody. Over an x amount of time we operate in the same area as the other factory, with regard to buying materials, which causes that we are working with the same people. So other parties tell us how it went by the other companies and vice versa.

L: Do you guys think that the collaborations are divided by 50/50, when it is about intern and extern?

L1: Mmm, ehm, for new collaborations it is mostly extern. The reason for this is because the information is most of the time quite new, so a lack of experiences. But the knowledge we have inside the organization will be used as much as can. An example is building the new factories: because there is already a lot of information, because three factories are already build from the ground up, which brought quite a lot of new knowledge into the organization.

L: Okay, you see that you are missing experiences when you talk about process innovation, is this because you do not have the knowledge or is there another reason?

L1: That is especially because we do not want to reinvent the wheel, that is a waste of time.

S: Yes if we found someone who wants to work together and it exactly knows. Than that is something we rather do.

L1: Yes, and I want to add to this that I think that this is the certain way to do it. Look at society, with collaboration you can come a lot further. Collaborations in all industries is what is happening now. What is really interesting for us is the government, we cannot do anything without the government. So that is something we are working on. A colleague is a lobbyist, which is a member of the same board that talks with Den-Haag etc. Via, via is the way you sometimes need to take, otherwise you won't make it. Also Ikea is an important partner for us.

L: How is that related?

L1: They have invested in our company, which made it possible to grow or capital even further. With a part of this capital, we are building a new factory, where they will become a big customer. Also we do a lot of other project for Ikea, but that are relativity small projects. Finally, I can also start with a new project of mine that is about PET bottles.

L: All right, in summary, production employees will be actively involved in making decision on their level, at the office this is done more according to you, Lars. Also, you think both external and internal collaborations are important. External is especially the government really important for the company.

S: Yes.

L: Than I would like to bring my last subject with regard to innovation on the table. This subject is called autonomy. Could you both give a report figure about the autonomy from employees in this organization. Why are you giving this number?

S: An 8.

L1: an 8. We have a lot of freedom but at the same time also a lot of responsibility. In this company is it possible to follow your own plan, but you need to make sure that you can take responsibility for when it goes wrong. My fastest way to get in touch with someone is via my nearest colleague. He can easily say that something is good or not good.

L: Okay, Sanne why do you give a 8?

S: If I am looking at production we do not steer on numbers, but on quality. A production employee, stands alone by the production and needs to take care of. People are really are very free to.

L: Okay.. ehm

S: At the office, how I experienced it as a new employee, was that my function was new. I get all the freedom to determine mine function and to focus on what I think is important. Once a month I have a conversation about what I already did etc, what I want to do and what I think is going really good.

L: Okay, so you wont get punished for not doing the right things.

S: Exactly, it is your responsibility to do the right things at the right moment. How you are doing it, unless it is illegal (laughs), it does not matter.

L: Okay, but there is still an amount that can not be watched by use.

S: No exactly, you are free to determine the work.

L: Okay, clear. All right.

S: And by the way, it applies to the production and the office.

L: Does the production also do not have any targets?

S: No, we do not work with targets, of course we know what the mean is a day, which is achievable in a working day from 7.5 hours.

L: Okay.

S: Also, it will be capture what you made, which kind you made and the amount of what you did.

L: How is this captured?

S: Employees need to regulate their administration by their selves and it won't be digitalized. It is an act of showing autonomy, because we cannot check if someone honestly or not honestly fills in their forms.

L: Okay.

S: So we do not have targets. Of course we keep one eye on the paper work, but employees always need to have the feeling that they can be trusted. Is there a huge amount of decline, then of course the employees are gathered and the question will be asked.

L: Clear! Do you think that autonomy can lead to better or more innovation processes within the organization?

S: Mmm..

L: You already doing a lot.

S: I think we are to our maximum. I also think that we cannot expect more from the production employees than that they are already doing.

L: Okay, clear.

S: Yeah not to sound rude, but the production always needs a certain amount of leadership in their working lives.

L: So you think that this way you take the maximum out of autonomy and innovation processes?

S: Yes, but I am not sure if autonomy overall something has to do with innovation. I think I do not see a connection between these 2 in our company.

L: Can you maybe explain that?

S: Of course, to what extent leads autonomy to innovation? I think maybe at the office this is possible to have a connection, but for the production employees I do not see a connection. At the office you can still add your own creativity, when you do not have to work following a certain plan.

L: Okay, creativity. Do you think that there is a connection between training and the creativity of the employees in the organization?

S: Yes, that I think so. Especially for our business developers.

L1: Okay, that is not what I agree on. I think autonomy and innovation process within the company are related to each other. What I agree on with you Sanne is the part of creativity. I think that plays a big factor. But another thing is that when you make everybody conscious about the fact that they were asked to think in terms of the company, that it also becomes a little bit your company. In the sense of not in euro's but in your mind it feels like it.

S: Yes, that is something I can agree on.

L1: I think it is a stimulant, which makes it nice to work.

L: Okay, clear. So in summary, autonomy with production employees does not have added value for product or process innovation, however at the office autonomy could have influence on the innovation processes, which is for a big part to blame on the creativity of the employee and the feeling that you are really part of the company.

S: Yes exactly, I think this needs to develop more in our company.

L1: Yes.

L: All right, then I will continue to the last part of my research. Which is R&D. You do not have a specific R&D department, but the business developers do the tasks that belong with a R&D department, is that right?

S: Yes, that sounds good, because they are on a daily basis with improvements for the company overall, so product and process innovations.

L1: Yes I think every test of trial I do, is important for the business developers. These tests and trials can check whether something can be made or can be employable. That is also the art of recycling, to make from nothing, something.

L: Okay, good to know. How many of the people working at the offices in the Netherlands are business developers?

S: I think three people, but Lars knows it better than I.

L1: Ja it's 3 with the official title of business developers, but then also 2 others that have another position (I forgot the name), but they almost do the same as us. So I would say 5 or 6 in total.

L: Alright, so when looking at product innovations that already have been done in the organization, can you tell me how much of the people working on it where R&D employees or "normal" employees?

S: I am not sure. That is so different with regard to what kind of project is happening. In Belgium for example, 1 business developer is the whole week working on a really big project. But he needs to collaborate with others inside the company to be sure that everything is right.

L: All right, my final question is about if there are any differences with regard to the share of R&D employees that are working on the bigger or smaller projects?

S: I think the business developers do have more to say by big projects than by smaller projects, because by smaller projects sometimes other employees take it out of the hands.

L1: I agree with that totally.
L: All right, thank you very much. I hope that you found it interesting to talk about and if you would like to I can send you a copy of the project, when it is finished.

Interview 2:

Organization: likes to stay anonymous
Date: 18-5-2018
Duration: 38.21 minutes

Speaker	Assigned character
Lotte Vredegoor	L
Gerben	G

L: Can you explain how big the company is?
G: Yes, we have around 3200 employees, in 26 countries. In these 26 countries we have offices and in 11 of these countries we also have distribution centers.
L: Okay.
G: So, 3200 employees, 800 million revenue last year.
L: Wow
G: Yes, that is the description of our organization in a few main elements.
L: Okay, clear. What is your position within this organization?
G: Currently I am working as the head of innovations. Currently, I am busy setting up new business units, for innovation experiments and also for doing investments in new ventures.
L: Okay.
G: This means, startups and scale ups, to see if there is a future in working together. However, also for buying stocks from the company, who have the potential for becoming useful for our organization.
L: Okay, that sounds good. So the company is still busy with trying to become bigger and bigger?
G: Yes, definitely. Growth is an important thing within the organization. Not only at the core business we try to grow, but also with all the 3200 employees in 26 countries and 11 distribution centers, also in those countries we are trying to grow our current business centers.
L: Okay.
G: From the innovation portfolio and venture portfolio we try to look at future markets. Currently we are in the B2B business.
L: Yes.
G: But to be prepared for all the disturbance and change in the world with new business models and new technologies etc. we would like to invest, if possible, in totally different business models and technologies.
L: Okay.
G: And maybe even markets.
L: Okay, interesting. How long are you working for this company at the moment?
G: I am almost afraid to tell you, but it is 16 years now.
L: That is quite long.
G: Yes, I started in 2002 as an official member of the organization and it's holding, but I came in contact with the organization earlier for internships.
L: Okay.
G: I did an internship at England, for 7 months and also for 6 months in America.
L: Oh wauw, that sounds really nice.
G: After these internships I started at this organization.
L: Okay, clear.
G: Never did I thought I would be here this long.
L: And why is that?
G: I did not expected that the level of ambition of this organization would be high enough to make my own ambitions come true.
L: Okay, but now it did?

G: Yes, the whole time it went steady in the same way as my own ambitions.
L: Okay, because the organization is one of the leading companies here in the Achterhoek?
G: Yes, I think we are one of the biggest employers here.
L: yes.
G: Alone with the location we have here, which consists of 800 employees.
L: Wow, that is quite a lot.
G: Yes, I think we are quite a big employer.
L: Definitely. Okay, so that is really clear. I would now like to talk about one of the topics of employee driven innovation, which is competence building. This means training etc.
G: Yes, yes.
L: Could you tell me which kind of training and courses are held in this organization? This can be everything, it may be very divers.
G: Yes, euhm, I do not know all aspects of training and courses within this organization, but I know a few areas. For example we have a lot of product specialists, one of the distinctive factors of this organizations , is that we know a lot about the products we sell. We have around 600.000 articles. These are dived into different categories. We involve 2500 suppliers for these articles. The people who sell the products to our customers, or give advice about it, all get product focused training. This means than when a new product line is added, employees need to get training. We train our employees jointly, even sometimes the customers in our new product range. So that is really technical.
L: Okay.
G: One of the most important training, at least that is what I really like, are the once that involve the culture of the organization. When you are going to work here, you get in your first month a kind of onboarding program in which you get to see and get to know all the facets of the organization. So, you get to know the processes in general. After this program you get a training for the job of department that you are working at. This training is focused on getting to know the relevant systems, processes etc. Within this organization it is really important that people stay up to date.
L: yes.
G: That is a responsibility we take as an employer, to stimulate and support the employees. But it is not the only one who is responsible for it. We also put a lot of responsibility by the employee itself.
L: Okay, and why?
G: To stay up to date, which makes it possible for an employee to take initiative in the training an courses he/she would like to do.
L: Okay.
G: Of course, there is a whole portfolio available for the employee, that is made available for them.
L: Really?
G: Yes, we have different training and courses. We all have on-the-job related training in this portfolio, which is made available by HR, but is also facilitated by the learning and development department.
L: Yes.
G: This portfolio is focused in national and international, this way all employees can participate. But on the other side it can also be training and courses that are focused on the soft skills and negotiations skills of the employees.
L: All right, so personal skills?
G: Yes, personal skills is really important. Besides this, the employees can make their own proposal for a certain kind of training, because they want to developed their selves. It is a kind of personal development plan.
L: Okay.
G: And finally, we still have two things. The training can be paid by the organization itself, or by the ANJO foundation. ANJO, is one of the former owners of this organization. In 2010 he sold his stocks, but wanted to show sympathy to the organization.
L: Okay.
G: So he offered an amount of dollars to keep the employees within the organization ambitious.
L: Wauw, that sounds really good.
G: Yes, because it sometimes are courses that are not necessarily needed for their today job, but for the job of tomorrow.

L: Okay, so really trying to develop for the future?

G: Yes, the future, yes, yes.

L: Okay.

G: So, if someone is saying I want to try to do the MBA, which I think can do something good to the organization in the future, than you can apply for it by the ANJO foundation.

L: Really good.

G: So, training and motivation to always look outside, to see what it can mean for your own competencies. Really important.

L: Yes, definitively important. Okay, good. These training and courses, are these most of the time done within the organization our outside organization at another location?

G: Definitely intern the organization, but employees also go outside this organization. Sometimes, it can really add some value to the training with other people than your colleague's.

L: Yes, definitely.

G: Yes, than you get a whole different interaction. Myself, is really active in networks that have nothing to do with the branch we are working in. This is because I sometimes think that the hairdresser maybe asks the question that can send me in a certain direction.

L: Mmm..

G: Then somebody who is in the same branch as me. But, another side to this story is that we have our own academy.

L: Yes, I read something about it.

G: Yes another offices of us is located there. In this office, the top floor is transformed in an academy and trainings' center and almost all training will be given over there.

L; Okay, interesting. Do you see a connection between the training and what you guys are doing within the organization? This can be on product and process innovation.

G: Mmm.. product innovation is suitable, the same holds for the commercial products that are in the market. Another thing is change management and change leadership.

L: Ja, ja.

G: If that also fits the subject, than there are definitely trainings that we facilitate that have an important interface with innovation. And that is both on product and process innovation.

L: Okay, clear. So this organization is facilitating a lot of training, which some of them are focused on the job and others are more focused on the soft skills of the employee.

G: If there is time left, then I can show you a list of all the training possibilities we offer.

L: Yes, nice, nice. Okay, another subject of this interview is employee involvement. Can you tell me the extent to which employees are actively involved by the innovation in this organization?

G: We try to involve them really active. Especially when looking at our core values.

L: Yes.

G: This organization's mission is: it's that easy. Which means that the organization wants to make it easy for the customers, business partners etc., which makes doing business easier.

L: Okay.

G: But, to make it happen, there are four values in this organization that should be reflected in our thinking and doing. The first one is: customer first. In everything we do, the customer needs to come first. The second value is: engaged. Which means involvement. It is involvement based on people, planet, profit.

L: Okay.

G: So these values need to come back. The third one is: together. The businesses we do, we try to realize that: you are as a company nothing. A company consists of people, so finally it is about the people that together try to achieve the best. Finally, the fourth element is entrepreneurship. This is an important value, in which try to, as much as possible, to bring out the best entrepreneur you as a person have in you.

L: Yes.

G: But, to make sure people can make mistakes and are possible to show initiatives, which can bring new business.

L:Okay.

G: So, to bring renewal, which management thinks is cleaver, makes it possible to work out some new initiatives.

L: Okay and is there someone the employees can talk to when they have initiatives?

G: Well, there are three staffels. We work a lot with continuous improvement projects lately.

L: Okay, nice.

G: There are some international teams that look at the best practices and trying to put it in a standard process for improvement. So they are trying to make the things that are working today, become batter.

L: yes.

G: Than we have a third step which is: the innovation that is more radical.

L: Okay, yes.

G: This is what keeps me busy. It is something from which we do not know if it is important in the future, but we invest a little bit, just to be sure.

L: yes.

G: We are at the start of trying to get a healthy and strong channel in this organization. In the upcoming weeks, I have some meetings about this subject. The idea is to put all three channels together.

L: Okay, yes.

G: So the people that recognize problems or have ideas can go in that channel.

L: yes.

G: And we are looking from within that channel, to see where people should go with their idea or problem. We can support that in a way that we only take one process. This way we try to create some overview and we try to give the employee insight into what is happening now, because I am now busy with 3D printing.

L: Really nice.

G: Yes, that is really nice.

G: But there is a certain amount of fear in the organization when it gets out, extern and intern.

L: Really, why?

G: They think that when they hear it, other people (the competition) are trying to do it faster and better than us.

L: Okay.

G: However, the other side of the story is that when we do not want to make it known in the outside world, it can not be known in the inside world

L: No, exactly.

G: When we are not talking about it intern, it is also really good possible that we not achieve the people that have already knowledge about 3D printing.

L: No, definitely not.

G: So, at a certain moment we need to create a little bit transparency.

L: Yes, yes.

G: We need to create transparency, to create speed, and that is what we try to do currently.

L: But how do you get it transparent?

G: Eehm..

L: For example communication via a newsletter or?

G: Yes we have a lot of TV screens in this building. But I personally think the communication is mostly about operational things.

L: Okay.

G: And we also have a digital newsletter, the intranet on which we communicate as much as possible on what is happening within the organization, what is decided in the organization and what is happening in the market. But for this theme, innovation, we need to create something new. I think we need a kind of forum, or interactive space.

L: Yes, exactly, yes.

G: In this way people can posts their ideas, or can they tell others what they think about their idea, and can they add something to ideas that are posted.

L: Yes.

G: When a lot of people think the idea is really good, you can together create a concept. So, for short term and medium term, these innovations are very good.

L: Yes.

G: Also, the medium term are possible for it. However, the radical innovations..

L: It becomes harder?

G: It becomes harder, yes. Because what I see in this organization is that the culture still needs a boost to think a lot about radical innovations. To think outside in..

L: Okay.

G: Yes, to think outside in and outside the box.

L: So, nowadays the innovations are more incremental or?

G: Yes, most of the innovations are incremental.

L: Yes, okay.

G: I personally think, but okay I have to say this as head of innovation, that it is to much incremental innovation.

L: I understand.

G: This is because we focus most of the time on what we can do better today.

L: Okay.

G: And I am the one that asks: is what we do today, still relevant tomorrow?

L: Yes, that is really smart.

G: And do you have to go to…

L: Yes, absolutely.

G: This way I try to create a field of tensions. I am somebody that always want to stir things up, to cause some unbalanced feeling. This is because, from within this unbalanced feeling, you get change.

L: Yes.

G: We are a company that is really healthy, we earn money and we are not in a crisis. Most of the time you see that companies change when they have a crisis.

L: Yes, that is true. You need to be ahead of that.

G: Yes, the challenge is: how do we get people to feel the need to change, even when everything is going very good.

L: Yes, absolutely. Good, you already mentioned briefly the autonomy of the employees. Can you give a report figure for the autonomy of the employees within this organization?

G: Mmm.. an average number?

L: Yes, an average. I understand that this can be different per department or even position.

G: Well, yes, than I have to give it a 6.5.

L: Okay, why this low?

G: Euhm

L: Oh i mean "low", but…

G: Yes, no, definitely , it is low. I think it is low too, yes it is a good average, a realistic 6.5. The reason for this is because, people get a lot of freedom, but whenever a customer is calling, they always go first.

L: Yes.

G: And in real life, everybody is that busy with it's daily job that in practice there is no freedom to be autonomous, and think about other stuff then your daily job.

L: So they get no change?

G: There is relatively low change.

L: Yes, yes.

G: That is why I give it a 6.5. So we say that a lot is possible and we want to stimulate each other, but in the modus employees find it really hard to say: hey I am doing for 70% my job for what I get paid and for 50% I do what I think is important for the organization.

L: Yes.

G: If you employees, to do this, then they offer a piece of their spear time, or maybe that is even asked to much, but at least spend their time where they get paid for and a little bit of their time for free thinking. This culture I hope to achieve with the new investments in the ventures and innovation hub.

The new business unit.

L: Yes.

G: When i can deliver a contribution to creating this culture in the whole organization, is a step in the good direction.

L: Yes, and do you think that when employees have this much autonomy later on, will this lead to a bigger change for innovations within the organization?

G: Yes, I think so. Because, a lot of our employees have daily contact with customers or suppliers or business partners. When they only with these short customer contacts inform about the situation by the customer, it does not matter if this is via phone or physical, you know what kind of problems the customer is dealing with and you can try to respond to it.

L: Yes.

G: Or you can ask which innovation projects the supplier is dealing with at the moment. I think that can be a big step, to accelerate innovation.

L: Yeah, definitely. Do you think creativity is also part of this process?

G: Yes.

L: Because not every employee has the same creativity.

G: That is right, because we have a lot of technical oriented employees. Maybe do you know the profile systems?

L: Yes.

G: We work with insides, that means red, green, blue or yellow. Red means: employees who continue, that have enough information and make a decision. Yellow means: the creative employees. Blue: employees that bring a lot of structure into work and that really want to know all the details before making a decision. Green: those are the people, people. Who not change that much. In this organization there are a lot of blue people. These employees work really structured and are really interested in the products we sell. So, when you want to make teams, and the way teams work, it is now all discipline or job oriented.

L: Yes.

G: but I think we need to focused more on multidisciplinary systems, because the right creatives, the right technical people and sales people when brought together can become a pretty good team.

L: Yes.

G: You can bring them together for a product-market combination for example. Euhm, that even the people that are not that creative at the moment, can become more creative by the consultation you have with each other.

L: Yes you can take them with you in the process.

G: Yeah, definitely, take them with you.

L: Okay. Is that why you are doing this color test next week or?

G: I do not know what kind of test you mean?

L: With the yellow, red etc. that is what Ruben told me, "haha".

G: Yes, mm. I did not know that was next week. I am not in the department with Ruben anymore.

L: Oh, okay.

G: I have worked for a long time on the IT department. Once in a while, we do the test with the whole department. I can tell you, it used to be that every job applicant did this test before they came on their first interview. But this was quite expensive.

L: Yes, I can imagine.

G: But nowadays, we do the inside test with the department, once in 2/3 years. It is quite fun to get to know which colors you are.

L: Yes.

G: And it is even nicer to find yourself with all the color is one room. Then you can see what it actually means. Okay, you are not only blue or red and also the person that is red is not the other person that is red, there are a lot of differences.

L: Absolutely.

G: But to go with each other on this adventure, what it means in terms of behavior and decision making with a human.

L: Yes.

G: That is the kind of stuff this organization is repeating multiple times.

L: yes, it sounds really fun. You already mention shortly the interplay between different actors, outside and inside the organization. Does this organization works a lot with people outside the organization or do they only work together with people inside the organization?

G: Ehm, we have a lot of customer-supplier relations, both.. in contact with our supplier we are the customer, but we also are the supplier sometimes. We have a lot of business partners and consultants who we work together with when we talk about processes, they are the once that need to deliver burden of proof to make strategic decisions. So, in that way we work together a lot with different actors. But when you talk about actively working together inside the organization, we do not do that a lot for innovation.

L: Mm, okay.

G: But that is something that I want to work on in the new business unit.

L: Yes.

G: Not only me, but also other colleague's, because I think that co-creation is really important, because it can lead to totally different views on something. For example, there are a lot of startups, who have a really nice dream, with a nice product, but they cannot tell you which problem they solve.

L: Yes.

G: But they do have a really nice product and a really nice dream. When you are going to work with someone who has a problem, that can become very strong.

L: Definitely.

G: Those collaborations need to get a bigger message, upcoming year.

L: Okay, and this also counts for internal collaboration?

G: Yes, definitely.

L:So different people, from different departments are put together in a project team?

G: Yes, what we do now? Euhm, the most concrete I can tell you from the past couple of years, is our continuous improvement program. We try to become as multidisciplinary as possible, by euh working horizontally through the organization.

L: Okay.

G: From origin, it always was from cilos.

L: Yes.

G: I mean, sales organizes sales, eh.

L: Yeah, exactly.

G: The department purchase should be really efficient in purchasing product, but eventually, it meant that we bought such a large amount of products that it would arrive later of we had a stock of 100 million euros.

L: Wow, that sounds not efficient.

G: Yes, you never sell that, but it was bought really "efficient". The continuous improvement program tries to connect these departments with each other, by having conversations, which should create a different dynamics, which causes new ideas for process innovations.

L: Yes, exactly.

G: So, that is really important.

L: Yes.

G: It took a couple of years, before the switch could be made.

L: Yeah I can imagine that. I do not think everyone wanted to change immediately?

G: No, we needed to be open and not trying to stop them. People are creature animals, we have done it this ways for years now..

L: Yes.

G: That is really hard to change.

L: Definitely.

G: But the introduction of our continuous improvement program has made some bridges, which causes better communication between departments. It can always be done better, but I think we made a step in the right direction.

L: Yes, good to hear that you already tackled the biggest part of the problem.

G: Yes.

L: I have one last subject, that is research and development. Can you tell me how many people are working at the R&D department within the organization?

G: Well, we have different R&D departments. We have technical R&D department, they are in the same building as the Academy we have. I am not sure how many people are working on that department.

L: Okay.

G: Also, January last year, a colleague of mine, Alexander Ketelaar, opened a new location in Utrecht. The Hub is settled in that place.

L: Okay.

G: The Hub is occupied with the developments of the online techniques, they are occupied with the techniques in the broader sense of the word, who eventually are used by the organization.

L: Okay.

G: In the Hub, 30 employees are active at the moment.

L: Wow.

G: Yes, they grow a lot in the last year. On the same location, I am going to set up my team. I am still working on that and the whole team is sitting in front of you at the moment.

L: Okay, so it is still in its infancy?

G: Yes, definitely. We recently made the decision that we want to set up a team, and that there is also budget for the team. We want to do innovation experiments and also want invest in mergers and acquisitions.

L: Okay.

G: There are a lot of millions in the MNA budget holding. I am currently looking for the first 2 people that suite the job well.

L: Okay, really nice.

G: Yes, so we can start.

L: Super interesting. Finally I want to ask you how you think that the contribution of non-R&D and R&D employees compares in combination with the innovation process within the organization? Are only the R&D employees involved or is it a combination of both parties?

G: Eventually, I think that R&D employees are involved in phase one, which is the idea generation till the phase of minimal viable product.

L: Yes.

G: They need to be the once that develop an idea and want to see whether it can add something or not.

L: yes.

G: The moment we as non-R&D employees say: yes, that is a really good idea! It can work out really well for us, than then non-R&D employees need to pick up the idea and integrate it into the company, only this way the idea can get ownership.

L: Okay clear.

G: Maybe they also need to have an important role in judging the proposal of the idea, to see if it is possible, because maybe after finishing it, 1000 employees need to work with it.

L: MM..

G: Yes so that is absolutely different.

L: Yes absolutely. And do you find any differences between incremental and radical product innovation?

G: Mm, incremental, I think the current process is the reason for trying to discover flaws in the processes and to optimize these. With radical product innovation, it is possible, that you work out an

idea that has nothing to do yet with the organization. You are not even sure if it fits the organization.

L: Yeah, that is clear. So, in summary you say that R&D is more on the radical product innovations and non-R&D is more on the incremental product innovations?

G: Yes, that is the way I see it.

L: Okay, thank you very much. I would like to thank you for this interview.

G: Yes, is it the right information?

L: Definitely. Is there something you would like to add or ask?

G: No, I think I told you everything.

L: Okay, thank you very much.

Interview 3:

Organization: likes to stay anonymous
Date: 5-6-2018
Duration: 34.13 minutes

Speaker	Assigned character
Lotte Vredegoor	L
Mieke	M

M: Sure, let's begin.

L: Okay, first of all can you tell me how big the company is?

M: Yes, we already exist 400 years now. I am not totally sure, but I think we have around 675 employees.

L: Okay, that is quite a lot.

M: Yes, it definitely is and since last year we are part of the Asahi group.

L: Okay, what does that mean for the organization?

M: Nothing much will change, we are still the same company as we were before the take-over. However, now we have even more international potentials.

L: Okay, interesting. What do you mean with even more?

M: We already available in 70 countries, but this can grow now.

L: Wow 70, that is quite a lot. Can you also tell me what your position is within this organization?

M: Currently I am working in the department for innovations, I am focusing on product innovations within this organization.

L: Okay and do you only focus on incremental or also radical product innovation?

M: My daily activity is focusing on which new products we can make, but also a part of my job is focusing on how we can make current products better by for example a different bottle or other decoration for a label.

L: Okay nice, so this means you are most of the time busy with radical product innovation?

M: Yes, I think that is safe to say.

L: Okay.

M: Yes, we try to look at what the customer wants and also if it is profitable for us.

L: Yes.

L: Okay, sound like a really nice job. How long are you working for this company at the moment?

M: Euhm, euhm.. I think around 7 or 8 years now.

L: Okay, that is long already.

M: yeah, I really like it here and I think this company is amazing. I did not started in this position right away (Laughs).

L: Mm.. what did you do first?

M: I started with a summer job in the warehouse and after I finished my study, I could work as a process optimizer. And euh.. from the one thing the other came.

L: Okay, okay, so that were some introduction questions. I would now like to talk about competence building, which is in my research one of the topics of employee driven innovation.

M: Yes, okay. And what actually do you mean when you say competence building?

L: Euhm, I mean training and other things that the organization is doing with regard to the competences of the employees.

M: Okay, so training, mmm we do that.

L: Yes, can you tell me which kind of training and courses the organization is doing? Just give me some examples.

M: We do a lot of different trainings for our employees. It depends on the function they have within the organization. (Laughs) when I started working here, I did not know how to drive a forklift, so I got a driving lesson in fork lifting. (laughs) While on a higher level, euhm euhm, a manager can get an MBA if he thinks that it will add value to his functioning inside the organization.

L: Okay, mm..

M: Yes, sorry I am not aware of every training possibility within this organization. But I know the organization is doing a lot to keep the employees up to date.

L: Okay, it does not matter. Any other examples you can think of?

M: Yes, I can give you another example about our sales people. When they are new in the organization they get a training to learn about all the projects we have and they get a training about euhm euhm, how to work with the customers, because we want to convey a certain image.

L: Okay.

M: Yes, and when you are new in this organization you also get a training about the systems you are working with in your position and a few lessons about the culture, the way of working etc. inside this organization. We want euhm, euhm, yes euhm, all employees to think about it the same way.

L: Yes, that sounds good to do when an employee is new.

M: Yes, so I think that a lot is possible within this organization and a lot is done with regard to training, but I cannot tell you exactly which kind of trainings we do, apart from the once I mentioned.

L: Okay, thanks. Do you know if these trainings happen most of the time within the organization or outside the organization?

M: Oh wait, I remember something. This year we started with the (name of company) Vakman education. This training for technicians should ensure that there is a better attraction on the labor market and well-trained technical staff.

L: Okay, nice.

M: Yes, sorry I just remember it. What did you say just yet?

L: If you know if these trainings happen most of the time within the organization or outside the organization?

M: That depends, sometimes when multiple employees need to the course or the training, it can be done inside. This is also financially most of the time cheaper for the organization. However, for example with the colleague that is doing a MBA, this is not happing inside the organization but at the university of Twente for example.

L: Okay, so sometimes intern and sometimes extern?

M: yes, yes .. euhm.. yes.

L: Okay, and is there a annual budget for the employees with regard to training? Or how has the organization taken care of this?

M: To my knowledge, euhm, eh, not. Because most of the time the employee when an employee wants to do a training of a free will, they need to show why this is important for them and how this is valuable for the organization. When there is a course or training that needs to be done by the organization, the employees do not need to do this, because then the organization already decided that it adds value to the company.

L: Okay, euhm, yes that sounds logical.

M: Yes, because most of the time, when you want to do a training based on free will, you want to work on the competences you have as an employee and most of the time if an employee is increasing his or hers competences, it will only bring good to the organization, I think.

L: Okay, so to conclude, you named a couple of examples which you thought off. You are not sure which trainings the organization all do, but you are sure that if an employee is willing to do a training of free will, it almost all the time adds good for the organization.

M: yes, definitely.

L: Okay and you said that it will bring good to the organization, do you also think that the trainings the organization is doing has any effect on the introduction of new processes technologies?

M: pff, oeh, euhm, I am not sure, because I do not think you can see immediately results from doing a training, but I think indirectly, the employees train there competences and these competences are necessary for different process technologies, so yeah indirectly I think this is the case.

L: Okay, yes.. and for product innovation?

M: For product innovation I do not think so. A lot of our new products that we bring to the market are based on the wishes the customers has. We do a lot of market research for it. And to change existing products, I think it is most of the time the creativity of an employee. For example, I think 2 years ago one of the product employees came to my office and wanted to share an idea he had for one of the bottles of our products. The idea was really good, but eventually not financially feasible. So, no.

L: Okay, correct me if I am wrong, but indirectly you see a connection between the trainings the organization is giving and process innovation and for product innovation you do not see a connection between these two.

M: yes, that is correct.

L: Okay, nice. So, I wanted to change to another subject of employee driven innovation which is employee involvement. Can you explain to me if and in what way the organization is trying to actively involve employees by the innovations in this organization?

M: We try to involve them. The example I just gave about the production employee that came to my office because he had an idea. We are really open for such ideas, and when the idea is good and it can be performed, this employee will also be taken into the process the whole time.

L: Okay, interesting.

M: One of our values is trust. This means not only trust in the product we make, the things we do, but also trust in our employees. That they try to perform as optimally as possible every day. This also means that when they have something good, they need to get the possibility to explain these ideas to us.

L: Okay, and can you give any examples of activities or something else that euh, the employees got involved in.

M: Yes, employees who recognize problems or have ideas, can always go talk to one of the management employees. Which management employee that is, depends on what the employee wants to talk about. When it is about a problem in the process, they most of the time go to one of the persons that are busy on a daily basis with optimalizing the process. However, when they have an idea for a new product or an adjustment to an existing product, they can come to my or 2 of my other colleagues.

L: Okay, but then you are only involving the employees that come up with an idea of themselves.

M: Yes, euh, true.

L: How do you try involve the other employees? I know it is not possible to involve them all in once with an innovation project.

M: Well, euh, euh, this is not based on production employees but on employees higher in the company. For example, when I have a good idea, I need to work together with sales, finance etc. to see if this idea is also feasible. Euhm, so then I involve also different employees, is that what you mean?

L: Yes, euh a little bit.

M: Okay.

L: And when you are busy with a major new innovation project within the organization, do other employees get to know this or do they hear about it when it will be introduced?

M: No, of course not.. euhm, we have a news latter which comes 1 in the 2 months in your e-mail. This letter will always describe which projects are currently running. Also, when a new product needs to be tested before it goes on the market, the employees get the change to tasted it, of course after work (laughs). Because we want to know what they think about it, before we bring it to the market. For example, they taste it and afterwards they need to fill in a small survey about what they thought about the label, the bottle and the taste of course.

L: Oh wauw, that sounds nice (laughs).

M: yeah, so we communicate a lot, via newsletter, tv-screens and tests, because want to know what the employees are thinking about it. But maybe, we should do something else to get them even more involved, but I am not sure yet what that would be, so if you had a good idea (laughs).

L: Well, one of the other companies talked about a kind of forum, where employees can post their ideas and everyone inside the organization react on it.

M: Yes, that sounds nice, but also maybe that is still not good enough.

L: Yes, I don't know.

M: (laughs) Oh no, thank you for your advice. But I hardly think that only employees can be the once that can establish innovation, I think there is more needed then that.

L: Of course, I understand and will also come back to this because it fits perfect to another subject I have for this interview (laughs).

M: (laughs) Okay, I was just wandering.

L: Oh no, I understand and I am glad you do that.

M: Okay.

L: Euhm, final question about this subject is: to what extent do you think it is necessary to actively involve employees in innovation processes?

M: Well, as I said it is not only the employees that achieve innovation, a lot more is necessary. But, I really think, for example, euh, with the tasting we do before a new product, is necessary to let the employees speak and give them a voice about the new product. So, they can tell us better than anyone or anywhere if it tastes good and if the product is looking okay.

L: mmm..

M: So, to what extent, I think it is necessary to actively involve employees is at some parts big and at some parts small.

L: Okay, why?

M: Because I do not think it is necessary involve a lot of employee the whole process,, but some employees who have the right knowledge can be involved in the whole process and the others, when there is a new product, they all need to get involved to get as much as feedback as possible.

L: mmm, okay.. euhm..

M: Clear?

L: Yes, definitely.

L: because when I understand it right, you still want some employees that are suitable for the project to b involved, but you need all employees involved when a product needs to be tested.

M: yes, correctly. We are a company that is really healthy, we earn money and we can use that money to introduce new products to the market.

L: okay, that sounds clear.

M: Okay, super.

L: Yes, thank you. So another part of employee driven innovation is autonomy.

M: Okay and what do you mean with autonomy in this case?

L: In my research, eh it means that employees are free to handle, that there are no written work instructions for example for the product employees, so that they have freedom to act.

M: Oeh, euhm, okay, yes..

L: Do you understand what I mean?

M: Yes, yes, I thought it would be that, but I would make sure we understand the same about it.

L: Yes, I understand, thank you.

M: Okay, but euhm autonomy, let me think.

L: Yes, can you give a report figure for the autonomy of the employees within this organization?

M: oh, euhm, wauw, (laughs), good question.

L: (laughs), thanks.

M: Yes, you know, it depends really hard between positions in this company.

L: Okay, and can you maybe explain which is so different between them?

M: Look, for product employees we have written instructions, because for the brewery to work perfect, a good and precise process needs to be followed, so for them I would give a 6.5.

L: Okay and why a 6.5, only because they have written instructions?

M: No, because quality is everything with our product. So therefore, a lot of strict rules need to be followed when working on the daily process, but still a 6.5, because they have freedom to come up with ideas or problems that need to be solved according to them, all to make the process or the product better.

L: Okay.

M: Yes, euh, it does not happen a lot but when a production employee has a good idea, it is most of the time also a really good idea, because they are the once working with it. But I need to say, it is most of the time an improvement from an existing product or process.

L: Okay, clear, and what is the other position that needs to get a number according to you?

M: Yes I think we as managers and employees that are not working in the production, we have a lot more freedom, therefore I would like to give a 7.5.

L: Okay.

M: Yes, what I wanted to say is that we take really good care for the workplaces the employees are working in, they need to be really safe but this also means that for them to be safe they need to follow some rules.

L: Yes, I understand. And can you give me an explanation of the 7.5 for not production employees?

M: Yes, every employee is encouraged to think for the organization. However, I think we are in the middle of it with a 7.5, because whenever a customer is calling, they always go first, so then they are too busy with making the current situation better for the customers, instead of looking at new products or processes.

L: Okay, so you are actually saying that they get the time and are encourage to think with/for the company, but most of the time they do not have time because they are busy with customers.

M: Yes, exactly.

L: Okay, and is it safe to say that the average for this organization is a seven?

M: yes, I think it is a fair number to give to autonomy in this organization.

L: Okay, good, good. Seven is not a ten yet

M: (laughs), no definitely not.

L: (laughs) but do you think that when employees get a change to become more autonomous that this leads to more innovation?

M: Mm…

L: with regard to process or product innovation.

M: mmm, another tough but good question (laughs)

L: (laughs), yes, yes.

M: No I think that more autonomy is not possible for the employees working in the production, because as I said they need to follow strict protocols because the product needs to taste as good as possible and it needs to have same quality and taste over and over again.

L: okay, mmm..

M: Euh, for us as non-production employees, I probably think that more autonomy leads to more innovations.

L: okay and why?

M: Because I think a lot of the employees working in this organization are very creative and can come up with a lot of really good ideas, with regard to the process or product, but they simply do not have time.

L: Mm, okay.

M: yes if they want to do it now, they almost need to use their own spear time and I think that is not a possibility for a lot of people. So, I am not sure what the solution for that will be, but …

L: Mmm, euhm..

M: But I think that if employees got more autonomy, and at the same time more time, they will come up with more ideas.

L: and where do you think these ideas are coming from?

M: Euhm, mmm, I think because these employees are in contact with a lot of people inside and outside the organization and via this way they get a lot of knowledge which they can use or which can trigger their creativity for a new idea.

L: Okay, interesting. So, you do think that autonomy leads to more innovations, but only when employees get more time for it and also if they have right creativity for it.

M: Yes, exactly.

L: mmm, okay. You already mentioned briefly that employees are working inside and outside the organization together with other people. My last item of employee driven innovation is interplay, internal and external. Which is about collaborations inside as well as outside the organization.

M: Okay, sounds logical. Mmm…

L: Can you explain to me if the organization is working with a lot people outside the company and how does these relationships work?

M: We work really close with our partners and suppliers for every part of the chain. We have a very strict suppliers policy. This policy demands from every supplier that they fulfill the relevant national environmental legislation.

L: Okay and why does the organization has this policy?

M: Because environment is really important for this organization and therefore the organization wants to collaborate with suppliers who think the same about the environment.

L: okay interesting. Do you use these suppliers with regard to an innovation process?

M: Yes, we have some suppliers we already work with quite a long time. Sometimes they come to us and explain they have something new which we can use to make the product better but also the other way around. Sometimes we ask them if they can deliver something, which is not a normal delivery, which we can use to test for example for a new product.

L: mmm, okay.

M: So, yeah, I think it is safe to say that we work a lot together with some of the suppliers.

L: Okay, interesting and what does the organization do with regard to collaborations inside the organization?

M: Mmm, what I already mentioned is that different employees for example one from sales, one from finance and me work together when I have created a new idea, because I cannot work out the idea by my own.

L: Okay, and is this also the case for process innovation? Because I know you are specialized for product innovation.

M; MM, yes but I think less employees are involved because most of the time when it is for example a problem only the employee who reports the problem and the person who needs to fix the problem work together.

L: mmm, okay.

M: Yes and for example co-creation inside the company, we are working on it, but it can be done better.

L: Okay.

M; yes but what I already said, there is not enough time and employees should really make time when they want to make it happen.

L: I understand.

M: But, overall, I think we work together whenever it is necessary and there is an idea of plan, because then this employee will bring everyone together which are necessary, but we want to go to project groups that are talking with each other and trying to bring up new ideas etc.

L: Okay, interesting. You are still busy with that?

M: yes we are trying to set it up.

L: okay, so you both do internal and external collaborations. Which one do you think has the most influence on innovations inside the organization?

M: Euhm, mmm, I think both can be really important. For new ideas the internal collaboration is important I think, but when the idea is there and the organization needs to develop it, the collaboration with external is really important.

L: Mmm, okay.

M: Do you know what I mean?

L: Yes, you think it starts with the internal collaboration for an idea and after the idea is developed, the external collaboration is important to make it to a success.

M: Yes, exactly.

L: But do you think in general that collaboration is important for one of the innovations within the organization (process / product innovation)?

M: Yes, I think so. I think co-creation can lead to new ideas that otherwise would never been thought about, and this can be for either process or product innovation.

L: Okay, thank you that is clear. My last subject is R&D. This is about the research and development department in your organization. Can you tell me how many people are working at the R&D department within the organization?

M: Mm, well we do not call it R&D anymore. It has all kind of different names, such as business developer. But they still do the same as an R&D department.

L: Okay, mmm.

M: But I think around approximately 25 people.

L: Okay, that is quite a lot.

M: yeah, I am not sure but I think that is around that number.

L: okay and if there is any product innovation how is the division between non-R&D employees and R&D employees with regard to a product innovation project?

M: I think it is most of the time R&D, when it is about a new project, maybe 1 or 2 non-R&D employees, so around 75/25. With regard to small changes, new to the company for the product, than it could be another division, because more non-R&D employees have something good to say about existing products.

L: Okay.

M: However, at the end of a new project for a new product, as I said, non-R&D employees, get to taste, but that is not taken into consideration with what I said just yet.

L: No, okay I understand.

M: (laughs).

L: So, if I understand it right you think that the division for radical product innovation is 75/25, in which R&D has the most employees working on it and by incremental product innovation you think it is more 50/50 or even more 25/75.

M: Yes that is right.

L: Okay, thank you very much. I have all the information I needed, so I would like to thank you for your time.

M: Not a problem at all, you asked very interesting things and I am curious about the results.

L: Thank you very much, is there anything you want to add?

M: No, I do not think so.

L: Okay than I will stop recording.

Appendix X. Coding interviews

Overview colours

Colour	Interview
	1
	2
	3

Tekst fragment	Open code	Axial code	Selective code
Training is definitely organized within our organizations, but these courses are really divers.	EDI	Competence building	Training
Examples are: forklift course, EHBO course, BHV courses, but also new courses	EDI	Competence building	Training
also training who is suitable for a position within the organization is possible. This can be: a training to learn to speak German or a course of labor law	EDI	Competence building	Training
The training is determined at the demand and need of the employees.	EDI	Competence building	Training
We do not have a standardized policy for training within the organization	EDI	Competence building	Training
For example we have a lot of product specialists, one of the distinctive factors of this organizations , is that we know a lot about the products we sell. We have around 600.000 articles. These are dived into different categories. We involve 2500 suppliers for these articles. The people who sell the products to our customers, or give advice about it, all get product focused training. This means than when a new product line is added, employees need to get training. We train our employees jointly, even sometimes the customers in our new product range. So that is really technical.	EDI	Competence building	Training
One of the most important training, at least that is what I really like, are the once that involve the culture of the organization. When you are going to work here, you get in your first month a kind of onboarding program in which you get to see and get to know all the facets of the organization. So, you get to know the processes in general. After this program you get a training for the job of department that you are working at. This training is focused on getting to know the relevant systems, processes etc.	EDI	Competence building	Training
But on the other side it can also be training and courses that are focused on the soft skills and negotiations skills of the employees.	EDI	Competence building	Training

We do a lot of different trainings for our employees. It depends on the function they have within the organization. (Laughs) when I started working here, I did not know how to drive a forklift, so I got a driving lesson in fork lifting. (laughs)	EDI	Competence building	Training
Yes, I can give you another example about our sales people. When they are new in the organization they get a training to learn about all the projects we have and they get a training about euhm euhm, how to work with the customers, because we want to convey a certain image.	EDI	Competence building	Training
Yes, and when you are new in this organization you also get a training about the systems you are working with in your position and a few lessons about the culture, the way of working etc. inside this organization.	EDI	Competence building	Training
This year we started with the (name of company) Vakman education. This training for technicians should ensure that there is a better attraction on the labor market and well-trained technical staff.	EDI	Competence building	Training
Yes, we have different training and courses. We all have on-the-job related training in this portfolio, which is made available by HR, but is also facilitated by the learning and development department.	EDI	Competence building	Training / learning
a lot of employees within this organization did the course NEN3140, which was very important for the employees to achieve	EDI	Competence building	Learning
Another good example is an colleague of my is not doing any courses, but wants to follow a master, which can bring us new knowledge inside the organization.	EDI	Competence building	Learning
So then when a lot of added value can be added and then we are prepared to pay a x amount of the costs	EDI	Competence building	Learning
they do net get direct training, but they go to a lot of knowledge sessions in which similar companies come together and talk about a lot of different things and share their knowledge about multiple subjects	EDI	Competence building	Learning
Within this organization it is really important that people stay up to date.	EDI	Competence building	Learning
Yes, because it sometimes are courses that are not necessarily needed for their today job, but for the job of tomorrow.	EDI	Competence building	Learning
But, another side to this story is that we have our own academy.	EDI	Competence building	Learning
While on a higher level, euhm euhm, a manager can get an MBA if he thinks that it will add value to his functioning inside the organization.	EDI	Competence building	Learning
But I know the organization is doing a lot to keep the employees up to date.	EDI	Competence building	Learning
Yes, so I think that a lot is possible within this organization and a lot is done with regard to training.	EDI	Competence building	Learning

To my knowledge, euhm, eh, not. Because most of the time the employee when an employee wants to do a training of a free will, they need to show why this is important for them and how this is valuable for the organization. When there is a course or training that needs to be done by the organization, the employees do not need to do this, because then the organization already decided that it adds value to the company.	EDI	Competence building	Learning
the business developers do not get any specific training but join knowledge sessions where they get information and knowledge from other parties involved in the plastic industry.	EDI	Competence building / Interplay	Learning / Collaboration outside the organization
Definitely intern the organization, but employees also go outside this organization. Sometimes, it can really add some value to the training with other people than your colleague's	EDI	Competence building / Interplay	Learning / collaboration outside the organization
Myself, is really active in networks that have nothing to do with the branch we are working in. This is because I sometimes think that the hairdresser maybe asks the question that can send me in a certain direction.	EDI	Competence building / interplay	Learning / collaboration outside the organization
That depends, sometimes when multiple employees need to the course or the training, it can be done inside. This is also financially most of the time cheaper for the organization. However, for example with the colleague that is doing a MBA, this is not happing inside the organization but at the university of Twente for example.	EDI	Competence building / interplay	Learning / collaboration outside the organization
So, training and motivation to always look outside, to see what it can mean for your own competencies. Really important.	EDI	Competence building	Competencies
Finally, the fourth element is entrepreneurship. This is an important value, in which try to, as much as possible, to bring out the best entrepreneur you as a person have in you.	EDI	Competence building	Competencies
We work with insides, that means red, green, blue or yellow. Red means: employees who continue, that have enough information and make a decision. Yellow means: the creative employees. Blue: employees that bring a lot of structure into work and that really want to know all the details before making a decision. Green: those are the people, people. Who not change that much. In this organization there are a lot of blue people. These employees work really structured and are really interested in the products we sell. So, when you want to make teams, and the way teams work, it is now all discipline or job oriented.	EDI	Competence building	Competencies
Yes, because most of the time, when you want to do a training based on free will, you want to work on the competences you have as an employee and most of the time if an	EDI	Competence building	Competencies

employee is increasing his or hers competences, it will only bring good to the organization, I think.			
In the past they regular needed to do a leading course. I think this could help with innovation, because it achieves that people are involved, working together and are able to tell each other something they can learn from. This can cause the effect that people are working and thinking in the same way, which may cause efficiency	EDI	Competence building	Absorptive capacity
This way I try to create a field of tensions. I am somebody that always want to stir things up, to cause some unbalanced feeling. This is because, from within this unbalanced feeling, you get change.	EDI	Competence building	Absorptive capacity
In my contract was written that it would be appreciated and asked to think in terms of the company.	EDI	Employee involvement	High involvement
For my personal, if I think for the company it makes me feel involved in the company. Like one piece of it is mine	EDI	Employee involvement	High involvement
But you get a lot of freedom, which is stimulated to do things that you otherwise would have never had done. Of course this is not at the start of the working experiences, but comes in a later stage.	EDI	Employee involvement	High involvement
Yes, because I think that it is important that when certain decisions are made, that there should always be understanding from the employees.	EDI	Employee involvement	High involvement
A lot of people that have something good and smart to say about, will get involved.	EDI	Employee involvement	High involvement
because a small example is that we decided to buy a traffic light for production, because an employee told us that he found it really dangerous to all drive around on these forklifts and sometimes were not fully able to see if someone is approaching you. That kind of feedback from the production employees is really appreciated. It is something small, but makes their working space a lot safer, which makes it possible to work even more efficient.	EDI	Employee involvement	High involvement
We try to involve them really active. Especially when looking at our core values	EDI	Employee involvement	High involvement
The second value is: engaged. Which means involvement. It is involvement based on people, planet, profit.	EDI	Employee involvement	High involvement
you are as a company nothing. A company consists of people, so finally it is about the people that together try to achieve the best.	EDI	Employee involvement	High involvement
We try to involve them. The example I just gave about the production employee that came to my office because he had an idea. We are really open for such ideas, and	EDI	Employee involvement	High involvement

when the idea is good and it can be performed, this employee will also be taken into the process the whole time.			
One of our values is trust. This means not only trust in the product we make, the things we do, but also trust in our employees. That they try to perform as optimally as possible every day. This also means that when they have something good, they need to get the possibility to explain these ideas to us.	EDI	Employee involvement	High involvement
For example, when I have a good idea, I need to work together with sales, finance etc. to see if this idea is also feasible. Euhm, so then I involve also different employees.	EDI	Employee involvement	High involvement
But I hardly think that only involving employees can be the one thing that can establish innovation, I think there is more needed then that.	EDI	Employee involvement	High involvement
Yes, employees who recognize problems or have ideas, can always go talk to one of the management employees. Which management employee that is, depends on what the employee wants to talk about. When it is about a problem in the process, they most of the time go to one of the persons that are busy on a daily basis with optimizing the process. However, when they have an idea for a new product or an adjustment to an existing product, they can come to my or 2 of my other colleagues.	EDI	Employee involvement	High involvement / instruments for involvement
If you look at the company, a company is a building with people in it. Those people make or break the company. So I think it absolutely not possible to separate it from each other. I think it is almost a direct relationship between involvement and innovation processes.	EDI / process and product innovation	Employee involvement	High involvement
Well, as I said it is not only the employees that achieve innovation, a lot more is necessary. But, I really think, for example, euh, with the tasting we do before a new product, is necessary to let the employees speak and give them a voice about the new product. So, they can tell us better than anyone or anywhere if it tastes good and if the product is looking okay.	EDI / process and product innovation	Employee involvement	High involvement
Because I do not think it is necessary involve a lot of employee the whole process,, but some employees who have the right knowledge can be involved in the whole process and the others, when there is a new product, they all need to get involved to get as much as feedback as possible.	EDI / process and product innovation	Employee involvement	High involvement
We try to involve the employees. For example we have digital TV screens in the canteen, where we try to give an update about certain projects	EDI	Employee involvement	Instruments for involvement
Yes we do obviously mouth to mouth, but that is expected. We are also thinking about a flexible working staff representation.	EDI	Employee involvement	Instruments for involvement

Quote	Code 1	Code 2	Code 3
Yes we have a lot of TV screens in this building. But I personally think the communication is mostly about operational things.	EDI	Employee involvement	Instruments for involvement
And we also have a digital newsletter, the intranet on which we communicate as much as possible on what is happening within the organization, what is decided in the organization and what is happening in the market.	EDI	Employee involvement	Instruments for involvement
But for this theme, innovation, we need to create something new. I think we need a kind of forum, or interactive space.	EDI	Employee involvement	Instruments for involvement
We have a news latter which comes 1 in the 2 months in your e-mail. This letter will always describe which projects are currently running. Also, when a new product needs to be tested before it goes on the market, the employees get the change to tasted it, of course after work (laughs). Because we want to know what they think about it, before we bring it to the market. For example, they taste it and afterwards they need to fill in a small survey about what they thought about the label, the bottle and the taste of course.	EDI	Employee involvement	Instruments for involvement
yeah, so we communicate a lot, via newsletter, tv-screens and tests, because want to know what the employees are thinking about it. But maybe, we should do something else to get them even more involved, but I am not sure yet what that would be, so if you had a good idea	EDI	Employee involvement	Instruments for involvement
When a lot of people think the idea is really good, you can together create a concept. So, for short term and medium term, these innovations are very good.	EDI / process and product innovation	Employee involvement	Instruments for involvement
I think both, because the example of Zeewolde, we bought a washingline for PET, which is 25 years ago, which was kind of a "gamble". This worked out really well, the reason therefore is because they tried to develop together with the machine supplier a process. That is what is happening in Heerenveen now. Multiple parties are involved, from which we know that they have right knowledge, about how we want to have it. So this is a really close and intensive collaboration	EDI	Interplay	Collaborations within the organization / collaboration outside the organization
The experience that is already in the company is very useful and important, because working really close to suppliers and customers, makes it possible to have an open relationships.	EDI	Interplay	Collaboration within the organization / collaboration outside the organization
Also, you think both external and internal collaborations are important. External is especially the government really important for the company.	EDI	Interplay	Collaboration within the organization /

			collaboration outside the organization
Because I think it starts intern within the company, that is important. However, it also comes from extern, but also intern. So I think the foundation has been laid intern and then you need the right companies to support you in this. Which means that both intern and extern have a 50/50 share.	EDI	Interplay	Collaboration within the organization / collaboration outside the organization
Not only me, but also other colleague's, because I think that co-creation is really important, because it can lead to totally different views on something. For example, there are a lot of startups, who have a really nice dream, with a nice product, but they can not tell you which problem they solve and when we help them, it can become useful for us.	EDI	Interplay	Collaboration within the organization / collaboration outside the organization
I think both can be really important. For new ideas the internal collaboration is important I think, but when the idea is there and the organization needs to develop it, the collaboration with external is really important.	EDI	Interplay	Collaboration within the organization / collaboration outside the organization
But the knowledge we have inside the organization will be used as much as can. An example is building the new factories: because there is already a lot of information, because three factories are already build from the ground up, which brought quite a lot of new knowledge into the organization. We try to involve these people, who already have build a factory before.	EDI	Interplay	Collaboration within the organization
Yes, every Monday we have meeting, where commerce, the business developers and production employees come together. In this meeting they look at the questions from the customers, which can be achieved immediately, which questions take more time, what can we do to make it faster etc.?	EDI	Interplay	Collaboration within the organization
So that is something we do, where multiple people come together. When the process starts to run, then not only someone from commerce is working on it, but also a business developer is involved in the process.	EDI	Interplay	Collaboration within the organization
Well, I also think that it is good that different people sit together, also because a lot of requests can come from different places within the organization. So, bringing these people together on Monday, makes it easier to look at a request and make sure we handle it in the right way.	EDI	Interplay	Collaboration within the organization
but I think we need to focused more on multidisciplinary systems, because the right creatives, the right technical people and sales people when brought together can become a pretty good team.	EDI	Interplay	Collaboration within the organization

But when you talk about actively working together inside the organization, we do not do that a lot for innovation.	EDI	Interplay	Collaboration within the organization
Euhm, the most concrete I can tell you from the past couple of years, is our continuous improvement program. We try to become as multidisciplinary as possible, by euh working horizontally through the organization.	EDI	Interplay	Collaboration within the organization
The continuous improvement program tries to connect these departments with each other, by having conversations, which should create a different dynamics, which causes new ideas for process innovations.	EDI	Interplay	Collaboration within the organization
Mmm, what I already mentioned is that different employees for example one from sales, one from finance and me work together when I have created a new idea, because I cannot work out the idea by my own.	EDI	Interplay	Collaboration within the organization
Yes and for example co-creation inside the company, we are working on it, but it can be done better.	EDI	Interplay	Collaboration within the organization
But, overall, I think we work together whenever it is necessary and there is an idea of plan, because then this employee will bring everyone together which are necessary, but we want to go to project groups that are talking with each other and trying to bring up new ideas etc.	EDI	Interplay	Collaboration within the organization
I think co-creation can lead to new ideas that otherwise would never been thought about, and this can be for either process or product innovation.	EDI / process and product innovation	Interplay	Collaboration within the organization
for new collaborations it is mostly extern. The reason for this is because the information is most of the time quite new, so a lack of experiences and we won't reinvent the wheel.	EDI	Interplay	Collaboration outside the organization
Look at society, with collaboration you can come a lot further. Collaborations in all industries is what is happening now.	EDI	Interplay	Collaboration outside the organization
What is really interesting for us is the government, we cannot do anything without the government. So that is something we are working on. A colleague is a lobbyist, which is a member of the same board that talks with Den-Haag etc. Via, via is the way you sometimes need to take, otherwise you won't make it.	EDI	Interplay	Collaboration outside the organization
we have a lot of customer-supplier relations, both.. in contact with our supplier we are the customer, but we also are the supplier sometimes. We have a lot of business partners and consultants who we work together with when we talk about processes, they are the once that need to deliver burden of proof to make strategic decisions. So, in that way we work together a lot with different actors.	EDI	Interplay	Collaboration outside the organization

We work really close with our partners and suppliers for every part of the chain. We have a very strict suppliers policy. This policy demands from every supplier that they fulfill the relevant national environmental legislation.	EDI	Interplay	Collaboration outside the organization
Because environment is really important for this organization and therefore the organization wants to collaborate with suppliers who think the same about the environment.	EDI	Interplay	Collaboration outside the organization
I think because these employees are in contact with a lot of people inside and outside the organization and via this way they get a lot of knowledge which they can use or which can trigger their creativity for a new idea.	EDI	Interplay / Autonomy	Collaboration outside the organization / collaboration inside the organization
Yes, definitely. We work together with a lot of parties for product and process innovation	EDI / process and product innovation	Interplay	Collaboration outside the organization
Yes, we have some suppliers we already work with quite a long time. Sometimes they come to us and explain they have something new which we can use to make the product better but also the other way around. Sometimes we ask them if they can deliver something, which is not a normal delivery, which we can use to test for example for a new product.	EDI / process and product innovation	Interplay	Collaboration outside the organization
An 8 and an 8. We have a lot of freedom but at the same time also a lot of responsibility. In this company is it possible to follow your own plan, but you need to make sure that you can take responsibility for when it goes wrong.	EDI	Autonomy	Responsibility
If I am looking at production we do not steer on numbers, but on quality. A production employee, stands alone by the production and needs to take care of it.	EDI	Autonomy	Responsibility
At the office, how I experienced it as a new employee, was that my function was new. I get all the freedom to determine mine function and to focus on what I think is important. Once a month I have a conversation about what I already did etc, what I want to do and what I think is going really good.	EDI	Autonomy	Responsibility
Employees need to regulate their administration by their selves and it won't be digitalized. It is an act of showing autonomy, because we cannot check if someone honestly or not honestly fills in their forms.	EDI	Autonomy	Responsibility
Yes, but I am not sure if autonomy overall something has to do with innovation. I think I do not see a connection between these 2 in our company	EDI	Autonomy	Responsibility
Of course, to what extent leads autonomy to innovation? I think maybe at the office this is possible to have a connection, but for the production employees I do not see a	EDI	Autonomy	Responsibility

connection. At the office you can still add your own creativity, when you do not have to work following a certain plan.			
I think autonomy and innovation process within the company are related to each other. What I agree on with you Sanne is the part of creativity. I think that plays a big factor. But another thing is that when you make everybody conscious about the fact that they were asked to think in terms of the company, that it also becomes a little bit your company. In the sense of not in euro's but in your mind it feels like it.	EDI	Autonomy	Responsibility
So in summary, autonomy with production employees does not have added value for product or process innovation, however at the office autonomy could have influence on the innovation processes, which is for a big part to blame on the creativity of the employee and the feeling that you are really part of the company.	EDI	Autonomy	Responsibility
I have to give it a 6.5. Yes, no, definitely , it is low. I think it is low too, yes it is a good average, a realistic 6.5. The reason for this is because, people get a lot of freedom, but whenever a customer is calling, they always go first.	EDI	Autonomy	Responsibility
And in real life, everybody is that busy with it's daily job that in practice there is no freedom to be autonomous, and think about other stuff then your daily job.	EDI	Autonomy	Responsibility
That is why I give it a 6.5. So we say that a lot is possible and we want to stimulate each other, but in the modus employees find it really hard to say: hey I am doing for 70% my job for what I get paid and for 50% I do what I think is important for the organization.	EDI	Autonomy	Responsibility
But, to make sure people can make mistakes and are possible to show initiatives, which can bring new business.	EDI	Autonomy	Responsibility
Look, for product employees we have written instructions, because for the brewery to work perfect, a good and precise process needs to be followed, so for them I would give a 6.5.	EDI	Autonomy	Responsibility
No, because quality is everything with our product. So therefore, a lot of strict rules need to be followed when working on the daily process, but still a 6.5, because they have freedom to come up with ideas or problems that need to be solved according to them, all to make the process or the product better.	EDI	Autonomy	Responsibility
Yes I think we as managers and employees that are not working in the production, we have a lot more freedom, therefore I would like to give a 7.5.	EDI	Autonomy	Responsibility
Yes, every employee is encouraged to think for the organization. However, I think we are in the middle of it with a 7.5, because whenever a customer is calling, they always go first, so then they are too busy with making the current situation better for the customers, instead of looking at new products or processes.	EDI	Autonomy	Responsibility

yes, I think it is a fair number (7) to give to autonomy in this organization.	EDI	Autonomy	Responsibility
No I think that more autonomy is not possible for the employees working in the production, because as I said they need to follow strict protocols because the product needs to taste as good as possible and it needs to have same quality and taste over and over again.	EDI	Autonomy	Responsibility
But I think that if employees got more autonomy, and at the same time more time, they will come up with more ideas.	EDI	Autonomy	Responsibility
Besides this, the employees can make their own proposal for a certain kind of training, because they want to developed their selves. It is a kind of personal development plan.	EDI	Autonomy / competence building	Responsibility / learning
That is a responsibility we take as an employer, to stimulate and support the employees. But it is not the only one who is responsible for it. We also put a lot of responsibility by the employee itself.	EDI	Autonomy / competence building	Responsibility / learning
Yes, I think so. Because, a lot of our employees have daily contact with customers or suppliers or business partners. When they only with these short customer contacts inform about the situation by the customer, it does not matter if this is via phone or physical, you know what kind of problems the customer is dealing with and you can try to respond to it.	EDI / product and process innovation	Autonomy / radical and incremental product innovation	Responsibility / major / minor changes / lower cost and produce more
Yes, euh, it does not happen a lot but when a production employee has a good idea, it is most of the time also a really good idea, because they are the onces working with it. But I need to say, it is most of the time an improvement from an existing product or process.	EDI / product and process innovation	Autonomy / radical and incremental product innovation	Responsibility / minor changes / lower cost and produce more
Euh, for us as non-production employees, I probably think that more autonomy leads to more innovations.	EDI / product and process innovation	Autonomy / radical and incremental product innovation	Responsibility / major/ minor changes / lower cost and produce more
Because I think a lot of the employees working in this organization are very creative and can come up with a lot of really good ideas, with regard to the process or product, but they simply do not have time.	EDI / product and process innovation	Autonomy / radical and incremental product innovation	Responsibility / major / minor changes / lower cost and produce more
because they are on a daily basis with improvements for the company overall, so product and process innovations.	R&D	Productivity	Improvements product and process innovations

Well, we have different R&D departments. We have technical R&D department, they are in the same building as the Academy we have. I am not sure how many people are working on that department.	R&D	Productivity	Improvements product and process innovations
The Hub is occupied with the developments of the online techniques, they are occupied with the techniques in the broader sense of the word, who eventually are used by the organization.	R&D	Productivity	Improvements process innovations
Yes I think every test of trial I do, is important for the business developers. These tests and trials can check whether something can be made or can be employable	R&D	Science driven	Improvements product innovations
I think the business developers do have more to say by big projects than by smaller projects, because by smaller projects sometimes other employees take it out of the hands.	R&D	Productivity	Improvements product innovations
I think that R&D employees are involved in phase one, which is the idea generation till the phase of minimal viable product	R&D /product innovation	Productivity / incremental and radical product innovation	Improvement product innovations / major and minor changes
The moment we as non-R&D employees say: yes, that is a really good idea! It can work out really well for us, than then non-R&D employees need to pick up the idea and integrate it into the company, only this way the idea can get ownership.	R&D / product innovation / EDI	Productivity / incremental and radical product innovation / employee involvement	Improvement product innovations / major and minor changes / high involvement
I think it is most of the time R&D, when it is about a new project, maybe 1 or 2 non-R&D employees, so around 75/25.	R&D / product innovation / EDI	Productivity / radical product innovation / employee involvement	Improvement product innovations / major changes / high involvement
With regard to small changes, new to the company for the product, than it could be another division, because more non-R&D employees have something good to say about existing products.	R&D / product innovation / EDI	Productivity / incremental product innovation / employee involvement	Improvement product innovations / minor changes / high involvement
Now you are talking about efficiency. Yes I think this is all about the level of process innovation.	Process innovation	Efficiency	Lower costs
I think it is mostly process innovations, because the product is already really good. It is more that we look at how can we attract more, or what can we offer as an extra to the customer which makes it possible to produce even more.	Process innovation	Efficiency	Produce more

I think there is one really big effect and that is the efficiency.	Process innovation	Efficiency	Lower costs / produce more
There are some international teams that look at the best practices and trying to put it in a standard process for improvement. So they are trying to make the things that are working today, become batter.	Process innovation	Efficiency	Lower costs / produce more
I am not sure, because I do not think you can see immediately results from doing a training, but I think indirectly, the employees train there competences and these competences are necessary for different process technologies, so yeah indirectly I think this is the case	Process innovation / EDI	Efficiency / competence building	Lower costs / produce more / training
If that also fits the subject, than there are definitely trainings that we facilitate that have an important interface with innovation. And that is both on product and process innovation.	Process innovation / product innovation / EDI	New techniques / Radical and incremental product innovation / competence building	Major / minor changes / training
I do not think our training and courses have effect on product innovation	Product innovation / EDI	Radical and incremental product innovation / competence building	Major / minor changes / training
For product innovation I do not think so. A lot of our new products that we bring to the market are based on the wishes the customers has. We do a lot of market research for it. And to change existing products, I think it is most of the time the creativity of an employee. For example, I think 2 years ago one of the product employees came to my office and wanted to share an idea he had for one of the bottles of our products. The idea was really good, but eventually not financially feasible. So, no.	Product innovation / EDI	Radical and incremental product innovation / competence building	Major / minor changes / training
Yes, also they are focusing on the competition, to see if there are other ways to make the product better or to make new products possible	Product innovation	Radical and incremental product innovation	Major / minor changes
Mm, incremental, I think the current process is the reason for trying to discover flaws in the processes and products and to optimize these. With radical product innovation, it is possible, that you work out an idea that has nothing to do yet with the organization. You are not even sure if it fits the organization.	Product innovation / EDI	Radical and incremental product innovation / employee involvement	Major / minor changes / high involvement
So, in summary you say that R&D is more on the radical product innovations and non-R&D is more on the incremental product innovations	Product innovation / EDI / R&D	Radical and incremental product innovation /	Major / minor changes / high involvement /

		employee involvement / productivity	improvements product innovation
product innovation is suitable, the same holds for the commercial products that are in the market. Another thing is change management and change leadership	Product innovation / EDI	Radical and incremental product innovation / competence building	Major / minor changes / training
It is something from which we do not know if it is important in the future, but we invest a little bit, just to be sure.	Product innovation	Radical product innovation	Big risk