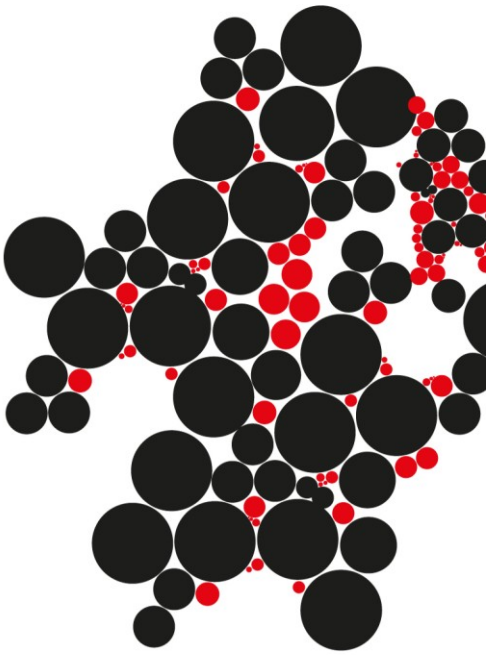

PERCEPTIONS OF INNOVATION FOCUSED HRM

and its impact on employee outcomes and organizational innovation in technology companies

Master Thesis by
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MASTER THESIS

PERCEPTIONS OF INNOVATION FOCUSED HRM AND ITS IMPACT ON EMPLOYEE OUTCOMES AND ORGANIZATIONAL INNOVATION IN TECHNLOGOY COMPANIES

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Melanie Peters

Abstract

This research focuses on the employees' perceptions of innovation focused HRM and the impact on creativity, innovative work behavior and organizational innovation. Both scientists and practitioners continuously emphasize the importance of innovation performance in today's economy, and the important role employees' creativity and innovative work behavior play for success. It is also often emphasized that employee perceptions are crucial to the effect HRM can have on behaviors and organizational outcomes, and that HRM practices rarely act on their own but need to be embedded in an entire system that represents an underlying goal. This study thus integrates a number of streams of research and develops an innovation focused HRM system that particularly aims at employees' perceptions. It contains practices regarding Recruitment and Selection, Training and Development, Performance Management, Compensation, Teamwork and Job Characteristics and Employee Participation, and formulates them to fit the overall goal of innovation. A measure for that system in form of a questionnaire is presented. The study also compares the developed system to existing systems, like High Performance Work Systems, High Commitment Work Systems, and High Involvement Work Systems and concludes that the goal of innovation makes the system more in-depth and detailed, and therefore easier for practitioners to apply. It further suggests a multi-level research model in which a positive relationship between employees' perceptions of such a system and organizational innovation is hypothesized, and creativity and innovative work behavior are introduced as mediating variables.

The research is conducted with 54 employees from 4 manufacturing firms in the Netherlands and is able to provide a test for validity for the measure, reducing the initial 34 items to 20 items and resulting in a reliable index for employees' perceptions of an innovation focused HRM system. By means of correlation and regression analyses it is shown that on the individual level the perception of the presented system does positively influence employees' innovative work behavior. Some support is provided for the hypothesis regarding the impact on creativity as well. On the organizational level and regarding the impact on organizational innovation the data was inconclusive. Here, further research is merited and recommended.

Contents

Chapter 1

Introduction

1.1 Research Motives

In the last few decades it has become of crucial importance for firms to be able to continuously innovate products, services and work processes (Parker et al., 2006; De Jong and Den Hartog, 2010; Crossan and Apaydin, 2010). Increasing environmental turbulences characterized by changing customer demands, rapid technological changes and global competition require a firm's ability to diversify, be flexible and rapidly adapt to changes in order to remain successful (Shipton et al., 2006; Jiménez-Jiménez and Sanz-Valle, 2008; Kang and Snell, 2009; Crossan and Apaydin, 2010). Following fundamental theories, such as the Resource-Based View (RBV) (Wright et al., 2001) or human capital theory (Kang and Snell, 2009) it becomes clear that employees and their human capital (their knowledge, skills and abilities (KSAs)) are a potential source of success; especially if they are valuable, rare, inimitable and non-substitutable (Piening et al., 2012). With HRM activities it is consequently possible to acquire, develop and use human resources in a way that the four criteria of the RBV are met (Piening et al., 2012). Also, Gupta and Singhal (1993) state that "people, not products, are an innovative company's major assets" (p. 41), which makes their management a crucial part of innovative success.

By adding to the RBV with the concept of subjectivism, Foss et al. (2008) argue that it is not the resources themselves that are valuable, but that there are multiple types and levels of value determined by individuals and their judgment. Value thus arises from *using* resources well and efficiently, not from merely possessing them (Foss et al., 2008). Here, resources not only refer to financial or tangible resources, but also include human resources, thus employees and their human capital. This further confirms the relevance of HRM in the success of a firm, since managing (or using) human resources efficiently ought to create value. Although HRM alone is probably not able to fully counter poor organizational performance, it still has the potential to drive innovative activities: by recognizing, boosting and rewarding employees' human capital, behavior and creativity (Gupta and Singhal, 1993).

This trend towards emphasizing employees' contribution to innovativeness is not only evident in the HRM literature. Various researches on innovation and its management

increasingly recognize the important role human resources, their capital (e.g. education, KSAs) and their management play in fostering innovation and organizational change (e.g. Greenwood and Hinings, 1996; Kahn et al., 2006; Crossan and Apaydin, 2010).

It is interesting to note that most idea improvements (80%) seem to be caused by employees during day-to-day work and not by planned innovation activities (Getz and Robinson, 2003; Imran et al., 2010). This phenomenon was also confirmed in an interview with the CEO of a computer firm (see appendix H. It is therefore desirable to manage employees in a way that motivates them to recognize problems and short-comings during daily work and to innovatively think of solutions without being explicitly asked to do so. The interview also revealed that the main challenge is hereby three-fold: Firstly, employees experience it as too much work to report short-comings and think of solutions; secondly, they don't want to squeal a colleague by reporting a problem and thirdly, they often feel that nothing will change anyway.

HR practices to foster innovation should thus arguably encourage employees to constantly bring forth ideas for improvement of products, services and processes by recognizing and antagonizing the challenges employees experience. It is however often assumed and shown that there is a potential divergence between the intention behind HR practices and how employees actually perceive them (Bowen and Ostroff, 2004; Khilji and Wang, 2006; Kehoe and Wright, 2013). This research therefore investigates how HR practices are *perceived* by employees and what message they take from them in order to accurately estimate the impact on employee outcomes on the one hand and eventually on organizational innovation on the other hand.

There are various researches done on the topic of innovation and how HRM can contribute to it (Beugelsdijk, 2008; Shipton et al., 2006; Lau and Ngo, 2004; Jiménez-Jiménez and Sanz-Valle, 2008; Jiang et al., 2012) but there is no consensus about the exact processes that explain the HRM – innovation link (Lau and Ngo, 2004; Jiang et al., 2012; Laursen and Foss, 2013; Zhou et al., 2013), especially when it comes to "theorizing the links between complementary HRM practices and innovation performance more comprehensively" (Laursen and Foss, 2003, p. 257). Two of the processes and mediators with which researchers often try to explain the link are the individual employee outcomes "creativity" (Jiang et al., 2012; Amabile, 1998) and "innovative work behavior" (Scott and Bruce, 1994; De Jong and Den Hartog, 2010). In line with the assumption by Foss et al. (2008) that value arises from *using* resources, it is obvious to assume a positive relationship between employees' behaviors and the way they handle their own and the company's resources, and organizational innovation. It will therefore be investigated if and to what extend creativity and innovative work behavior mediate the relationship between perceptions of innovation focused HRM and organizational innovation.

1.2 Research Objectives and Research Questions

This research aims at bringing together the various approaches to the HRM-innovation link, and thereby add to the understanding of how exactly HRM can foster organizational innovation (defined in terms of product innovation and innovation in technical systems/process; adopted from Shipton et al. (2006), as well as innovation of administrative systems; adopted from Jiménez-Jiménez and Sanz-Valle (2008)). In particular, it aims at finding out whether the perceptions of an innovation focused HRM system positively influences organizational innovation; and if and to what extent the specific employee outcomes "creativity" and "innovative work behavior" play a mediating role in that relationship.

Research Question:

To what extent can perceptions of an innovation focused HRM system affect innovation-related employee outcomes and organizational innovation?

Subquestions:

- *What components and variables (practices) does an innovation focused HRM system include and how do they relate and interact with each other?*
- *What impact do employees' perceptions of an innovation focused HRM system have on organizational innovation?*
- *What role does "creativity" play in the relationship between perceptions of an innovation focused HRM system and organizational innovation?*
- *What role does "innovative work behavior" play in the relationship between perceptions of an innovation focused HRM system and organizational innovation?*

1.3 Relevance of the Research

As was mentioned in the beginning of this chapter, innovation has become a crucial part of organizational success; and employees and their human capital are the major assets of an innovative company (Gupta and Singhal, 1993). Arguably, optimal results can only be achieved if they are managed in the right way; and they actually perceive the management in that way in order to induce the desired behaviors. The relevance of the research at hand is thereby twofold: scientific on the one hand and practical on the other hand.

1.3.1 Scientific relevance

Firstly, this research adds to existing literature of innovation in general and the HRM-innovation link by combining findings from both fields and developing a system that

considers both the principles of the innovation process, and the basic guidelines for HRM systems. It consequently adds to the understanding of organizational innovation and how HRM can contribute to it.

Additionally, it manages to combine and merge several established theories into a strong foundation that allows the development of an ideal innovation focused HRM system, as it builds on several theoretical frameworks, such as the Resource-Based View (RBV), the Human Capital Theory, the configurational approach to HRM, the AMO model, Social Exchange Theory (SET) and Attribution Theory. Although the HRM-Innovation link is a much discussed topic in literature, to my knowledge there has been no development of a complete HRM system that explicitly focuses on innovation as ultimate goal. Also, past research mainly focused on either the effects of firm level implemented or intended HRM systems, or on the perception of a single practice; instead of investigating the impact of employees' perceptions of an entire system (Boon et al., 2011). Also, perceptions are mostly only measured in terms of whether practices are perceived as being existent in the company (Boon et al., 2011), leaving out any judgment or assessment of those practices. Bowen and Ostroff (2004) managed to include such assessment in their conceptualization of HRM system strength, but make no distinction between practices and for example only generally assess whether HRM as a whole is "visible" in the company, or all HR practices are interpreted similarly among all employees. This research however argues for the importance of perceptions of specific practices regarding their fairness, balance and value in addition to their mere existence.

Lastly, this research uses a multi-level approach in which perceptions and behaviors are measured on an individual level, asking employees to assess and judge the HRM system as well as their own creativity and innovative work behavior; which are then related to organizational innovation on the firm's level.

Summarizing, this study presents a unique approach that relates employees' perceptions of a customized ideal innovation focused HRM system to individual employee outcomes on the one hand (IWB and creativity) and organizational innovation on the other hand.

1.3.2 Practical relevance

As was mentioned earlier, innovation has become one of the most important topics for firms that wish to globally compete in an environment of rapid technological changes and constantly changing customer demands. This research gives a deep insight and understanding of how HRM can contribute to organizational innovation and also discusses possible interactions with employee creativity and innovative work behavior. It provides knowledge and insight into the practical effectiveness of an innovation focused HRM system and thereby has the potential to significantly change the intentions firms have for their HRM system. With more knowledge about innovation focused HRM, firms can conclude where there is room for improvement regarding their own implemented HRM practices and how they are presented and brought over to employees.

Participating companies directly gain insight into how employees perceive their HRM system and to what extent it is perceived as innovation focused. Intended HR practices

can then be compared to actual perceptions of employees, and adjustments can be made. Hence, organizations will be able to react to the outcome of the study, which has the potential to influence their innovative outcomes and thereby also improve performance in general.

1.4 Thesis Outline

This chapter provided an introduction into the topic of organizational innovation in general and how HRM can contribute to it. It further discussed research motives and how the research objectives and questions resulted from them and gave an overview of scientific and practical relevance, and how participants and readers can benefit from this research. Chapter 2 provides the theoretical framework and hypotheses development and is the heart of this study. By starting out on a theoretical base and aiming to test it, this research can be classified as deductive and demands a highly structured approach (Saunders et al., 2009). With a detailed and comprehensive literature review an elaborate selection of subject-related scientific articles and books was gathered, as well as an interview with the CEO of a target firm (not participating in the actual research). Based on the resulting knowledge an innovation-focused HRM system is developed. It is discussed in-depth how and to what extent the perception of such a system can impact organizational innovation and how it compares to other existing HRM systems. Next, creativity and innovative work behavior and their role in the relationship are elaborated and hypotheses regarding mediation are formulated. Chapter 3 gives an overview of the methodology of the research and discusses sampling, data collection and measurements, as well as the way in which the data will be analyzed. Chapter 4 will present the study's findings and interpret them. Lastly, in chapter 5, conclusions will be drawn and the findings will be critically discussed, including theoretical and practical implications, the study's limitations and suggestions for future research.

Chapter 2

Literature Review and Hypotheses Development

There is various recent literature that investigates the HRM – innovation link (e.g. Lau and Ngo, 2004; Shipton et al., 2006; Beugelsdijk, 2008; Jiménez-Jiménez and Sanz-Valle, 2008; Jiang et al., 2012; Laursen and Foss, 2013) but none of which presents a complete well-developed theoretical framework that has the ability to explain the exact processes through which HRM contributes to organizational innovation (Beugelsdijk, 2008; Laursen and Foss, 2013). This research therefore aims at reflecting on existing research and thereby developing an HRM system that efficiently fosters organizational innovation; and exploring its effectiveness and the mediating effect of employee outcomes in the process.

2.1 Organizational innovation

The term 'innovation' is often used in HRM literature as well as business management literature in general. However, the more often it is used the more meanings and definitions the term gets, as it can refer to various different concepts. Often it merely reflects the change in products or services a firm offers (see Lau and Ngo, 2004; Beugelsdijk, 2008). This change can be the introduction of entirely new products or services, the improvement or upgrade of existing products or services, the use of new materials for an existing product or new tools/means for an existing service and can also simply refer to changes in design. Other authors additionally include innovation in production processes and technical systems (see Shipton et al., 2006), while in some cases a third type of innovation is introduced: the innovation of administrative systems (see Jiménez-Jiménez and Sanz-Valle, 2008). Another distinction can be made regarding the nature of innovation or the degree of change products and processes undergo: changes can either be incremental (new to the firm) or radical (new to the industry) (Beugelsdijk, 2008). Changes that are new to the firm not only refer to the introduction of an entirely new product for the firm, but also to small changes in functionality, design or use of materials that the firm is not yet familiar with, that were adopted from elsewhere within the industry.

The main difference between incremental and radical innovation is whether changes are adopted from other examples within the industry or new to the industry or even new to the world.

This results in two basic dimensions classifying innovation: the first one can be called the 'subject' of innovation, identifying whether products and services, production processes and technical systems, or administrative systems are innovated; and the second one can be called the 'mode' (adopted from Van de Ven and Poole, 1995) of innovation, describing whether the subject is incrementally or radically innovated. Here, organizational innovation embraces all subjects and modes mentioned above, and is further regarded as a process with four distinguishable phases of equal importance ((from Dorenbosch et al., 2005; De Jong and Den Hartog, 2010; Kheng et al., 2013):

- Problem recognition, or recognition of room for improvement (niche)
- Problem solving, or the generation of novel and useful ideas
- Solution championing, or the promotion of an idea or solution
- Solution or improvement implementation

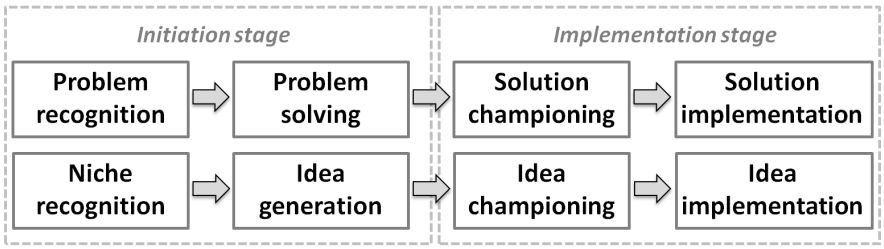

Figure 1: The stages of the innovation process

Literature on innovation generally agrees on this multistage process, although sometimes problem recognition is already implied in problem solving (e.g. Scott and Bruce, 1994); or a fifth phase is introduced, called 'formative investigation' (e.g. Kleysen and Street, 2001). Here, problem recognition and problem solving are clearly differentiated, since they are assumed to require a different set of skills and actions from employees. Also, formative investigation is assumed to be involved in the process of solving a problem or generating novel and useful ideas, resulting in the four innovation phases presented above (see also figure 1). The two strands that are depicted in the figure correspond to different triggers of the process: whether there is an actual problem that has to be solved, or a niche has opened up or was discovered.

The first two phases of the innovation process can be summarized as the *initiation stage*, where opportunities are explored "for the purpose of idea generation" (Kheng et al., 2013, p. 93) and all ideas should be treated as potentially valuable. The third and fourth phase then represent the *implementation stage*, where the relevant and valuable ideas and solutions are converted into actual results (Kheng et al., 2013).

In the past, involvement in innovation has mostly been associated with research and

development (R&D) departments, although today it becomes more and more clear that many innovations have their origin elsewhere, during day to day work with the products, processes and methods to be innovated (Getz and Robinson, 2003; Imran et al., 2010; Kheng et al., 2013). This demonstrates the importance of a company's human resources and their management for innovation, especially regarding employees working in e.g. production.

2.2 Innovation focused HRM

Following the configurational approach outlined by Meyer et al. (1993) (and e.g. Delery and Doty, 1996; Martin-Alcázar et al., 2005; Lepak and Shaw, 2008), it is assumed that single HR practices do not operate and take effect on their own, but mainly in **configuration** of an HRM system. With this approach, HR systems are regarded as complex and unique patterns of factors that "represent nonlinear synergistic effects and higher-order interactions" (Delery and Doty, 1996, p. 808). In such a system, two types of "fit" play an important role: on the one hand, an HR system needs to be consistent with environmental and organizational conditions (Martin-Alcázar et al., 2005) and also be targeted toward some strategic objective (Lepak et al., 2006); which can be summarized as *external or vertical fit*. On the other hand, for an HRM system to be effective in achieving specific organizational goals, it is equally important for the included HR practices to internally fit together (Jiménez-Jiménez and Sanz-Valle, 2008; Subramony, 2009; Boselie, 2010). Firstly, if practices are synchronized and embedded in an interactive HR system, their impact on any organizational goal is likely to exceed the mere sum of individual effects (Laursen and Foss, 2003; Shipton et al., 2006; Lepak and Shaw, 2008; Subramony, 2009). Secondly, due to the complex interactions between practices, a whole system is harder to imitate by competitors (Laursen and Foss, 2003), which is, according to the Resource Based View of the firm an important antecedent for competitive advantage (Barney, 1991). Thus, an HR system needs to capitalize on synergistic effects with complementing practices, which requires an *internal or horizontal fit*.

The underlying reasoning behind the configurational approach is that employees are always exposed to more than one practice during their employment (Lepak and Shaw, 2008); that different practices have the potential to amplify or weaken each others effects in a nonlinear way (Martin-Alcázar et al., 2005); and that the effectiveness of practices also depends on business strategy, and environmental and organizational conditions (Martin-Alcázar et al., 2005). Also, it is often not even possible to change a single organizational component in isolation, but it will affect other components, in this case HR practices, as well (Meyer et al., 1993).

Although it is generally assumed that HRM can facilitate and foster organizational innovation (Gupta and Singhal, 1993; Michie and Sheehan, 2003; Jiménez-Jiménez and Sanz-Valle, 2008; Laursen and Foss, 2013), it seems that traditional HRM systems may not be the most worthwhile option and that there are more efficient configurations of

practices instead (Zhou et al., 2013).

Traditional HRM systems refer to several discernible configurations of HR practices that have been proposed across literature in the past (Lepak et al., 2006): Control Human Resource Systems (Lepak et al., 2006; Boselie, 2010), High-Commitment HR Systems (Lepak et al., 2006; Boselie, 2010; McClean and Collins, 2011), High Involvement HR Systems (Lepak et al., 2006) and High Performance Work Systems (Huselid, 1995; Combs et al., 2006; Lepak et al., 2006). All these systems have in common that they are objective specific and concentrate on a goal: control, high commitment, high involvement and high performance. However, it appears that some traditional practices within these systems are even negatively related to innovation, such as strict job descriptions and short term contracts (Michie and Sheehan, 2003). Managers and scholars therefore face the challenge of identifying specific HRM practices that support innovation most efficiently under the dynamic and uncertain circumstances firms nowadays face (Martell and Carroll, 1995; Zhou et al., 2013) and embedding them in a system that fulfills the requirements for both vertical and horizontal fit.

For these reasons and in the context of the configurational approach, here, a unique HRM system will be developed. The practices will be externally aligned with the overarching goal of organizational innovation as well as internally aligned in order to complement each other and possibly work synergistically. At this point it is important to note that another important feature of the configurational approach is equifinality: the assumption that "multiple unique configurations of the relevant factors can result in maximal performance" (Delery and Doty, 1996, p. 808), or in this case innovation. The system that will be developed here thus only represents one possible derivation of a configuration of an ideal innovation focused HR system. There might be more configurations that are equally effective.

For the choice of practices, Lepak et al. (2006) argue that an HR system should, next to being targeted towards a certain goal, "operate by influencing (1) employee knowledge, skills and abilities, (2) employee motivation and effort, and (3) opportunities for employees to contribute" (Lepak et al., 2006, p. 217). Thus, an HR system should ideally follow the underlying principles of the *AMO model*. The foundation of that model was presented by Bailey (1993) and further developed by Appelbaum et al. (2000); and states that overall performance is generally a function of employees' **A**bility, **M**otivation and **O**pportunities to participate. The base line is that people perform well when they are able to do so, motivated to do so and get the opportunity to do so (Boxall and Purcell, 2003). Further, "the AMO model builds on the notion that HR practices can be bundled to enhance ability, motivation and opportunity" (Boselie, 2010, p. 134), which again consolidates the use of the configurational approach. The following links between employees' abilities, motivation and opportunity, and certain HR practices can be characterized (Appelbaum et al., 2000):

- **Ability** can be enhanced with practices regarding
  - *Recruitment and Selection* by thoroughly assessing what abilities are needed for success right now, and identifying potential employees' knowledge, skills

and abilities. It can further broaden the range of abilities accessible for a company by compiling a broadly based workforce.

  - *Training and Development* by giving the opportunities to generate, increase and expand employees' knowledge, skills and abilities and helping employees to move forward, either within their field of expertise or even beyond.

- **Motivation** can be enhanced with practices regarding

  - *Performance Management* by making performance assessment a visible and seizable process that motivates employees to reach clear goals.
  - Compensation by offering attractive compensation and rewarding for reaching these goals or going beyond them.
  - *Training and Development* by giving employees the opportunity to move forward and to develop themselves and giving them the possibility to expand their knowledge.
  - *Teamwork and Job Characteristics* by evoking the perception of responsibility not only for oneself and meaningfulness of an employee's work.

- **Opportunity** can be enhanced with practices regarding

  - *Teamwork and Job Characteristics* by providing opportunities to go beyond daily routines in order to perform better in day-to-day work. Giving employees the opportunity to communicate extensively and freely also bears opportunities for employees to improve their work and perform better.
  - *Employee Participation* by letting employees have a say in all kinds of decisions and encouraging them to express their opinions.

The AMO model is not only applicable to overall firm performance in general, but can be translated to innovation as ultimate goal. The six categories included in the innovation focused HRM system therefore are *Recruitment and Selection*, *Training and Development*, *Performance Management*, *Compensation*, *Teamwork and Job Characteristics* and *Employee Participation*. It is important to note that some of the practices have the potential to not only influence one of the three performance enhancers, but can be designed to foster multiple characteristics. Here, Training and Development is assumed to influence both **A**blities and **M**otivation, while Teamwork and Job characteristics are able to affect both **M**otivation and **O**pportunities. This again emphasizes the interrelatedness of HR practices, the importance of using a configurational approach and why equifinality has to be a point of attention: by changing one practice in either of these categories, not only one outcome changes, but possibly two outcomes. This, and the fact that practices have the potential to influence each others effects and their magnitude, make it possible that there are multiple configurations that are equally effective.

2.3 Employees' Perceptions of Innovation focused HRM – a multi-level approach

In recent research it has become evident that when it comes to HRM and its impact on employee outcomes such as abilities, motivation and opportunities, an important distinction has to be made between "intended", "implemented" and "perceived" HRM (Khilji and Wang, 2006; Wright and Nishii, 2007; Kehoe and Wright, 2013; Boon et al., 2011; Piening et al., 2012). Here, "Intended" HRM refers to the practices as they were formulated by the policy-makers (senior management and HR managers) on a firm level; "implemented" HRM bears on the practices actually operationalized in organizations; whereas "perceived" HRM encompasses the practices that are experienced and perceived by individual employees.

Arguably, "employees' HR practice perceptions are temporally closer to, and consequently likely to be more predictive of, their attitudinal and behavioral outcomes than are HR practice ratings as provided by managers" (Kehoe and Wright, 2013, p. 369). Also, most HRM practices can only have the desired effects on the behaviors and performance of employees if they actually perceive them as being implemented. If employees, for example, don't know or recognize that training opportunities are being offered; or that creativity is rewarded, these practices are unlikely to have a significant effect on employee behavior and consequently on their performance. The differences between the implemented practices and those that are perceived by employees can either be caused by actual differences in the implemented HR practices among employees (which causes valid variance), and by differences in individual interpretations of the same practice (Wright and Nishii, 2007). In order to evoke desired behaviors in employees it is thus not only important to implement practices as they were intended, but especially for employees to perceive them as being implemented as intended.

Social Exchange Theory (SET) can thereby provide an explanatory framework that clarifies how perceived HRM practices and employee behaviors are related to each other (Alfes et al., 2013). SET focuses on exchanges occurring between employers and employees and the concept of reciprocity. In that concept it is assumed that employees generally feel obligated to react equitably to the way they are treated by employers (Jackson et al., 2012). This again emphasizes the importance of how employees *perceive* HRM, since they are acting according to these perceptions and the way in which they formed these expectations (Jackson et al., 2012). In line with Social Exchange Theory, Bowen and Ostroff (2004) argue that HRM is mainly a form of communication from employer to employee, where HR practices are supposed to send certain messages and induce desired behaviors. Following the attribution theory (Kelley, 1967) in the HRM context, employees make cause-effect attributions to perceived HRM practices and then draw conclusions about the behaviors that are important, expected and rewarded (Bowen and Ostroff, 2004). Also, employees will experience HR practices differently and draw different conclusions from them based on individual experience, value or preference (Boon et al., 2011). From this it becomes clear that in order to assess HRM's impact on innovation it is appropriate and advisable to perform a multi-level analysis, where HR practices and behavioral

employee outcomes are rated on the individual level, and innovation is measured on the firm level.

In the past however, research has often focused on either the effects of firm level implemented or intended HRM systems, or on employees' perceptions of a single practice (Boon et al., 2011). This study therefore not merely encompasses the direct relationship between HRM and organizational innovation on a firm level, but contemporary aims at demonstrating the link between HRM and employee behaviors and their abilities, motivation and opportunity on an individual level. On that note, and following the configurational approach, the attribution theory and social exchange theory, a multi-level approach will be adopted in which individual perceptions of HRM are linked to individual employee outcomes on the one hand and organizational innovation on a firm-level on the other hand.

2.4 Perceptions of an innovation focused HRM system

2.4.1 Recruitment and Selection

Regarding Recruitment and Selection Jiang et al. (2012) argue that "the careful recruitment and selection of talented people may play a key role in creating the conditions needed for innovation" (p. 4029), while Chen and Huang (2009) state that "through effective staffing employees become important sources of new ideas in the firm's innovative process" (p. 106).

The first step in recruiting and selecting the right people is identifying what actually makes a person 'right'. With human resource planning, future personnel needs and recruitment criteria are identified in order to create venture teams with a diverse and balanced skill-mix (Gupta and Singhal, 1993). For effective personnel planning it is also important to note that, as was mentioned before, an innovation process moves through different stages (Gupta and Singhal, 1993; Tidd et al., 1997; O'Connor and DeMartino, 2006). Thus, a team working for innovative purposes needs to combine skills concerning "R&D, marketing, sales, manufacturing, engineering, and finance" (Gupta and Singhal, 1993, p. 43). With employees recognizing strategic personnel planning as being implemented it can be assumed that they have better insight in recruitment and team composition decisions and better understand role division, and therefore can work more effectively as a team.

Schuler (1986) mentions in the context of recruitment and selection the specific practices of having implicit criteria and open procedures as well as using external and multiple sources for recruitment. Amongst others these practices are assumed to stimulate innovation (Schuler, 1986; Zhou et al., 2013). In line with considerations regarding employee development (discussed below), also internal recruitment sources should be exploited. Since it is especially employees' human capital that is the potential source of (innovative) success (Kang and Snell, 2009; Yang and Lin, 2009) it is reasonable to argue that the *initial* knowledge, skills and abilities (KSAs) of an employee are important for a

firm's innovative capacity, as well as the capability and willingness to learn and adopt *new* KSAs.

Additionally, because organizational flexibility and the ability to quickly react to environmental turbulences are regarded as a key success factors for firms (Jiménez-Jiménez and Sanz-Valle, 2008; Chen and Huang, 2009), the flexibility of an employee should be another criterion for selection. More specifically, an innovative firm needs "creative employees who are flexible, risk taking, and tolerant of uncertainty and ambiguity" (Chen and Huang, 2009, p.106). The general requirement for the ability to adapt to rapid environmental changes and the issue of worldwide competition (Shipton et al., 2006) also emphasize the necessity of a broadly based workforce that has, as a whole, the ability to bring different perspectives together and to form a dynamic multi-faceted entity. Thus, a potential employee does not only have to fit the job, but also the team in which he or she will work in the sense that an entity of diverse, complementing and compatible team members evolves.

Employees who recognize the essence and importance of hiring criteria have a better sense of what makes them important within the company, which should positively impact their attitudes and behaviors. The knowledge about how the recruitment process works, which sources are used and what criteria are mostly paid attention to also lets them draw conclusions about the behaviors that are important, expected and rewarded within the company (Bowen and Ostroff, 2004).

Summarizing, innovation focused Recruitment and Selection is characterized by perceptions of (1) selective hiring concentrating on the criteria KSA, willingness and ability to learn, flexibility and team compatibility; and (2) the extensive search for new employees using multiple recruitment sources.

2.4.2 Training and Development

When it comes to Development many scholars agree that extensive training is a key success factor in innovation matters (Lau and Ngo, 2004; Shipton et al., 2006; Beugelsdijk, 2008; Jiang et al., 2012). Especially the rapid technological changes and changing customer demands require for a firm to have employees that are constantly "up to date" and that are able to creatively work with the newest developments on the market. Regular training (either scheduled and formal or in between and informal) is therefore of crucial importance in order to keep up with modern technology and to further diversify perspectives and opinions (Beugelsdijk, 2008). Additionally, training can enhance employees' KSAs and task domain expertise (Lau and Ngo, 2004). Since it is sometimes difficult for highly educated people in technical positions to properly communicate, training should also be focused on social skills. Moreover, de Leede et al. (2002) reported that high-performing firms tend to offer more training regarding team work and communication. A potential problem is however, that employees often find that kind of training useless, which then probably results in the training actually being useless. Thus, trainings need to be perceived as a valuable opportunity by employees in order to induce positive results. This can be achieved by letting employees participate in the design of training

activities (Jiménez-Jiménez and Sanz-Valle, 2008), which will be discussed further in the next section. Also, not every kind of training can be assumed to be beneficial for organizational innovation, as for example training for standardization. The mere existence of training opportunities is therefore not enough to foster innovation, but they need to be appropriate regarding their content and need to be perceived as valuable in order to be effective.

To be in line with Teamwork and Job Characteristics and appraisal criteria, training needs to have a long-term and team orientation and aim at providing polyvalence skills (Jiménez-Jiménez and Sanz-Valle, 2008). This includes for instance, that not only creative and communication skills will be trained but also the implementation and adoption of creative ideas (Chen and Huang, 2009). Again, with employees clearly recognizing training opportunities to be given and understanding their value (on a firm level as well as on a personal level), they are more likely to have a positive impact on their behaviors and innovative performance. The underlying argumentation here is the Social Exchange Theory. If employees feel the company makes an investment by providing training opportunities and helping them to develop further, they generally feel obligated to react equitably and give something back to the company (Jackson et al., 2012).

It can further be argued that giving employees the opportunity to develop and grow within an organization, and providing career opportunities will motivate employees to put extra effort into their work (Schuler, 1986) and might even encourage them to seek training outside of work which will result in an increased knowledge base for the firm (Jiang et al., 2012). In combination with appraisal meetings, possible and desired career paths can be discussed and regular developmental feedback can be given. With this feedback, employees know where they are standing and are more likely to understand what they have to do in order to move on in their career path. It is hereby important to grant high performers individual paths that they feel comfortable with. It is for example a good option to offer career paths for technical employees that do not involve management, since they often would like to move up the career ladder without having to manage people (Gupta and Singhal, 1993). In order for those practices to have a high impact on employee behaviors, of course, employees have to actually perceive them as being implemented and realize that individual paths and support with career choices are being offered. Hurley and Hult (1999) showed that the employee perceptions of a culture that emphasizes learning and development by providing formal training, individual development opportunities and career management indeed positively relates to innovativeness and a firm's innovative outcomes. Decisions regarding which employees will be trained/promoted and how should depend on the outcomes for Recruitment and Selection criteria and the appraisal that results from the Performance Management System, which will be discussed next.

Summarizing, innovation focused Development is characterized by (1) extensive training on both professional and communication/team work skills that are perceived as valuable, (2) internal career opportunities offering individual career paths for high performers, and (3) regular developmental feedback. (4) Lastly, it needs to be based on

Performance Management.

2.4.3 Performance Management

Performance Management is the process of defining, measuring and stimulating employee performance and mainly contributes to the goal-setting and evaluation of employees (Boselie, 2010) and is together with rewarding essential for effective HRM (Gupta and Singhal, 1993). A formal appraisal mechanism can help to cope with the long, uncertain and multidisciplinary innovation process (Chen and Huang, 2009) and generally serves to provide employees with valuable feedback from the job, supervisors and sometimes even colleagues (Jiménez-Jiménez and Sanz-Valle, 2008). Moreover, it gives room for individual and team based goal-setting, makes expectations and demands clear, and ideally generates positive pressure resulting in motivation and feelings of achievement (Jiménez-Jiménez and Sanz-Valle, 2008; Chen and Huang, 2009).

With innovation as ultimate goal it is probably not the optimal solution to appraise performance solely on hard indicators, such as productivity or service quality outcomes, since the creation process and implementation of new ideas would not be recognized in that system. For an employee to be motivated to innovate and think creatively it is important for those behaviors to be recognized, otherwise he or she might perceive it as wasted effort. Encouraging risk-taking is another important task of Performance Management, since innovation is always accompanied by risk, where "innovative companies accept failure as a price of playing the game" (Gupta and Singhal, 1993, p. 43). Innovation focused Performance Management can therefore not only consider visible outcomes but should also recognize progress made and concentrate on rather subjective performance indicators, such as proactivity (Parker et al., 2006), creativity, motivation, and risk-taking (Gupta and Singhal, 1993; Amabile, 1998) in order to foster individual and consequently organizational innovation.

To be in line with the Recruitment and Selection criteria mentioned above, also flexibility, and ability and willingness to learn should be included in the Performance Management system, as well as teamwork. Following Foss et al. (2008), entrepreneurship and innovation are creative team acts, in which the most important actions are 'using and judging resources as a team'. These behaviors should be recognized and appreciated accordingly. The more visible, clear and understandable the system is perceived by employees, the greater its impact can be on desired behaviors and consequently organizational innovation. A problem that often occurs with performance appraisal is the lack of perceived fairness (Hui and Qin-xuan, 2009; Choon and Embi, 2012; Ishaq et al., 2013) although it was shown that for appraisal systems to be effective, employees have to be confident in it, and support and accept it (Kavanagh et al., 2007; Ishaq et al., 2013). It is however difficult to make a system that is perceived as fair to everyone, since personal attribution deflection plays an important role here: a person often attributes his or her own success to personal ability and effort, while own failure is mostly attributed to environment and bad luck (Kavanagh et al., 2007). To narrow the likelihood of perceived unfairness, an employee should feel that the person appraising the performance is actually qualified to do so, understand what the expectations and criteria

are, get frequent feedback that is perceived as valuable, and gets information on how to improve the performance (Kavanagh et al., 2007). Additionally, a balanced "PM system also pays attention to 'what employees want"' (Boselie, 2010, p. 182), which emphasizes the importance of employees' participation in the design of performance management and evaluation processes (which will be further discussed with Employee Participation). Performance appraisal should never only be used as a tool to control employees and their behavior, because it makes PM unwelcome (Hui and Qin-xuan, 2009) and induces pressure and stress, which might negatively influence creativity and general performance.

Consequently, innovation focused Performance Management focuses on perceptions of a visible, formal appraising mechanism that (1) recognizes processes as well as behaviors, such as the creation and implementation of new ideas or creativity and risk-taking; (2) covers goal setting and goal-oriented appraisal, and (3) is valuable, fair and balanced.

2.4.4 Compensation

However, the mere recognition of behaviors and progress does not necessarily engender the desired behaviors in employees; they should be rewarded for those as well - with financial rewards as well as with e.g. granting autonomy, awards or promotions. The underlying mechanism can once more be explained with the Social Exchange Theory. By being rewarded for good performance, employees experience that the company is 'giving back' to them and that their investment in the firm is not going by unnoticed. This is assumed to foster commitment and motivation.

Lau and Ngo (2004) argue that performance-based pay (PBP) represents a commitment to employees and provides incentives for creativity and innovation, while Beugelsdijk (2008) found that PBP is positively associated with incremental innovation. Aerts et al. (2013) investigated the effects of profit-sharing on product and process-innovation and found that it adds to companies' innovative capacity. The reasoning is that it aligns mutual interests by letting employees directly benefit from good firm performance (Aerts et al., 2013). The interview with a CEO (see appendix H) revealed the fact that profit-sharing activities are a very useful practice especially if the whole team is affected by the outcome, because it gives everyone part of the responsibility. Therefore both individual and team accomplishments need to be recognized and compensated with intrinsic and extrinsic rewards (Chen and Huang, 2009). Gupta and Singhal (1993) suggest a reward system in which autonomy and freedom for creativity are granted, and financial rewards, promotion and awards (peer recognition, plaque, letter of appreciation, etc.) are important subjects in compensation. Additionally, a needed balance between team and individual rewards is emphasized, which is in line with *Teamwork and Job Characteristics* (discussed in the next section) and Performance Management considerations above. Also, attractive compensation packages are likely to attract the best skilled employees (Jiménez-Jiménez and Sanz-Valle, 2008). However, pay raises and rewards need to be kept balanced in order to keep employees satisfied, where creative performers are rewarded just enough to make them continue their good work, and less creative performers are kept satisfied without letting the two salaries become too close (Gupta and

Singhal, 1993). Bohnet and Oberholzer-Gee (2002) add to the discussion by mentioning that rewards do not have to involve huge amounts of money, and that it is most effective if the *quality* of ideas is rewarded, not the quantity. Thus, performance management needs to recognize what becomes of an idea, which can then be rewarded accordingly. As with Performance Management, the more visible, clear and understandable the rewarding system is perceived by employees, the greater its impact can be on desired behaviors and consequently organizational innovation.

Summarizing, innovation focused compensation offers (1) attractive compensation packages including PBP and profit-sharing; (2) rewards, promotions and awards based on Performance Management; and (3) appropriately balanced pay raises and rewards for creative performers and non-performers.

2.4.5 Teamwork and Job Characteristics

One of the HR practices that is mentioned most often when it comes to job design for innovation is probably cross-functional team work (Lau and Ngo, 2004). It provides opportunities to make better use of local knowledge and it brings together knowledge, opinions and abilities, that have the potential to yield better results in combination, than in separation (Laursen and Foss, 2003). Communication and knowledge diffusion play a very important role in this process (Brown and Eisenhardt, 1997; Laursen and Foss, 2003; Kellog et al., 2006; Jiménez-Jiménez and Sanz-Valle, 2008). Similarly, Jiang et al. (2012) argue that especially teams in which cooperation, communication and conflict resolution are perceived as essential will be able to work creatively and innovative, while Shipton et al. (2006) were able to confirm the positive impact of the extent of teamwork on both product innovation and innovation in technical systems. General innovation management literature grants teamwork a role of similar importance and additionally emphasize identifiable team leaders that are supportive, motivating and have technical and professional expertise (see Kahn et al., 2006; Crossan and Apaydin, 2010).

According to the *Job Characteristics Model (JCM)* by Hackman and Oldham (1975) there are five core motivating job characteristics that influence work outcomes and behaviors through three critical psychological states (i.e., experienced meaningfulness of the work, experienced responsibility for outcomes of the work, and knowledge of the actual results of the work activities) (Neufeind et al., 2013). The characteristics are skill variety, task identity, task significance, autonomy, and feedback from the job (Hackman and Oldham, 1975). Since feedback from the job is already a part of this HRM system within the category Performance Management, it will be left out here. The remaining four characteristics are likely to positively influence motivation and opportunity for employees to innovate.

Firstly, job autonomy is the defined as the degree to which the job provides substantial freedom and independence, and the discretion to schedule work and determine the methods to be used. It has been shown to be positively related to innovation and motivational and creativity outcomes, since the anticipation of and reaction to changing conditions can happen faster and autonomous employees feel more in control of their job

(Beugelsdijk, 2008; Jiang et al., 2012). A second task characteristic is significance, which is the impact on people in- and outside the organization and significance and importance "in the broader scheme of things" (Morgeson and Humphrey, 2006, p. 1337). Arguably, if an employee recognizes his significance in a project and the importance he plays for others, he will be more motivated and willing to put effort into tasks. Thirdly, task variety or job enrichment refers to the variety of activities that are involved in carrying out the work and has been shown to stimulate creativity and innovation (Jiménez-Jiménez and Sanz-Valle, 2008; Jiang et al., 2012; Zhou et al., 2013). Lastly, task identity (doing an identifiable and complete piece of work with a visible outcome) should yield positive results regarding creativity and innovation, since staying with a project from beginning to end will create individual expertise in and commitment to the project, positively influencing excitement and interest in finishing a project (Jiang et al., 2012). It should also make continuous communication easier, as well as the awareness of clear responsibilities and expectations, which are important points in fostering innovativeness as well (Scott and Bruce, 1994).

Summarizing, innovation focused Teamwork and Job Characteristics emphasize the use of cross-functional teamwork with identifiable leadership and the perception of high levels of (1) communication, (2) autonomy, (3) task significance, (4) task variety, and (5) task identity.

2.4.6 Employee Participation

Employee Participation is very important for employees to contribute to organizational performance, because they need a voice to bring in and implement their ideas. Employees need to feel supported in implementing innovative ideas (Klein and Sorra, 1996) and therefore should be given the opportunity and autonomy to pursue their own ideas (Jiang et al., 2012). Laursen and Foss (2003) refer to this as decentralization, where "problem-solving rights are delegated to the shopfloor" (p.248). Arguably, this then "may allow better for the discovery and utilization of local knowledge in the organization" (Laursen and Foss, 2003, p.248). Thereby, it is important to make it easy for employees to present new ideas, and for managers to meet new ideas with an open mind. Time-consuming layers of evaluation bear the risk of creating a climate of fear and shift the focus to external rewards, which might negatively influence employees' creativity (Amabile, 1998). From the interview with a CEO (see appendix H it could be confirmed that the most important reason for employees to not report shortcomings is that they perceive it as too much effort with too less or no reward.

In order for employees to participate efficiently they need to be able to understand more than just their area of work or expertise. Thus, informing all employees about all products and processes, and giving them the right to question these or even encourage them to do so will probably result in a higher rate of implemented ideas from employees. Shipton et al. (2006) found that induction activities that provide employees with knowledge about goals, processes and norms indeed predicts organizational innovation.

In fact, the concepts of participation cannot only be applied to professional matters,

but to all categories of HRM practices discussed above as well. Employee participation can be enhanced by granting them involvement in decision making that affects their work in general (Chen and Huang, 2009). Consequently, employees can, amongst others, be involved in the design of training activities (Jiménez-Jiménez and Sanz-Valle, 2008), in the selection of new team members and the composition of teams, their own level of autonomy, individual compensation packages and criteria for performance appraisals. Also, letting employees participate in the design of HR related activities is likely to result in higher consensus between implemented and perceived HR practices (Wright and Nishii, 2007). Hurley and Hult (1999) were able to show that employee perceptions of a culture that emphasizes participative decision making by high levels of delegation, involvement and communication between managers and employees indeed positively influences innovativeness and a firm's innovative outcomes. Additionally, it was shown that one thing employees remember most fondly about working at a company is the recognition and implementation of their ideas, since it makes them feel that they personally have made a difference (Getz and Robinson, 2003).

Summarizing, innovation focused Employee Participation concentrates on (1) communicating the importance and opportunities of participation, (2) comprehensive information sharing and communication, (3) encouraging critical thinking regarding products and processes, and (4) involving employees in decision making that affects their work. (5) Employee Participation needs to be relatively easy without making it hard through time-consuming layers of evaluation.

Based on the above argumentation, the following can be hypothesized:

H1: Perceptions of an innovation focused HRM system, consisting of innovation focused HRM practices regarding a) Recruitment and Selection, b) Training and Development, c) Performance Management, d) Compensation, e) Teamwork and Job Characteristics, and f) Employee Participation will positively affect organizational innovation.

2.5 Comparison to other HRM systems

The question that presents itself now is in how far this system is similar to other HRM systems and in which aspects it differentiates itself and stands out. For an overview of the following discussion, see table 2.1. When comparing the Human Resource Management system that is presented here with other established systems, such as the High Performance Work Systems (HPWS), High Commitment Work Systems (HCMS) and High Involvement Work System (HIWS), the most obvious difference lies in their goals and strategies. A HPWS is a slightly more general approach, with which firm performance is improved by recognizing employees as primary source for competitive advantage and motivating them to continuously improve (Zacharatos et al., 2005). It encompasses several elements from high-commitment and high-involvement approaches, but is broader

in scope (Zacharatos et al., 2005). High Commitment Work System's goal is also to improve performance, but here the strategy focuses on aligning the interests of employer and employee by creating a mutual obligation (McClean and Collins, 2011), and on encouraging employees to identify with the goals of the organization (Lepak et al., 2006). The underlying assumption is that highly committed employees perform better. High Involvement Work Systems do also strive to improve performance, but here the most value is attached to employee involvement. The strategy involves empowering employees through increased information flows and devolution of decision making power.

It can be argued that the High Innovation Work System presented above is also constructed to improve firm performance, but it is a very special form of performance, namely innovation. The goal is to foster organizational innovation by influencing (1) employee knowledge, skills and abilities, (2) employee motivation and effort, and (3) opportunities for employees to contribute. In this it is very similar to the general High Performance Work System, since this also builds on the AMO-model (Appelbaum et al., 2000). However, because of the very specific goal of innovation performance, the system is not as broadly applicable as the other systems, but is consequently more in-depth and detailed in its practices. The applicability is limited to companies in which innovation is defined as most important performance indicator and ultimate goal, while the other systems have no such severe limitations.

High Performance Work Systems consist of "nearly all types of best practices" (Lepak et al., 2006, p. 228) for all categories and have no specific strategic focus that aligns HR practices with organizational climate or objectives. HCWSs and HIWSs on the other hand do have a strategic focus, but it is mainly limited to the alignment of the HR system with organizational climate, since the focus lies on the firm wanting to have highly committed or involved employees, respectively. The high innovation work system, however, heavily focuses on the strategic objective of innovation and simultaneously creates an environment in which creativity, risk-taking and participation are highly encouraged.

Looking into the specific practices per category it sticks out that the high innovation work system offers more in-depth and detailed practices with a more narrow objective than the other systems. The HPWS for instance only generally recommends selectivity in recruitment (Boselie, 2010; Zacharatos et al., 2005) and HR planning (Combs et al., 2006), while HCWSs specifically value a Person-Organization fit (McClean and Collins, 2011) and HIWSs regard experience, willingness to learn and ability to teamwork as important (Pil and MacDuffie, 1996), as well as propensity for problem solving (Boxall and Macky, 2009). The High Innovation Work System explicitly recommends HR planning considering all innovation stages, and to choose new employees from multiple sources based on their knowledge, skills and abilities, as well as willingness to learn, flexibility and team compatibility. It contains most of the practices from the other three systems regarding Recruitment and Selection, but gives a more detailed description of what the practices contain in particular and thereby maximizes both horizontal and vertical alignment of the system.

Essentially the same applies to all other categories, except for Performance Management and Compensation. For performance management High Performance Work

Table 2.1: Comparison of HRM systems

	High Performance Work System	**High Commitment Work System**	**High Involvement Work System**	**High Innovation Work System (presented here)**
General goal and strategy	improve firm performance by recognizing employees as primary source for competitive advantage and motivating them to continiously improve[7], builds on AMO-model[9]	aligning the interests of employer and employee by creating a mutual obligation[1], encourage employees to identify with the goals of the organization[3]	empowering employees through increased information flows and devolution of decision making power[3]	foster organizational innovation by influencing (1) employee knowledge, skills and abilities, (2) employee motivation and effort, and (3) opportunities for employees to contribute
Recruitment and Selection	selective recruitment and selection (e.g. assessment and psychological tests)[2]; selective hiring[7], HR planning[8]	selective staffing[3], selection criteria: P-O fit[1]	criteria: experience in a similar job, willingness to learn and ability for teamwork[4]; choose workers with propensity for problem solving[6]	personnel planning considering innovation stages; hiring criteria: KSAs, willingness to learn, flexibility, team compatibility; use of multiple recruitment sources
Training and Development	general and skill training, internal promotion opportunities[2]; extensive, high quality training[7,8]	training to promote long-term growth and development within the organization[1,2,3], opportunities are given for employees to obtain outside training or coursework[1]	training for both new and experienced employees[4], opportunities to improve skills are given[5]	extensive training for professional an communication skills; individual career paths; decisions based on Recruitment and Selection criteria and PM outcomes
Performance Management	regular employee/ supervisor meetings[2]	emphasis on individual growth and development[1], evaluation by peers[2]	performance appraisal that fosters greater skill[6]	visible, formal mechanism, process- and behavior-based on individual and group level, fair, balanced, not distressful
Compensation	high wages, performance related pay [2]; compensation contingent on performance[7]	above market compensation and benefit packages[1,3], pay by skills mastered [2]	Performance based pay[4,5]	PBP, profit-sharing, based on PM, balanced pay raises and rewards
Teamwork and Jobcharacteristics	employee autonomy, teamwork and job rotation[2]; self-managed teams and decentralized decision making[7], flextime[8]	broadly defined jobs, job rotation, flexible team work, business data is shared widely, no direct supervision[2]	formal, self-directed work teams, job rotation, quality tasks[3], task significance[5]	cross-functional teams with high levels of autonomy, task significance, task variety and task identity
Employee Participation	participative decision making[2,7], information sharing[7,8]	regular participation in decision making[1,2]	employee involvement and problem-solving groups[3,4], keeping employees informed , an effort is made to get employees' opinions[5]	comprehensive information sharing, involving employees in decision making, make it relatively easy for employees to participate and submit ideas
Other	employment security, reduced status distinction, transformational leadership[7]	Job security and long-term employment[1], status differences are minimized[2]	minimize status differences[4]	–

[1] McClean and Collins (2011); [2] Boselie (2010); [3] Lepak et al. (2006); [4] Pil and MacDuffie (1996); [5] Harmon et al. (2003);
[6] Boxall and Macky (2009); [7] Zacharatos et al. (2005); [8] Combs et al. (2006); [9] Appelbaum et al. (2000)

Systems emphasize the importance of regular employee/supervisor meetings to rate and discuss performance (Boselie, 2010). There is no specific information on what the most important individual performance indicators should be and how performance is appraised in particular. In a High Commitment Work System the focus lies on growth and development of an individual employee (McClean and Collins, 2011) and on evaluation by peers (Boselie, 2010), which is in line with the overarching goal of commitment. It is highlighted to employees what development growth they have undergone in that particular company, which will make them, according to the Social Exchange Theory, more committed and willing to give back to the company. High Involvement Work Systems generally suggest performance appraisal that fosters greater skill (Boxall and Purcell, 2003), which is a very broad and unspecific guideline for how to appraise employees. The High Innovation Work System goes much more into detail by recommending a visible and formal mechanism that assesses both process- and behavior-based performance indicators on an individual and group level. Most importantly, the emphasis lies on performance appraisal being fair, balanced and not distressful to employees.

Similarly, both HPWSs and HCWSs suggest high or above market compensation in general and additionally propose some kind of performance based pay (PBP), which is also part of HIWSs. The High Innovation Work System also contains PBP and also suggests profit sharing, but emphasizes balanced pay raises and rewards, as opposed to high wages in general.

Lastly, all three other systems contain additional practices, such as employment security (HPWSs, HCWSs), reduced status distinction (HPWSs, HCWSs, HIWSs) and transformational leadership (HPWSs). Since they do not fall in any of the categories discussed in this research they will be neglected in the High Innovation Work System.

It can be said that the High Innovation Work System has most similarities with the High Commitment Work Systems, which is an expected outcome. Both systems build on the general guidelines of Social Exchange Theory and aim at encouraging employees to work towards the goals of the organization. This goal is specified as innovation for the High Innovation Work System. There are a few practices within the HCWS that are not included in the High Innovation Work System, but could be argued for as well, such as job rotation and flextime. However, they were not as often shown to be positively related to innovation outcomes and are therefore not included in the system. The main difference between the two systems lies in their goal: HCWSs specifically aim at binding and committing employees to the company on an individual level, while the High Innovation Work System counts on information sharing, and the concept of using and judging resources as a team in order to innovate by combining knowledge, opinions and ideas from multiple sources.

In conclusion, the main aspects in which the system developed here distinguishes itself from existing HRM systems are its

- narrower focus on a specific strategic goal (innovation);
- emphasis on perceived balance and fairness regarding Performance Management and Compensation; and

- focus on sharing information, knowledge, ideas and opinions withing cross-functional teams.

2.6 The mediating role of employee outcomes

After investigating whether there is a positive impact of innovation focused HRM on organizational innovation in general, it can be explored if and to what extent the hypothesized relationship is mediated by employee outcomes. It is arguably employees' abilities and their behaviors that have the potential to influence organizational effectiveness. However, a clear differentiation has to be made between ability and behavior, since it distinguishes between what an employee *can* do and what he actually *will* do.

A behavioral variable that embraces all stages of the innovation process is **Innovative Work Behavior** (IWB), in which both idea creation and idea implementation play a role (De Jong and Den Hartog, 2010). It is defined "as an individual's behavior that aims to achieve the initiation and intentional introduction (within a work role, group or organization) of new and useful ideas, processes, products or procedures" (De Jong and Den Hartog, 2010, p. 24). Creativity is thereby an important part of IWB, although it concentrates more on creativity-oriented work behavior during the initiation stage, rather than an individual's 'ability' to be creative (Dorenbosch et al., 2005). Therefore, the variable **Creativity** in terms of expertise, creative-thinking skills and intrinsic motivation (adopted from Amabile (1998)) will be introduced as well; representing what an employee *can* do, while IWB represent what he or she *actually does* in order to successfully innovate.

2.6.1 Creativity

In order to be innovative and find new solutions to existing problems, or to even invent an entirely new product or process it needs employees' creativity. It is the first step or even the precondition for innovation and provides an organization with important inputs (Jiang et al., 2012).

According to Amabile (1998) creativity consists of three parts: *expertise*, *creative thinking skills* and *motivation* (see figure 2). This definition is adopted in this research because it displays the process of the production of new and useful ideas very well and has been shown to be valuable in several other studies (Tierney et al., 1999).

Expertise thereby refers to knowledge - technical, procedural and intellectual; as well as technical proficiency and special talents regarding the target work domain. Expertise reflects the tools one can use, or the possible pathways one can go in order to solve a problem in a specific work domain (Amabile, 1996). For example, a researcher working in optical sciences needs a basic talent for thinking scientifically, the factual knowledge of optics and the techniques used in that domain as well as the skills to work with them. Lastly, he needs to be familiar with past and current work in that area in order to be

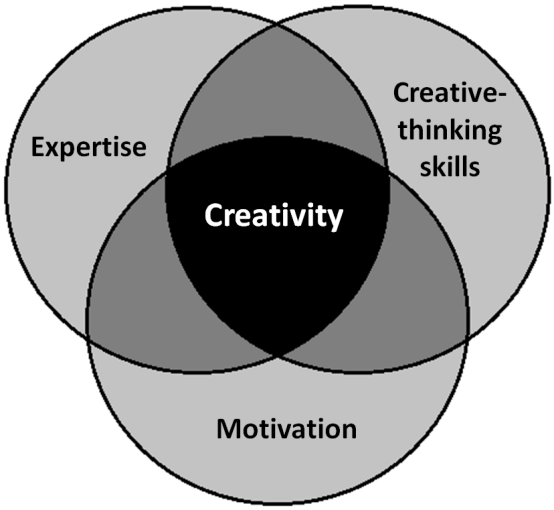

Figure 2: Creativity Component Model adopted from Amabile (1998)

able to find a novel solution to an existing problem, which makes work experience an important factor.

Creative thinking skills determine how a person approaches problems and solutions, including how comfortable one is to disagree with others, whether problems are viewed from different angles and how well knowledge from different and seemingly disparate fields can be combined (Amabile, 1998). It also includes being able to let go of strict algorithms, and being open to unconventional or even counter intuitive ways to handle a problem (Amabile, 1996). These skills are not domain specific and can be applied in any field or situation (Amabile, 1996).

Motivation refers in this conceptualization mainly to *intrinsic motivation*, which is driven by passion and interest and displays a person's internal desire to solve a problem, regardless of any rewards or consequences. It requires an employee's personal interest and involvement in a topic and is often accompanied by a general curiosity and enjoyment to tackle problems and create something new and unique (Amabile, 1996). It is regarded as the most important part of creativity, since "no amount of skill in the domain or in methods of creative thinking can compensate for a lack of intrinsic motivation to perform an activity" (Amabile, 1996, p. 7).

Expertise and creative thinking skills are hereby an employee's natural resources (Amabile, 1998), which makes Recruitment and Selection relevant in order to pick up creative people in the first place; as well as Training and Development to foster and extend their creative abilities, both domain specific and general. However, since creative thinking skills are partly dependent on personal characteristics such as independence, discipline, and tolerance for ambiguity (Amabile, 1996), those need to be carefully evaluated in Recruitment and Selection. Jiang et al. (2012) have shown that HR practices regarding (a) extensive search and intensive selection and hiring procedures, (b)

innovation-linked incentive rewards, (c) job design that provides autonomy, feedback, significance, variety and identity and, (d) teamwork are positively related to the overall level of employee creativity. Oldham (2003) further suggests that with complex and challenging jobs and clear performance goals, employees are more likely to produce novel and useful ideas which makes Job Characteristics and Performance Management important categories of HR practices to enhance creativity. Also, a safe climate and financial rewards are amongst others likely to positively influence an employee's willingness to share creative ideas, which emphasizes the relevance of encouraging risk taking and appropriate Compensation practices.

Based on the above argumentation, and the fact that Jiang et al. (2012) also have successfully shown that the overall level of employee creativity positively relates to administrative and technological innovation in an organization, the following can be hypothesized:

H2: Creativity partially mediates the relationship between perceptions of innovation focused HRM and organizational innovation.

However, since innovation also includes the successful implementation of creative ideas, creativity can be regarded as a necessary, but not sufficient condition of innovation (Amabile, 1996).

2.6.2 Innovative Work Behavior

As was mentioned before, Innovative Work Behavior (IWB) concerns itself with the actual process of going through the four innovation stages: idea exploration, idea generation, idea championing and idea implementation. The connotation of IWB is to generate innovative output and finally to benefit the organization (Imran et al., 2010). Here, it will be discussed what activities and individual behaviors each of the stages involves, and how the perception of the proposed HRM system can induce them.

Idea exploration occurs when an opportunity to innovate is identified (Kheng et al., 2013), either by a problem arising (such as customer dissatisfaction, changes in rules or laws that the current products or production processes don't fulfill, etc.) or the discovery of a niche. This niche might have been there, undiscovered for a long time; or could have just developed due to e.g. changes in industrial or market structures, in demographics, in perceptions or due to new knowledge (De Jong and Den Hartog, 2010). In order to be able to identify and explore such opportunities, an employee has to constantly look for ways to improve the current products, services and processes and try "to think about them in alternative ways" (De Jong and Den Hartog, 2010, p. 24). Kleysen and Street (2001) identified four basic behaviors involved in idea exploration: (1) paying attention to opportunity sources, (2) looking for opportunities to innovate, (3) recognizing opportunities, and (4) gathering information about opportunities.

Idea generation can either be related to new products, processes or services, new markets, improvements, or the solution to a given problem (De Jong and Den Hartog, 2010). According to Kheng et al. (2013), it is "a dynamic process of creation and association" (p. 94), in which existing knowledge and information is combined and reorganized in order to solve an identified problem or fill a given niche. The most important characteristic of an employee to be successful in idea generation is creativity, especially the ability to approach problems from different angles (De Jong and Den Hartog, 2010). Additionally, an idea has to be evaluated for feasibility, appropriateness and economic prospective, since arguably, an idea is only valuable if it can be converted into an actual result. This phase corresponds to 'generativity' and 'formative investigation' as defined by Kleysen and Street (2001), who identified the following behaviors to be crucial: (1) generating ideas and solutions to opportunities, (2) generating representations and categories of opportunities, (3) generating associations and combinations of ideas and information, (4) formulating ideas and solutions, (5) experimenting with ideas and solutions, and (6) evaluating ideas and solutions.

Idea championing refers to the promotion of an idea and requires an employee to communicate his or her idea, find support for it and build coalitions (De Jong and Den Hartog, 2010; Kheng et al., 2013). In addition to recognizing the problem and being able to find a solution it also needs initiative from an employee to actually bring forth and try to realize their solution. According to Parker et al. (2006) the pressure for innovation "increases the need for employees to use their initiative and be self-starring" (p. 636). This stage is crucial in the innovation process, since ideas often do not match existing routines, are uncertain be beneficial enough to exceed their costs, or are met with a resistance for change (De Jong and Den Hartog, 2010), which are obstacles to be overcome. De Jong and Den Hartog (2010) emphasize the importance of an employee being able to express enthusiasm and confidence about a potential innovation, being persistent and involve the right people. The required behaviors in this stage defined by (Kleysen and Street, 2001) are: (1) mobilizing resources, (2) persuading and influencing, (3) pushing and negotiating, and (4) challenging and risk-taking.

Idea implementation is the actual realization of an idea or solution (Dorenbosch et al., 2005). It takes both effort and result-oriented attitude to make it happen (De Jong and Den Hartog, 2010), while obstacles have to be eliminated in the process of implementation (Dorenbosch et al., 2005). Next to implementing an innovation, it has to be further modified to meet e.g. customer requirements, and become part of regular work processes (Kheng et al., 2013). This results in three desired behaviors, as was defined by Kleysen and Street (2001): (1) implementing, (2) modifying, and (3) routinizing. Especially the latter behavior is necessary for an innovation to be successful, since "implementation error occurs when [...] employees use the innovation less frequently, less consistently, or less assiduously than required for the potential benefits of the innovation to be realized" (Klein and Sorra, 1996, p. 1055).

The HRM practices that can potentially induce and increase these crucial behaviors for all innovation phases are

- Recruitment and Selection by making flexibility, team compatibility, ability and willingness to learn recruitment criteria; and emphasize during recruitment that each of the behaviors is highly valued.
- Training and Development by training professional and communication skills, and again emphasize the importance of desired behaviors during training sessions.
- Performance Management and Compensation by recognizing and rewarding the behaviors mentioned above.
- Teamwork and Job Characteristics by giving employees the setting and room to behave as desired.
- Employee Participation by providing employees with relatively simple ways to articulate and follow up on opportunities.

Consequently, it is assumed that the perception of the HRM system for innovation presented above is positively related to individual Innovative Work Behavior. Also, based on several researches (e.g. Scott and Bruce, 1994; Crant, 2000; Parker et al., 2006; Imran et al., 2010; De Jong and Den Hartog, 2010; Kleysen and Street, 2001; Kheng et al., 2013) it can be assumed that IWB is positively related to organizational innovation.

Therefore, the following can be hypothesized:

H3: Innovative Work Behavior partially mediates the relationship between perceptions of innovation focused HRM and organizational innovation.

2.7 The Research Model

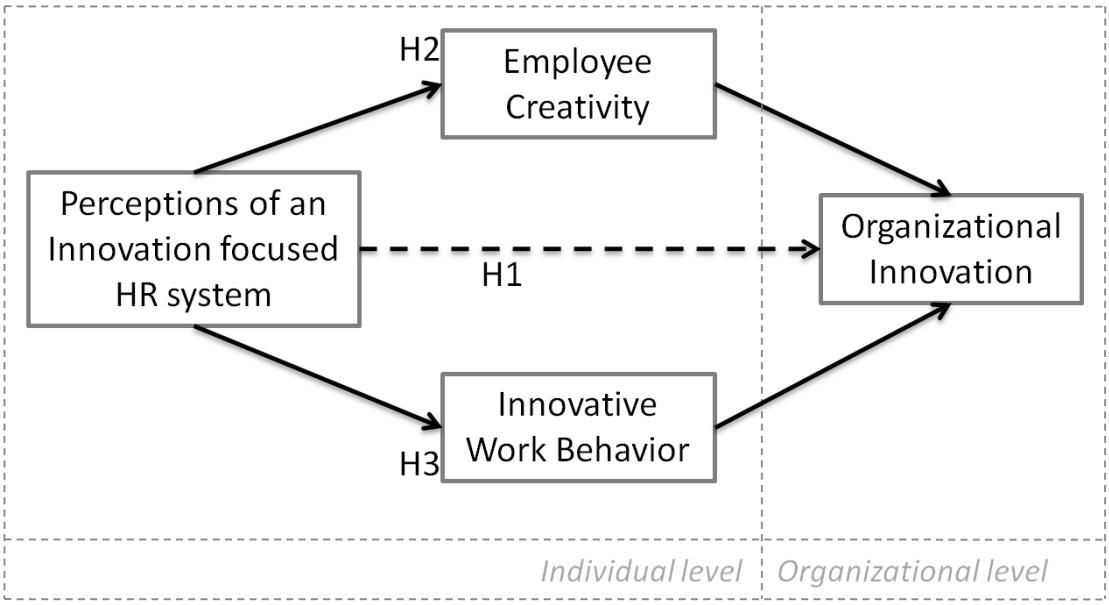

Figure 3: Research Model

Chapter 3

Methodology

3.1 Sample and Data Collection

Data was collected at both the individual level (Perceptions of Innovation focused HRM, Innovative Work Behavior and Creativity) and the firm level (organizational innovation). Requests for participation were sent via email to 161 manufacturing firms with a location in the Netherlands. Firms were required to have at least 50 employees, have an HR function and operate within the manufacturing industry in order to be considered for participation. The former two criteria serve the same purpose - to ensure that there actually are formal HR practices to be measured; and because the role and 'science' of HRM in small companies tends to be quite different from that in bigger or established companies (Mayson and Barrett, 2006). The latter criterion concerning the industry builds on Laursen and Foss's (2003) findings that the likelihood of firms being innovators depends on the sector they operate in, and that high-tech companies with specialized supply rank first. It also considers the contingency perceptive, where the impact and effect of HRM is assumed to differ according to environmental factors (such as sector) as well (Lepak and Shaw, 2008). Companies were searched for with the online database 'LinkedIn', with the keyword 'manufacturing' and the following restrictions: size $>$ 50 employees, location in the Netherlands. The results were then further limited by examining websites and finding whether companies could indeed be characterized as high-tech company with specialized supply. The request for participation that was sent to firms can be found in Appendix A (dutch version only).

Many reactions from companies indicated that they were not willing to let their whole workforce participate, or even half or a quarter of them. It was therefore chosen to ask companies to participate with at least 15 of their employees in the end, which resulted in 4 firms being willing to participate. Thus, the final sample consisted of 4 firms (54 employees in total), representing a response rate of 2.5%. Participating firms range from around 50 employees to around 400 employees and represent the following industries as they were defined in the database 'LinkedIn': Industrial Automation, Mechanical or Industrial Engineering, Electrical/Electronic Manufacturing, and Oil and Energy.

In order to gather data that can be statistically analyzed it was chosen to use ques-

tionnaires as data collection method. The questionnaire makes use of both statements and questions; each to be rated on a five-point Likert scale (ranging from "strongly agree" to "strongly disagree" regarding statements and from "not at all" to "very often" regarding the questions). Another option ("i don't know / n.a.") was added to prevent employees from skipping items or just guessing an answer, "a tendency known as uninformed response" (Saunders et al., 2009, p.363), which might have lead to biased results. Items were constructed to be as short and understandable as possible to ensure that employees could provide an answer without difficulty, and negative items were withal avoided, as those are easily misinterpreted (Babbie, 2010). Initially, the items were developed in English, and later translated to dutch using back-translation, where the source questionnaire is translated to the target questionnaire and then back to the source questionnaire by different people. Two new source questionnaires were compared with the original, and a final version of the target questionnaire was created. This type of translation is likely to discover most problems and give an accurate translation (Saunders et al., 2009). The translation also served as a pretest to make sure all items are understood and resulted in small changes of wording in both the source and target questionnaires. A conceptual discussion of the questionnaire follows in section 3.2.1.

A cover letter was attached to each questionnaire explaining the research's objectives and ensuring confidentiality (see appendix C). Additionally, employees were asked to fill in questionnaires on their own and without discussing them with others to prevent contamination and improve validity.

The individual level variables (HRM system perceptions, creativity and IWB) were measured by surveying 10 to 16 employees per firm (dependent on response rates within respective firms), who are working in technical positions, such as engineering, production, assembling or R&D. This choice was based on the assumption that most innovations happen during day to day work, and are initiated by employees directly in contact with the products and processes within the firm. Questions about organizational innovation were answered by either the CEO, an HR manager or the production manager, who had an overview over innovation related activities that were executed within the past two years. Responsibility over the selection of suited candidates within the workforce and the distribution and collection of questionnaires within the firm was transferred to the HR function of the respective firm. They were encouraged to choose candidates from production, engineering, assembling or R&D and to make the further selection as random as possible.

3.2 Measurements

3.2.1 Perceptions of an Innovation focused HRM system

The scale for measuring the extent to which the HRM system is perceived to be focused on innovation consists of six dimensions with three to seven items each: Recruitment and Selection (6 items), Training and Development (7 items), Performance Management

(5 items), Compensation (3 items), Team Work and Job Characteristics (7 items), and Employee Participation (6 items). All sub-scales make use of five-point Likert scaling for responses (1 = strongly disagree, 5 = strongly agree) and also offer the option "i don't know/ n.a.". The items are based on the argumentation made considering theory and hypotheses development and orient themselves towards the intermediate summaries from the theory. These are again portrayed in appendix B.1, together with all corresponding items. It was chosen to develop an entirely new measuring instrument, as there is no validated list of items for this HRM system, or even parts of it.

An example for the conversion of Recruitment and Selection includes the items "In our company, many different recruitment sources are used" and "In our company, people are thoroughly assessed before they are recruited.", which correspond to the theoretical statement that innovation focused Recruitment and Selection is characterized by perceptions of the extensive search for new employees using multiple recruitment sources. Training and Development includes amongst others "I think the training offered by our company is valuable." Examples for Performance Management and Compensation are "In our company there is a formal assessment and performance management system." and "Our company appropriately balances pay raises and rewards for creative performers and non-performers." Team Work and Job Characteristics includes for instance "In our company, teams consist of representatives from a wide array of specialties." and "Teams have an identifiable leader.", which correspond to the theoretical statement, that innovation focused teamwork has cross-functional teams with an identifiable leader. Lastly, an example for Employee Participation is "Our company attaches a lot of value to information sharing and communication." A complete list of items can be found in Appendix B.

3.2.2 Employee outcomes

The employee outcomes are measured in the same questionnaire as two separate variables: creativity (9 items), and Innovative Work Behavior (11 items).

As mentioned before, creativity consists of three parts: expertise, creative thinking skills and motivation. Based on the papers by Amabile (1998) and Jiang et al. (2012) three items for each factor have been developed.

The items have to be rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) and also offer the option to answer "i don't know/ n.a." as well. An example for the expertise measurement is "I am an expert in my area of operations.". Creative thinking skills is amongst others assessed with "I have the ability to combine knowledge from seemingly disparate fields.". And an example for the motivation measurement is "I enjoy tackling problems that are completely new to me.". All items can be found in Appendix B.

The measure of innovative work behavior (IWB) was adopted from De Jong and Den Hartog (2010) and Kleysen and Street (2001) and consists of eleven items that have to be rated on a five-point Likert scale (1 = not at all, 5 = very often) with the additional

option “i don’t know/ n.a.”.

Idea exploration was measured with 3 items adopted from Kleysen and Street (2001), for example: “How often do you recognize opportunities to make a positive difference in your work, department, organization, or with customers?”. The construct’s internal reliability was assessed with Cronbach’s alpha, which was found to be 0.719 (Kleysen and Street, 2001).

Idea generation was measured with the 3 items from De Jong and Den Hartog’s (2010) measurement for IWB. An example is “How often do you generate original solutions to problems?”. Cronbach’s alpha of this construct was found to be 0.90 (De Jong and Den Hartog, 2010).

Idea championing was measured with the 2 items from De Jong and Den Hartog’s (2010) measurement for IWB, for example: “How often do you attempt to convince people to support an innovative idea?”. The internal reliability (Cronbach’s alpha) for this construct is 0.95 (De Jong and Den Hartog, 2010).

Lastly, *Idea implementation* was also measured with the 3 items from De Jong and Den Hartog’s (2010) measurement for IWB. One of the items is: “How often do you contribute to the implementation of new ideas?”. For this construct the Cronbach’s alpha was found to be 0.93 (De Jong and Den Hartog, 2010).

The whole measurement for Innovative Work Behavior includes 11 items which can be found in Appendix B. The entire questionnaire in dutch, including the cover letter and control variables can be found in Appendix C.

3.2.3 Organizational innovation

Organizational innovation will firstly be measured in terms of product innovation and innovation in technical systems and processes (adopted from Shipton et al, 2006). Product innovation will be measured in terms of “the number of entirely new and adapted products developed” (p. 12) in the past two years and “the current sales turnover accounted for by the new products” (p. 12). Innovation in technical systems refers to innovation in production technology and innovation in production processes. Respondents will be asked how many changes in production techniques or process occurred during the past two years and how many new technologies or machines were developed or adopted for the production process. Secondly, an item for innovation in administrative systems will be added: the number of changes in administrative processes. Additionally an item will be added assessing the average age of technology in the firm. Building on the assumption that most innovations originate from day-to-day work, respondents will be asked to rate what percentage of the respective innovations are the result of planned innovation activities. A list with the exact questions can be found in Appendix F, and the dutch version of the questionnaire including control variables can be found in Appendix G.

3.2.4 Control variables

Control variables will be used on two different levels: On the organizational level for all variables and relationships and on the individual level for the perceived HRM system and the employee outcomes. Firstly, by selecting only certain companies to be considered for participation, it will be controlled for sector and for an HR department being existent. All other organizational variables will be included in the questionnaire that goes to the HR function and includes the following items (adopted from Jiang et al., 2012): firm size, firm age, and firm profitability. Additionally it will be asked whether innovation is part of the company's strategy, mission and vision, since a company that does not actively pursue innovation will arguably be less likely to innovate, or operate an innovation focused HRM system. The former three variables (firm size, age and profitability) have previously been shown to possibly influence innovative activity (Jiang et al., 2012). The organizational control variables are included in the questionnaire to HR managers (or CEOs or production managers) in Appendix F. Based on several previous researches mentioned earlier, on the individual employee level it will be controlled for employee age, gender, how long an employee works within that particular company, educational level, employment type and function. Those items are included in the questionnaires for employees and can be found in Appendix C.

3.3 Analysis

Exploratory Factor Analysis and Cronbach's Alpha

The collected data will first be analyzed by conducting a factor analysis in order to "discover patterns among the variations in values of several variables" (Babbie, 2010, p. 491) and identify the underlying dimensions of the constructs. The factors will be extracted based on eigenvalues that are greater than one, the sampling adequacy of the data will be verified with the Kaiser-Meyer-Olkin measure and eligibility of the data for factor analysis will be tested with Bartlett's test for sphericity.

Intraclass Correlation Coefficients

For the multi-level analysis it is necessary to aggregate the individual-level perceptions to the organizational level. In order to justify this aggregation the intraclass correlation coefficients ICC(1) and ICC(2) will be calculated for each variable and each of the four participating companies. The first coefficient ICC(1) thereby represents the magnitude of organizational level variability and has typical values of 0.05 to 0.12 in order justify aggregation, where values decrease naturally with bigger sample sizes (Piening et al., 2012). Due to the very small sample size here, values might thus be higher than that, and still be acceptable. The second coefficient ICC(2) represents the reliability of means across organizations and has a minimum acceptable value of 0.70 (Piening et al., 2012).

Hypothesis Testing

In order to test the hypotheses as they were stated earlier, the four-step test procedure for mediation outlined in Kenny, Kashy, and Bolger (1998) can be used. The advantages of this method are the fact that it tests all three hypotheses in one method and that it makes clear whether the employee outcomes fully mediate the relationship between innovation focused HRM and organizational innovation or only partially. However, it is a causal model, which means that reverse causality cannot really be eliminated by the model itself. In the first step it is shown that the independent variable is indeed correlated with the outcome, where organizational innovation is used as the criterion variable in a regression equation and the extent to which an innovation focused HRM system is used as a predictor. If the outcome is indeed positive, H1 can be accepted and there is a positive impact. The second step is then to show that the independent variable is correlated with the mediators and for now treating the mediators as outcome variables. This is again done with multiple regression and is done separately for both mediators. In the third step it needs to be shown that the mediators affect the outcome variable; thus, in a regression equation organizational innovation is the criterion variable, while the HRM system and both employee outcomes are the predictors. This is necessary in order to show that the outcome and the mediators are not only correlated because they are all caused by the HRM system. Lastly, the direct effect of the HRM system on organizational innovation should be smaller when the mediating variables are included. This proofs a partially mediating effect and, should the direct effect now be zero, it proofs complete mediation.

Due to the limited number of participants only the relationships between HRM perceptions and the employee outcomes can be analyzed quantitatively, and only on the individual level. In this relationship organizational innovation will then be introduced as control variable. Firstly, a **correlation analysis** will be conducted, revealing whether, how and to what degree variables are related to each other (Field, 2009). More precisely, a bivariate correlation will be conducted, showing the relationship between two variables without controlling the effect of additional variables (Field, 2009). The method that will be used is Spearman's correlation coefficient, also known as Spearman's rho (ρ), since it can also deal with data that is not necessarily normally distributed (Field, 2009). This applies to the gathered data, as it is measured with a 5-point Likert scale and transformed by an additive index. In contrast to Pearson's product-moment correlation coefficient, it first ranks the data and reduces it to a sequence of ordinal numbers before it measures the degree of linear dependence between the two variables.

Next, a **regression analysis** will be conducted, to see whether one variable actually predicts another, or more precisely, whether high levels of perceptions of innovation-focused HRM predict high levels of creativity, initiation-related IWB and implementation-related IWB. Simple regression can thereby test the predicting power of the entire HRM system, while multiple regression can test several predictor variables simultaneously (Field, 2009). In regression analysis and the interpretation of its outcomes there are several values that need attention: firstly, regression analysis provides values for R and R^2,

simply representing the correlation between two variables and its square (Field, 2009). The value of R^2 thereby shows the percentage of the variation in the dependent variable that the independent variable accounts for (Field, 2009). Limitations of R^2 are, that it does not determine whether the estimates and predictions are biased and does not indicate whether a regression model is adequate. It is also difficult to say what values for R^2 are 'good' or 'bad', especially if human behavior is involved, which is simply harder to predict than for example physical processes. Additionally, an adjusted R^2 is reported, which gives an idea of how well the model generalizes. In an ideal case that value would be equal to, or very close to the value of R^2, since it indicates the shrinkage, or loss of predictive power if the model had been derived from the whole population and not only a sample. However, it tells nothing about what would happen with an entirely different set of data from the same population (Field, 2009).

Secondly, the F-ratio and its significance are considered in regression analysis. The F-ratio compares the model against the error in the model, and should therefore ideally be greater than one. The most important thing however, is the value's significance. If it is very small, it allows the conclusion that the regression model overall predicts the dependent variable significantly well (Field, 2009).

Lastly, the regression coefficients (β) are reported, representing the Y intercept (β_0) and the slope (β_1) of the regression line (Field, 2009). In combination with the t-test and the probability that the observed value of t would also occur even if the value of β_1 was 0, these allow further conclusions. If the observed significance is less than .05 the results are considered to reflect a genuine effect (Field, 2009).

On the organizational level, a comparison of means will be conducted to reveal whether there are significant differences between the company means for HRM system perceptions, employee creativity and innovative work behavior. In particular, an independent-samples t-test will be conducted, as well as an ad-hoc ANOVA analysis. A t-test asks whether a difference between two groups' averages is unlikely to have occurred because of random chance in sample selection. Significant values thereby indicate significant differences. The post-hoc ANOVA analysis reports numbers for both Tukey's HSD (honest significant difference) test and the Games-Howell test as well as for F-ratios.

The former of the two tests thereby assumes equal variances, while the latter assumes unequal variances. Again, the significance of the values is important, as non-significant values don't allow the rejection of the null-hypothesis that variable's means do not significantly differ. The F-ratio for variables is in this case calculated by dividing mean square between-groups by mean square within-groups, and a significant value indicates that there are significant differences between groups.

Although the relationship between HR system perceptions and organizational innovation cannot be analyzed with correlation or regression analysis, it will be explored qualitatively by rating companies on their organizational innovation and investigating whether these concur with scores of organizational-level HRM system perceptions. This is by no means a statistical proof of correlation or regression, but at least provides insight into whether there is a trend indicating a positive relationship.

Chapter 4

Results

In this chapter the results from the gathered data will be presented and interpreted. First it will be elaborated on the handling of missing values in the data set, followed by a general analysis of the descriptive statistics on respondents. Then the results of the exploratory factor analysis (EFA) and intraclass correlation coefficients (ICC) will be presented and the data will be reduced accordingly. Next, the hypothesis on the individual level will be tested and lastly, an analysis on the organizational level is conducted.

4.1 Missing Values

An initial analysis of missing values for HRM system perceptions lead to the exclusion of three items as more than 40% of respondents did not provide an answer. Two of these items are from Training and Development and one item from Compensation. Removed items due to missing values are indicated with a * in the list of items in appendix B.1. For the exploratory factor analysis (EFA) as well as the additive index for the HRM system it was chosen to replace the remaining missing values with mean values to ensure a large enough sample size for analysis. These mean values were calculated for each company separately, as they are expected to differ across companies according to different intended and implemented HR practices or systems within the firms.

Questionnaires on company control variables and organizational innovation did not contain any missing values and could be used and analyzed as they were.

4.2 Descriptive Statistics on Respondents

After replacing missing values on employee questionnaires by mean values per company, there were 54 cases to be analyzed: 16 by respondents from the industrial automation company (henceforth company A), 15 each from the oil and energy company (company B) and the electrical/electronical manufacturing company (company C) and 10 from the

Table 4.1: Descriptive statistics on respondents

		A - industrial automation		B - oil and energy		C - electrical/ electronical manufacturing		D - mechanical/ industrial engineering		Total	
		Count	% within company	Count	% within company	Count	% within company	Count	% within company	Count	% across companies
Age	20 - 30	7	43.8%	4	26.7%	1	6.7%	4	44.4%	16	29.1%
	31 - 40	2	12.5%	7	46.7%	4	26.7%	1	11.1%	14	25.5%
	41 - 50	5	31.3%	2	13.3%	7	46.7%	2	22.2%	16	29.1%
	> 50	2	12.5%	2	13.3%	3	20.0%	2	22.2%	9	16.4%
Gender	male	14	87.5%	14	93.3%	14	93.3%	9	100.0%	51	92.%7
	female	2	12.5%	1	6.7%	1	6.7%	0	0.0%	4	7.3%
Employment duration	< 1 year	2	12.5%	0	0.0%	1	6.7%	2	22.2%	5	9.1%
	1 - 5 years	5	31.3%	7	46.7%	1	6.7%	3	33.3%	16	29.1%
	5 - 10 years	5	31.3%	7	46.7%	3	20.0%	1	11.1%	16	29.1%
	> 10 years	4	25.0%	1	6.6%	10	66.6%	3	33.3%	18	32.7%
Education	lower*	0	0.0%	0	0.0%	1	6.7%	1	11.1%	2	3.9%
	preparatory**	8	53.3%	6	50.0%	8	53.3%	6	66.7%	28	54.9%
	intermediate***	1	6.7%	0	0.0%	1	6.7%	0	0.0%	2	3.9%
	higher****	6	40.0%	6	50.0%	4	26.7%	2	22.2%	18	35.3%
	other	0	0.0%	0	0.0%	1	6.7%	0	0.0%	1	2.0%
Employment	fixed	13	81.3%	15	100.0%	13	86.7%	7	77.8%	48	87.3%
	temporary	2	12.5%	0	0.0%	2	13.3%	2	22.2%	6	10.9%
	borrowed	1	6.3%	0	0.0%	0	0.0%	0	0.0%	1	1.8%
Work area	production	0	0.0%	2	14.3%	12	80.0%	1	11.2%	15	27.8%
	engineering	16	100.0%	3	21.4%	0	0.0%	4	44.4%	23	42.6%
	R&D	0	0.0%	2	14.3%	3	20.0%	0	0.0%	5	9.3%
	other	0	0.0%	7	50.0%	0	0.0%	4	44.4%	11	20.4%

* Lower vocational education (LBO or comparable)
** Preparatory vocational education (MAVO/MULO/MBO or comparable)
*** Intermediate vocational education (HAVO/MMS/VWO/HBS/Gymnasium)
**** Higher vocational education (HBO)

mechanical/industrial engineering company (company D). A summary of all descriptive statistics can be found in table 4.1. Elaborating on employee age, gender, employment duration, education, employment type, and area of operations the following conclusions can be drawn.

Since employees were given the opportunity to skip the personal questions if they were not comfortable answering them, there are a few missing values: 1 for age, 1 for gender, 1 for employment duration, 5 for education, 1 for employment type and 2 for area of operations. The remaining data reveals the following. Employee age across all companies is quite evenly distributed, whereas within the single companies majorities occur. Firm A mainly provided respondents with age 20–30, as did company D. Company B had most respondents being age 31–40, while in company C most of the respondents are of age 41–50. Regarding employee gender, all companies represent a very strong majority of male respondents, with 87.5% up to 100%. In total, most employees have been working more than 10 years in their particular company, quickly followed up by both groups of employees being employed for 5–10 years, and for 1–5 years. The distribution of work duration is thus fairly even. For education, all majorities are preparatory vocational education (MAVO/MULO/MBO or comparable with the dutch system of education) with 54.9% of all respondents and at least 50% per company, followed up by respondents with higher vocational education. Regarding the employment type, 87.3% of all respondents have a fixed contract, which also holds the majority in the separate firms. All respondents from firm A happen to work in engineering, 80% of company C's respondents work in production, 44.4% of firm D's respondents work in both engineering and "other" areas, while company B provided 50% of respondents not working in either production, engineering, assembling or R&D. In total, the majority works in engineering (42.6%), although the distributions and majorities within firms differ heavily.

4.3 Exploratory Factor Analysis

HRM System Perceptions

After data collection, an exploratory factor analysis (EFA) was conducted using principal component extraction and varimax rotation to define the underlying factor structure of the HRM system (Hair Jr. et al., 2010). After the initial exclusion of three items and the subsequent replacement of missing values with company means, the EFA revealed a 5-factor solution. The five factors with eigenvalues greater than one explained in combination 68.25% of the variance. The extracted HR practice dimensions are *employee participation* (6 items), *training and development* (3 items), *recruitment and selection* (3 items), *performance management and compensation* (3 items) and *teamwork and job characteristics* (2 items). 11 items that did not load high on the respective HR practices were excluded from analysis (indicated with ** in the list of items in appendix B.1). Items for performance management (2 items) and compensation (1 item) ended up

loading on one single factor. This is a reasonable outcome, since the two practices are closely connected, while part of the compensation is considered to directly build and even depend on the outcomes of performance management. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the factor analysis: KMO = .738, while Bartlett's test for sphericity shows $p < 0.001$ and allows the conclusion that there are correlations in the data set that are appropriate for factor analysis. Communalities for this solution are all well above 0.5, which is the cut-off value. Appendix D shows the KMO and Bartlett's test, factor loadings after rotation, the communalitites, the components with eigenvalues greater than one and their explained variance, and the scree plot.

Further following the theoretical assumptions made in chapter 2.2 and the argumentation of Piening et al. (2012), that it is "preferable to examine the entire system, rather than individual practices" [p. 15], the practices will be summarized with an additive index in order to create a single comprehensive measure for employees' HRM system perceptions. The Cronbach's Alpha for that index is 0.89.

Creativity

The exploratory factor analysis (EFA) conducted for creativity did not load properly on either three factors (for the three components) or one factor (for creativity as a whole), but instead extracted four factors based on eigenvalues greater than one. There is no logical content-related explanation for the loading on four factors, but can most likely be ascribed to the small sample size that is not able to properly reflect the true underlying structure of only one factor. The Kaiser-Meyer-Olkin measure was also relatively small, with KMO = 0.641, indicating weak suitability of the data set for factor analysis. The Cronbach's Alpha for creativity as one factor is however 0.77, representing acceptable reliability regardless. The construct for creativity will hence still be used in this analysis, but the results will be interpreted with care due to arising issues concerning construct validity. The rotated component matrix for creativity can be found in appendix E.

Innovative Work Behavior

For Innovative Work Behavior, an exploratory factor analysis was conducted as well. The EFA uncovered two factors with eigenvalues higher than one. Together, they explain a total variance of 59.37%. The resulting dimensions correspond to the two innovation stages as presented in chapter 2.1: the *initiation stage* (5 items, $\alpha = 0.87$) and the *implementation stage* (6 items, $\alpha = 0.84$). These will consequently from now on be treated as two different variables. The Kaiser-Meyer-Olkin measure again verified the sampling adequacy for the factor analysis: KMO = .862. Bartlett's test for sphericity shows $p < 0.001$ and allows the conclusion that there are correlations in the data set that are appropriate for factor analysis. Communalitites are all above 0.5. Appendix E shows the KMO and Bartlett's test, factor loadings after rotation, the communalitites, the components with eigenvalues greater than one and their explained variance, and the scree plot.

4.4 Intraclass Correlation Coefficients

HRM System Perceptions

The aggregation to the organizational level of the measurement for the perception of an innovation focused HRM system can be justified with the given data for three of the four companies. One of the companies thereby only provided a very small viable sample size of 8, leading to a negative average covariance among items and resulting in negative values for both coefficients. This will be neglected and an aggregation of the measure will take place. The aggregation of the measurement of single practices could however not be justified for any of the companies, which further reinforces using an additive index for the HRM system. All values for the coefficients per company and per factor can be found in appendix D.

Creativity

None of the data was able to justify aggregation of individual-level creativity to the organizational level, as organizational level variability (ICC(1)) was too high in two cases, reliability (ICC(2)) was too low in another case and and the last set of data again showed negative values for both coefficients, indicating negative average covariance among items in general. All values for the intra correlation coefficients for creativity can be found in appendix E.

Innovative Work Behavior

Evaluating on the intraclass correlation coefficients ICC(1) and ICC(2), an aggregation from individual-level IWB to the organizational level cannot be justified. Although were the values for the reliability of means across organizations (ICC(2)) almost all above 0.7, the magnitude of organizational level variability seem to be too high in almost all cases, with values ranging from 0.245 to 0.675. This is the case for IWB as one factor, as well as for the two separate factors 'initiation' and 'implementation'. Hence, an aggregation for innovative work behavior will not be conducted, and both mediators (creativity and IWB) can only be inspected and analyzed on the individual level. All values for the intra correlation coefficients for IWB can be found in appendix E.

4.5 Hypothesis Testing on the individual level

4.5.1 Correlation Analysis

As was mentioned earlier, a correlation analysis reveals whether, how and to what degree variables are related to each other. Table 4.2 shows mean values, standard deviations (indicated as SD) and the correlation coefficients for the HRM system and the behavioral employee variables. Table 4.3 shows the same for the single HR practices.

Looking at means and standard deviations, it can be concluded that generally employees perceive an innovation focused HRM system, as the mean is above 3.50. The

Table 4.2: Correlation for the HRM system

	Mean	SD	1	2	3	4
1 HRM System	3.70	0.453	1			
2 Creativity	3.84	0.415	.427**	1		
3 Initiation IWB	3.52	0.522	.454**	.628**	1	
4 Implementation IWB	3.18	0.658	.417**	.554**	.719**	1

** Correlation is significant at the 0.01 level (2-tailed)

same applies to creativity and initiation related innovative work behavior, whereas implementation related innovative work behavior was neutrally rated on average. Regarding the separate practices, there tend to be positive perceptions of innovation focused recruitment and selection (mean is 3.77), employee participation (mean is 3.76) and strong positive perceptions of innovation focused teamwork and job characteristics with a mean value of 4.16. Innovation focused training and development as well as performance management and compensation were neutrally rated on average. Standard deviations are in all cases relatively small, and thereby indicate appropriate reliability of the used data. The means and standard deviations per company will be discussed in chapter 4.6.

Table 4.2 shows that all variables positively correlate at the 0.01 significance level and it can be concluded that all variables are significantly related to each other. The formulated hypotheses predicted that perceptions of an innovation focused HRM system will be positively related to creativity, initiation related IWB and implementation related IWB. These relationships can all be confirmed with the correlation analysis: The perception of an innovation focused HRM system was significantly correlated with creativity, $\rho = .412$, initiation related IWB, $\rho = .496$, and implementation related IWB, $\rho = .442$ (all ps $< .01$).

The fact that all mediators of the research model - creativity and the two IWB variables - strongly correlate with each other indicates that they might be measuring the same variable. This can be explained by having another look at the theory: the two IWB variables underlie theoretically the same construct, and were therefore expected to be correlated. Creativity on the other hand was specified as a different concept, although it is sometimes assumed to be part of IWB as well. Especially the high correlation between creativity and initiation related IWB ($\rho = .628$, p $< .01$) makes sense, since the latter is also sometimes referred to as creativity-oriented IWB. For the initial research model this means that with the gathered data the mediators cannot be seen as different variables, but should be summarized into one construct. Nevertheless, since exploratory factor analysis suggested IWB to be made up by two factors and no mediation will be tested, here, the three variables are treated as separate dependent variables and will be analyzed accordingly.

Table 4.3 shows correlation coefficients for the perception of the single HR practices and the three outcome variables. As was expected, several practices correlate with each

Table 4.3: Correlations for single HR practices

	Mean	SD	1	2	3	4	5	6	7	8
1 Recruitment and Selection	3.77	0.633	1							
2 Training and Development	3.47	0.773	.196	1						
3 PM and Compensation	3.36	0.703	.331*	.191	1					
4 Teamwork and Job Characteristics	4.13	0.558	.250	-.029	.295*	1				
5 Employee Participation	3.76	0.788	.402**	.316*	.289*	.334*	1			
6 Creativity	3.84	0.415	.399**	.066	.220	.451**	.405**	1		
7 Initiation IWB	3.52	0.522	.429**	.160	.126	.222	.485**	.628**	1	
8 Implementation IWB	3.18	0.658	.395**	.122	.113	.156	.481**	.554**	.719**	1

** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed)

Table 4.4: Regression Analysis

	DV: Creativity		**DV: inititation IWB**		**DV: implementation IWB**	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Control Variables						
1. age	.085	.070	.116	.092	.116	.092
2. gender	-.140	-.020	-.442	-.255	-.982*	-.786*
3. employment duration	-.003	.001	-.064	-.057	-.032	-.024
4. education	.025	.024	.009	.007	.050	.048
5. employment	-.032	-.104	-.093	-.206	.103	-.016
6. area of operation	.040	.000	-.008	-.070	-.041	-.105
7. innovation rating	.015	-.001	.013	-.013	-.026	-.053
Independent Variable						
8. HRM System		.354*		.550**		.577**
R^2	0.067	0.200	0.097	0.318	0.178	0.313
adjusted R^2	-0.089	0.043	-0.054	0.185	0.041	0.179
F-ratio	0.428	1.277	0.643	2.391*	1.301	2.335*

** $p < .01$ and * $p < .05$

other, indicating that perceptions of different practices are interrelated and underlie the assumptions of the configurational approach, as was discussed in chapter 2.2. It is further interesting to note that only recruitment and selection, and employee participation significantly correlate with the three outcome variables. while teamwork and job characteristics only significantly correlates with creativity. Training and development as well as performance management and compensation do not significantly correlate with any of the dependent variables on their own. The significant relationships between practices and outcomes are as follows.

Recruitment and Selection was significantly correlated with creativity ($\rho = .399$, $p < .01$), initiation IWB ($\rho = .429$, $p < .01$) and implementation IWB ($\rho = .395$, $p < .01$). Teamwork and job characteristics was significantly correlated with creativity ($\rho = .451$, $p < .01$). Lastly, employee participation was significantly correlated with creativity ($\rho = .405$, $p < .01$), initiation IWB ($\rho = .485$, $p < .01$) and implementation IWB ($\rho = .481$, $p < .01$).

It can be concluded that the variables show significant correlations at the highest level ($p < .01$) and the expected relationships on the individual level all find a foundation in correlation analysis. However, mere correlation does not give any information about causality. There might either be a third variable, or multiple variables, that are not considered in correlation analysis and that influence the relationship; or even if there is not, no assumptions can be made about the direction of causality. The next step is therefore the regression analysis.

4.5.2 Regression Analysis

With regression analysis we can go one step further and actually predict a variable from another (Field, 2009). The results of the simple regression analysis can be found in table 4.4. Model 1 thereby only takes control variables into consideration, while model 2 shows the results with the HRM system as independent variable included. DV refers to the three dependent variables that have been tested separately.

Control Variables

None of the control variables show significant effects on either creativity and initiation related innovative work behavior, and for both dependent variables they only explain a marginal amount of variance ($R^2 = 0.067$ and $R^2 = 0{,}097$, respectively). Regarding implementation related IWB however, gender does seem to have an impact ($\beta = -0.982$, $p < .05$ for model 1 and $\beta = -0.786$, $p < .05$ for model 2). The collected data thus indicates that women tend to score significantly lower on implementation related IWB than men, although the relationship shrinks with the HRM system included as independent variable. The control variables alone account for 17.8% of the variance in implementation oriented IWB, while with the inclusion of the HRM system 31.3% are accounted for. The F-ratio is however not significant for only control variables, indicating that model 1 is not able to predict implementation IWB significantly well. Also, in the context of the

sample only containing 4 women, it might be due to chance that these four employees score particularly low on implementation oriented innovative work behavior.

It could not be tested for the impact of company age and profitability, since there was no difference in the companies' answers.

R-squared and adjusted R-squared

The values for R^2 using model 2 show that perceptions of an innovation focused HRM system contribute to all three outcome variables. The model is able to explain 20.0% of the variance in creativity, 31.8% of the variance in initiation related IWB and 31.3% of the variation in implementation IWB. These values are relatively small, which implies that not the perceptions of innovation focused HRM alone account for the variation in the outcome variables. This can have several reasons. Firstly, as mentioned before, human behavior is generally less simple to predict than for example a physical process, resulting in an overall smaller R^2 in social studies. Secondly, at least part of the missing predicting power might be accounted for by aspects of the HRM system that are not part of the analysis due to the fact that the according items could not be supported to be part of the construct by exploratory factor analysis. This topic will be discussed in more detail in chapter 5.

The values for the adjusted R^2 are in all cases relatively far from the corresponding values for R^2, indicating a weak generalizability and weak cross-validity of the data. This is again an issue of small sample size, as the adjusted R^2 weights the unexplained variance, and subtracts it from R^2. The weighting factor is thereby inverse proportional to the sample size, resulting in a bigger difference between R^2 and adjusted R^2 for small sample sizes. The opposite counts for the number of indicators. The higher the number of indicators, the larger the weighting gets, especially with indicators that do not improve the model (as is the case for the control variables). Consequently, the big differences between R^2 and adjusted R^2 do not necessarily mean that the model's generalizability and cross-validity are overly weak, but can be accounted for by small sample sizes and the inclusion of control variables in the model. The negative values for the adjusted R^2 in model 1 for creativity and initiation IWB can be explained with the small numbers for the according R^2, because with very small R^2 it is likely for negative adjusted R^2 to occur due to chance.

Creativity

Model 2 shows a significant relationship between perceptions of an innovation focused HRM system and creativity ($\beta = .354$, $p < .05$). Although this finding supports the hypothesis of a positive relationship, it is not on the highest level of significance, and the F-ratio is not significant at all. The latter indicates that the positive results might be due to chance. Additionally, earlier findings related to the factor analysis already revealed issues regarding construct validity for creativity, which now leads to the conclusion that overall, the hypothesis cannot be supported. There are however indicators (correlation

analysis and significant β) that the hypothesis might hold with a different measure, or a more reliable data set.

Initiation oriented IWB

There is a significant relationship between perceptions of an innovation focused HRM system and initiation oriented innovative work behavior ($\beta = .550$, $p < .01$). The F-ratio is significant, indicating an overall goodness of fit. The hypothesis that perceptions of an innovation focused HRM system positively affect the first stage of IWB can hence be supported.

Implementation oriented IWB

The regression analysis also shows a positive significant relationship between perceptions of an innovation focused HRM system and implementation oriented innovative work behavior ($\beta = .577$, $p < .01$). Again, the F-ratio is significant at the .01 level, indicating that there is less than a 1% chance that the same values would arise if there was no real relationship between the two variables. Hence, the hypothesis that perceptions of an innovation focused HRM system positively affect the second stage of IWB can be supported as well.

Summarizing, the hypotheses that the perception of an innovation focused HRM system positively impacts the two stages of innovative work behavior can be accepted, while the hypotheses regarding the same relationship with creativity as dependent variable can neither be supported, nor entirely be rejected.

4.6 Organizational level analysis

Comparison of means across companies

On the organizational level, only a descriptive analysis of the data can be performed. Means and standard deviations of the variables in question per company are shown in table 4.5. Three of the four companies show positive perceptions of an innovation focused HRM system, as they have mean values above 3.5. Employees in all four companies generally rate themselves as being creative with mean values ranging from 3.75 to 3.93. Initiation related IWB is rated to be positive on average in two companies, and neutral in the other two; while implementation related IWB was rated as neutral on average in all firms.

Standard deviations are all relatively small, indicating that the data is reliable.

In order to specify whether the organizations' mean values differ significantly, an independent-samples t-test was performed, as well as an ad-hoc ANOVA analysis. The values for the t-tests for all variables and firms can be found in table 4.5 as well.

The t-test allows the conclusion that the only firm that has mean values that significantly differ from the rest is the electrical/electronical manufacturing company (firm C). The mean values for innovation focused HRM system perceptions are significantly lower than those in all other companies, while they also score significantly lower on initiation IWB in comparison with the firm active in mechanical/industrial engineering (firm D). For all other means a t-test failed to reveal a statistically reliable difference between companies.

Table 4.5: Means, standard deviations and the Independent-Samples t-Test

		Mean	SD	A	B	C	D
A	HRM system	3.83	.35				
	creativity	3.83	.37				
	initiation IWB	3.61	.55				
	implementation IWB	3.08	.87				
B	HRM system	3.76	.35	0.570			
	creativity	3.93	.53	-0.611			
	initiation IWB	3.46	.57	0.789			
	implementation IWB	3.17	.47	-0.387			
C	HRM system	3.35	.55	2.897**	2.410*		
	creativity	3.75	.43	0.491	0.962		
	initiation IWB	3.37	.50	1.309	0.456		
	implementation IWB	3.17	.64	-0.355	0.000		
D	HRM system	3.93	.29	-0.775	-1.305	-3.416**	
	creativity	3.84	.27	-0.134	0.447	-0.575	
	initiation IWB	3.70	.41	-0.419	-1.165	-1.751**	
	implementation IWB	3.36	.59	-0.909	-0.885	-0.737	

** $p < .01$ and * $p < .05$

Table 4.6: F-ratios

	F
HRM System	5.417**
Creativity	0.413
Initiation IWB	1.083
Implementation IWB	0.373

** $p > 0.01$

Considering the outcomes of the post-hoc ANOVA analysis, F-ratios are given in table 4.6, while the outcomes of the Tukey's HSD (honest significant difference) test and the Games-Howell test are given in table 4.7. Looking at the F-ratios, a significant value only occurs for the perception of an innovation focused HRM system, indicating that there is no significant difference regarding initiation IWB, as was proposed by the

Table 4.7: Post-hoc Analysis

		A - industrial automation		B - oil and energy		C - electrical/ electronical manufacturing		D - mechanical/ industrial engineering	
		Tukey	Games-Howell	Tukey	Games-Howell	Tukey	Games-Howell	Tukey	Games-Howell
A	HRM system creativity inititation IWB implementation IWB								
B	HRM system creativity inititation IWB implementation IWB	0.07 0.10 -0.16 0.10	0.07 0.10 -0.16 0.10						
C	HRM system creativity inititation IWB implementation IWB	0.49** -0.07 -0.25 0.10	0.49* -0.07 -0.25 0.10	-0.41* -0.17 -0.09 0.00	-0.41 -0.17 -0.09 0.00				
D	HRM system creativity inititation IWB implementation IWB	-0,10 0.18 0.09 0.29	-0.10 0.18 0.09 0.29	0.17 -0.08 0.24 0.19	0.17 -0.08 0.24 0.19	0.58** 0.09 0.33 0.19	0.58* 0.09 0.33 0.19		

** $p < .01$ and * $p < .05$

independent-samples t-test. In order to gain more insight into the specific cases in which means differ, the values for Tukey's HSD test and the Games-Howell test will be analyzed.

The calculated values from the post-hoc analysis indicate that indeed the only significant differences in mean values are related to the perception of an innovation focused HRM system, and only firm C differs significantly from the other firms. The significance of that difference always decreases (or even vanishes) under the assumption that variances across organizations are unequal.

In conclusion, employees across firms A, B and D have similar perceptions of an innovation focused HRM system on average, and employees across all organizations average similar scores for creativity and both stages of innovative work behavior.

Qualitative analysis

The next step is to investigate whether the data that could be gathered for this research is already able to show a positive trend in the relationship between perceptions of an innovation focused HRM system and organizational innovation despite the very small sample size of only 4. For that purpose, the scales for both variables were normalized (translated into a scale that rates companies from highest to lowest innovator and least to most perceived innovation focus of HRM). Then, both variables were put up against each other in a graph. The four data points should ideally represent a straight line with positive slope that indicates that high scores in HRM system perceptions per company can be associated with high scores on organizational innovation. The graph can be seen in figure 4.

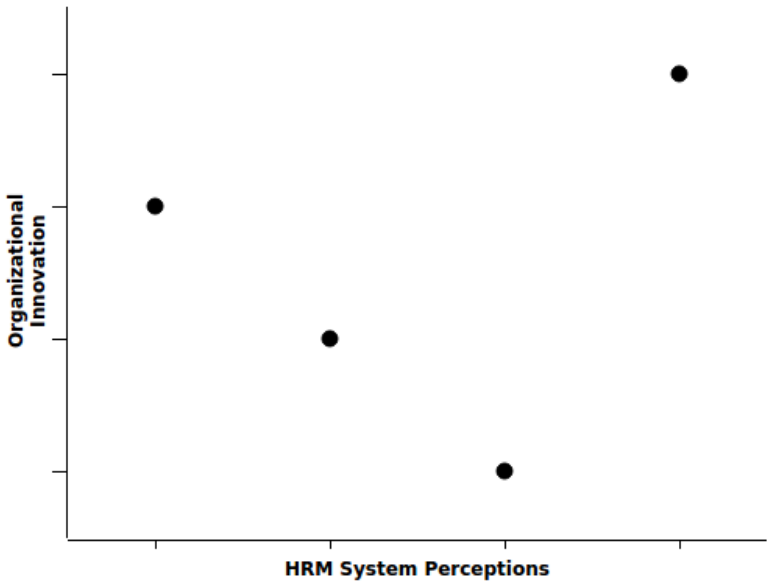

Figure 4: The relation between HRM system perceptions and organizational innovation

As can be seen in the graph, the desired relationship is not displayed and the first three points might even suggest a negative relationship. Drawing back on the analysis of differences between companies regarding the perceptions of an innovation focused HRM system however, it was concluded that only one company (firm C, lowest rating on HRM system, second highest rating on organizational innovation) significantly differs from the rest of the firms. This means that without normalized scales, all points, except that for firm C, would be very close to each other on the HRM system scale, and most differences in scores can be accounted for by natural error.

All things considered, this does by no means rule out the possibility that with more data points a line with positive slope would be the solution that fits the data best. Nevertheless, right now it does not allow for drawing any conclusions that support the hypothesis either.

Because the data did not allow to justify the aggregation of individual level creativity and IWB to the organizational level, there can be no analysis of the relationship of those variables with organizational innovation. Hence, there will be no testing of mediating effects.

Chapter 5

Conclusion and Recommendations

5.1 Discussion

At the start of the research a clear research question and more detailed sub questions were formulated in order to provide a guideline and structure for this thesis:

To what extent can perceptions of an innovation focused HRM system affect innovation-related employee outcomes and organizational innovation?

- *What components and variables (practices) does an innovation focused HRM system include and how do they relate and interact with each other?*
- *What impact do employees' perceptions of an innovation focused HRM system have on organizational innovation?*
- *What role does "creativity" play in the relationship between perceptions of an innovation focused HRM system and organizational innovation?*
- *What role does "innovative work behavior" play in the relationship between perceptions of an innovation focused HRM system and organizational innovation?*

The **first subquestion** was aimed to be answered in chapter 2 by means of a comprehensive literature review. The result is a unique and elaborated HRM system that specifically targets the improvement of innovative activities of a firm and explicitly considers employees' perceptions of those practices. In hindsight, it is the main contribution of the research and in combination with the development of a measure for that system, it is the research's most valuable aspect. The innovation focused HRM system embraces 6 general practices that have been defined and accentuated in great detail to fit the overall goal of innovation. It thereby differs from many other systems that often only suggest the implementation of a general practice without deeply elaborating on its specific aspects and the exact impact it should have on employees' behaviors. The specific

differences with other existing systems (HPWSs, HCWSs and HIWSs) were discussed in section 2.5.

To my knowledge there is no such system yet, that manages to combine elaborated practices for innovation as ultimate goal with employee perceptions and also considers the configurational effects of a system. There are however already a few studies that encompass the topic of HRM and innovation in which single practices and combinations of practices aimed at innovation are mentioned (e.g. Laursen and Foss, 2003; Jiménez-Jiménez and Sanz-Valle, 2008; Jiang et al., 2012; Laursen and Foss, 2013; Zhou et al., 2013). The exact processes underlying the positive effects have yet to be explored in more detail (Jiang et al., 2012; Laursen and Foss, 2013; Zhou et al., 2013).

Laursen and Foss (2003) for example find two distinct HRM systems that are conducive to innovation: the first one including interdisciplinary workgroups, quality circles, a system for collection of employee proposals, planned job rotation, delegation of responsibilities, integration of functions and performance-related pay; while the second one only encompasses firm-internal and firm-external training. The first of the two systems thereby presents a few practices that were not included in this research's system, namely quality circles, job rotation and the integration of functions. All other practices are to some degree represented in the innovation focused HRM system from this study. It was chosen to not include job rotation and the integration of functions here as they have the potential to counteract some of the other practices. For example, the system partly focuses on employees' expertise in their specific job by training professional skills and assessing employees with a formal appraising mechanism. Arguably, job rotation and the integration of functions potentially make both more difficult as training would have to be broader, and assessment needs to change according to job rotations. Additionally, teams with an identifiable leader and the initial focus on team compatibility in recruitment might be less effective for innovation if job rotation is implemented, since teams would change constantly. However, under the assumption of equifinality, job rotation and integration of functions could certainly be interesting additions in another configuration of practices that do not counteract with each other. Although quality circles are not mentioned explicitly in this research, they could be seen as one possible translation of the suggestions made regarding employee participation.

Jiménez-Jiménez and Sanz-Valle (2008) were able to show that an HRM system including flexible job design and empowerment, team working, long-term and skill-oriented staffing, extensive and long-term oriented training, broad career opportunities, behavior-based appraisal, and organic compensation positively influences organizational innovation. In comparison with the HRM system presented here both systems overlap heavily, whereas this research's system additionally suggests flexibility as recruitment criterion and attaches a lot more value to several aspects of employee participation.

Lastly, Laursen and Foss (2013) give an overview of additional studies that cover the topic of HRM and its impact on innovation (e.g. Beugelsdijk, 2008; Chen and Huang, 2009; Zoghi et al., 2010; Foss et al., 2011). All studies portray some aspects of the presented HRM system, but none of them fully covers it. Also, there are no additional practices presented that might add to the HRM system from this research in a significant

manner. Thus, compared to recent literature on HRM and innovation, this research is able to present an HRM system that is more specific and in-depth than other systems, and also generally covers more areas of HRM.

Moreover, it appears that none of the studies mentioned above considers employees' perceptions of the HRM system. While Laursen and Foss (2003) for example only measure the mere existence of HR practices by asking what percentage of employees is involved in a practice; Jiménez-Jiménez and Sanz-Valle (2008) interviewed top executives on their company's HRM system and to what degree they are applied (on a 5-point Likert scale). No employees were asked whether they actually perceive those practices as being implemented. As was discussed earlier in chapter 2.3 though, if it is the goal to induce certain behaviors in employees, it is of utmost importance for employees to actually perceive implementation, and beyond that to understand what behaviors are desired. Consequently, the HRM system presented here gives a unique approach to innovation focused HRM by aiming at employee perceptions and considering for example perceived fairness of performance management or perceptions of autonomy, task significance and task variety.

From the theoretical aspects a questionnaire was developed that measures to what extent employees perceive the mentioned practices, as displayed in appendix B.1. Due to the fact that no such system exists so far, it was a necessary step to create an entirely new measure for the perceptions of innovation focused HRM. Because the measure and its items are newly developed, there is no validation for it yet, and its validity and reliability are subject for discussion. Consequently, in order to further elaborate on subquestion 1 an exploratory factor analysis (EFA) was conducted with the gathered data to cross off expandable items and validate the measure for the present sample.

The EFA revealed a 5-factor-solution and lead to the exclusion of 14 out of the 34 initial items. This is a rather big number, but not unexpected with an entire new measure. The Cronbach's alpha of the resulting measure is 0.89. Nevertheless, the exclusion of 14 items is unfortunate, since most of the aspects within one practice are only measured with one item. This results in some theoretical concepts not being represented in the analyzable data set anymore. It was done to keep the questionnaire to a reasonable length, but lead in the end to entire aspects being excluded. In hindsight, some of them might have been better represented by using more than only one item. An example are the job design aspects from the practice Teamwork and Job Characteristics, where task variety, significance and identity are each represented by one item only, when there are already validated constructs including 4 items each (Morgeson and Humphrey, 2006). Next to the fact that a new measure should be expected to have expandable items by default, the reason for the exclusion of a high number of items could also be related to the small sample size. Minimum values reported as suitable for EFA lie between 100 cases (Gorsuch, 1983) and 500 cases (Comrey and Lee, 1992); or a subject-to-item ratio starting at 2 (Kline, 1979) and going up to a ratio of 20:1 (Hair Jr. et al., 1995). The gathered data included 54 cases, and presented a subject-to-item ratio smaller than 1. Still,

the result of the EFA is a measure for perceptions of innovation focused HRM that is validated for the given sample and has a relatively high reliability as it is (with $\alpha = 0.89$).

Another point for discussion is that the current measure for the perceptions of an innovation focused HRM system does not attach any weighting factors to certain aspects or practices and does not test for configurational effects. It is however reasonable to assume that not every aspect and every practice equally affects the dependent variables. In order to define and appoint such factors, it would be necessary to find an exact formula with which the practices combine to an HRM system, while simultaneously considering all interactive effects of items and practices. The estimation of such relationships would require a very large sample size and several measurements and simply exceeds the scope of this research.

After answering the first subquestion of the research question by presenting the innovation focused HRM system and its measure, it was aimed to answer the remaining three subquestions by analyzing the data that was collected in four companies. The data could not provide explicit answers to the three questions but still allowed partial elaboration on them.

Subquestion two concerned itself with whether there is a positive relationship between perceptions of an innovation focused HRM system and organizational innovation. A qualitative analysis was conducted on the organizational level (see chapter 4.6), but it did not provide an answer to the research question. Furthermore, the comparison of means across companies revealed that the perceptions of innovation focused HRM do not significantly differ from each other for most companies. This makes it difficult to show a relationship to another variable in the first place, and the small sample size of 4 on the organizational level did not allow for any conclusions to be drawn.

Regarding subquestions three and four, the role of creativity and innovative work behavior in the relationship mentioned above should have been explored. Since the data was not able to provide support for that relationship, creativity and innovative work behavior were instead analyzed as separate dependent variables on the individual level.

Regarding **subquestion three**, there was only little support for the relationship between perceptions of an innovation focused HRM system and creativity. Although the two variables correlate, the regression analysis did not show predictive power of perceptions of innovation focused HRM towards creativity. This can most likely be associated with the weak measure of the construct creativity. The EFA revealed that the data does not properly reflect the underlying construct of only one variable, or three factors. A content-related explanation for that outcome could be that creativity is mostly an employees natural resource and difficult to be influenced by HRM at all. Although expertise is potentially affected by the perception of practices such as extensive training on professional skills, it seems more difficult to imagine practices that can directly influence creative thinking skills and intrinsic motivation. The former is clearly stated to be an employees natural resource (Amabile, 1998), while the latter is defined

as the motivation that comes from within - from interest and passion - and not from external rewards or incentives.

Shifting the attention to **subquestion four**, the hypothesis that perceptions of an innovation focused HRM system positively influence innovative work behavior could be supported. This is the main finding of the quantitative analysis and is in line with earlier findings that HRM positively influences IWB. Dorenbosch et al. (2005) for example found that high-commitment HRM predicts high levels of both creativity-oriented IWB and implementation-oriented IWB, which correspond with the two stages of IWB that are presented here. It appears that HRM clearly has the potential to induce and foster desired behaviors in employees and that especially commitment and innovation focused practices are highly effective. Scott and Bruce (1994) further showed that variables such as leader role expectations, leader-member exchange and an employee's problem solving style influence IWB as well. This farther consolidates the approach of this research to aim at employee perceptions rather than organizational intentions, since all these variables can be expected to alter individual perceptions considerably. Although this study's HRM system has not been shown to account for all the variance in the two stages of IWB, the relationship is nevertheless positive and significant. The only point of concern is that all three outcome variables (creativity, initiation IWB and implementation IWB) highly correlate with each other. This indicates that they might measure the same variable after all and it could be interesting to merge them into one single variable, measuring an employee's overall innovativeness. This result is not entirely unexpected, because definitions of IWB often include creativity, either directly or indirectly. De Jong and Den Hartog (2010) for example states that "creativity can be seen as a crucial component of IWB" [p. 24], while Dorenbosch et al. (2005) actually calls the first stage of innovative work behavior creativity-oriented IWB. Both thus see creativity as being a direct part of IWB. Other authors indirectly include creativity in their measures for IWB by using an item related to the "generation of creative ideas" (e.g. Scott and Bruce, 1994; Kleysen and Street, 2001; Yuang and Woodman, 2010). With the definitions in this research however, the line of thinking of Kheng et al. (2013) was followed, that innovative work behavior is defined by *actions* directed at the generation, introduction and implementation of ideas. Creativity is then defined as the ability and competency to generate ideas, and IWB as actually doing it and implementing them. Nevertheless, the distinction into two variables might be questionable and not a valid solution as the concepts overlap and creativity is often seen to be part of innovative work behavior.

One last point for discussion is the fact that it was assumed that most innovations do not come from planned innovation activities but during day-to-day work. Evidently, this does not hold for the four companies that provided data for this study. In fact, firm D reports that 100% of all innovation are the result of planned innovation activities; firm B reports that 50% of innovation in products and 80% of innovations in processes are due to planned activities; firm A reported that 50% of all innovations resulted from planned innovation activities; while in firm C only 20% of all innovations are due to planned activities. The rating for organizational innovation does thereby not correlate

with these numbers and there is no obvious relationship between the percentage of innovations from planned activities and organizational innovation in general.

5.2 Limitations and Suggestions for Future Research

Looking back on the research, a few limitations and weaknesses emerge. First, the sample size is relatively small. Although 161 firms were asked, only 4 were willing to participate, and only with 15 employees each. The requirement for the number of employees was thereby lowered repeatedly to convince firms to participate. However, even with the small sample it was possible to validate the measure and to achieve high reliability. For future research it is recommended to conduct this study as it was intended with a bigger sample both within organizations (ideally the whole workforce participates) and in total (more organizations, representing more industries and different company sizes). The questionnaire for the perceptions of an innovation focused HRM system thereby has the potential to be improved by including more items per aspect of the HR practices, and the measure for creativity should be replaced with a validated measure, for example from Jiang et al. (2012). Since the measurement instrument for the HRM system perceptions is entirely new, it needs repeated and thorough validation and testing in a more comprehensive setting. For this validation the complete initial questionnaire should be used. Although here the EFA already indicated which items are expendable, it is reasonable to let common sense and the theoretical foundation outweigh the results of the exploratory factor analysis that was conducted here and to aim at validating the questionnaire again.

Another limitation concerns the sector, because it was chosen to only include manufacturing firms in the sample. Thus, both the theoretical foundation and the results from the analysis are limited to this sector. The reasoning was to filter for companies that actually can benefit from such an HRM system and to control for sector by limiting to it. The choice of sector builds on Laursen and Foss's (2003) findings that the likelihood of firms being innovators depends on the sector they operate in, and that high-tech companies with specialized supply rank first. Especially for those companies it is considered to be of high value to have an HRM system that directs its entire focus on innovation, while organizations in which innovation is not as important probably have other priorities regarding their HRM. It only makes sense to direct HRM entirely towards innovation if it is a main interest and main indicator for organizational performance in a firm. It is thus recommended to reapply such a limitation, because it increases the practical value of the research for participating companies.

Regarding the methodology, improvements should be made when it comes to the sampling within companies. Selection bias is no problem of course if the whole workforce is asked to participate, but in case it is not, the selection of participating employees needs to be random to prevent threatening validity.

In future research it should further be considered to measure the variables in question

over time rather than in a cross-sectional design, as was done by Piening et al. (2012) as well. This suggestion reveals another weakness of this research, as it relates HRM system perceptions and employee behaviors of today to the organizational innovation in the past two years. A delayed measure of all variables will most likely result in more accurate results regarding the true relationships between the variables: it is reasonable to assume that the perception of a practice takes time to induce desired behaviors in employees, and that it takes even more time to result in actual changes in organizational innovation. Thus, a longitudinal research design is definitely advisable.

Another suggestion for future research concerns the applicability and implementation of an innovation focused HRM system, as its effectiveness might have an upper limit; or it might have a punctuated equilibrium (Zhou et al., 2013). In theory, it is assumed that there is an approximately linear relationship between perceptions of innovation focused HRM and innovation. If the effectiveness is capped at an upper limit however, there might be a point where higher perceptions do not result in increased innovation anymore, because the effectiveness reached its maximum. This possibility builds on the assumption that HRM alone can only do so much, and is not able to fully counter poor organizational performance by itself.

The punctuated equilibrium is related to the costs and benefits of the implementation and perception of the system. There might be a point where the additional costs for increasing the perceptions of employees simply exceed the benefits that result from it. The presented HRM System should thus be regarded as an ideal case scenario that does not yet account for the cost of the implementation of included HR practices. It would be interesting to further explore both topics and try to conduct a cost-benefit analysis of the increase of employee perceptions.

Lastly, it emerged a weakness regarding the measure for innovation. Firms were asked to report the number of innovations in three different areas: (1) products, systems and services, (2) technologies, processes and working methods, and (3) administrative working methods. In discussion with the responsible persons in the companies it appeared that it was very difficult to decide what changes or improvements actually count as an innovation, and what can be considered trivial and should not be titled an innovation. Is it for example appropriate to count the addition of one more screw to part of a machine that is produced by the firm as an actual innovation, or is that change so minimal that it can be neglected when measuring the innovation performance within the past two years. Here, differences in the rating for innovation could be biased to due differences in definitions of what is an innovation. Consequently, it is advisable to attach a cover letter to the questionnaire for managers as well, giving explicit definitions and explanations on what can be counted as an innovation and what should be excluded from that count.

Still, after this research is conducted in a more comprehensive setting, there are several questions that remain. The most interesting one in relation to this study is

probably what actually leads to the *perceptions* of an innovation focused HRM system? This question relates to what was discussed in section 2.3, that an important distinction has to be made between "intended", "implemented" and "perceived" HRM. There are several theories as to how they relate to each other, and it will be interesting to explore what exactly makes employees perceive HRM as innovation focused and what makes them understand about the desired behaviors. Is it simply the actual implementation of those practices? Does the system strength (Bowen and Ostroff, 2004) matter in order to communicate and present the practices in the right way? Do climate and leadership within the company play a role? And lastly, what role do line managers play in bringing the 'message' of the HRM system across?

All of these questions require comprehensive literature reviews, detailed empirical researches and thereby provide material for entire studies to be conducted in the future.

5.3 Implications

Theoretical Implications

The current study addresses a number of research gaps regarding the HRM – innovation link that were identified and discussed in the introduction of this thesis. By reflecting on existing literature on innovation, HRM, creativity and innovative work behavior, conducting an interview and combining the emerging knowledge, this research significantly adds and contributes to the body of knowledge concerning these topics. It provides a clear conceptualization of HRM for innovation and the underlying processes of how it can induce and foster creativity and innovative work behavior in employees, and how it can contribute to organizational innovation in the end.

The developed HRM system represents a new and unique approach to the HRM – innovation link by considering employees' perceptions of an ideal customized system and specifically pinpoints similarities and differences with other HRM systems. It thereby puts it into perspective and context with past research. It also has high relevance for future research by providing several lines and directions for follow-up studies and by suggesting a research model and presenting a partially validated measurement for the innovation focused HRM system.

The study also provides further evidence for the impact of HRM on innovative work behavior and is able to show that the perception of the developed HRM system is indeed effective when it comes to IWB.

Practical Implications

In practice, the current research provides a clear guideline as to how HRM should be perceived by employees if the ultimate goal is fostering creativity and innovative work behavior, and increasing organizational innovation in the end.

It breaks down what processes innovation includes and shows that innovation starts with employees and their knowledge, skills and abilities. The research further emphasizes

the fact that the 'right' management of employees and their competences has the potential to positively influence organizational innovation. As the research clearly shows a positive impact of the perception of innovation focused HRM on innovative work behavior, firms that seek to improve their employees' IWB are provided with clear guidelines how to do it.

Additionally, with the given measurement, firms can get an idea of how their employees perceive HRM, and it can be identified in what areas employees feel that HRM does not focus on innovation. The results can then be compared to what managers would have expected to be perceived by employees and discrepancies can be revealed and resolved. The expected result is improved IWB and eventually an increase in organizational innovation.

Finally, participating companies cannot only compare scores within their own firms, but are put into context with other firms from the same sector. They get an idea how their innovation performance, their employees' behaviors and their employees' HRM system perceptions compare to other companies and thereby potentially get valuable information about how to stay competitive or even outdo their competition in the long run.

5.4 Conclusion

In conclusion, the current research provides three main contributions:

1. The conceptualization of a unique innovation focused HRM system that considers employee perceptions, representing a new and highly relevant approach to the HRM – innovation link. This HRM system is subsequently reflected on and compared to other existing systems.

2. A measurement for that system, that is validated for the given sample and shows high reliability within that sample.

3. A pre-test for the general validation of the measurement and statistical proof that for the given sample there is a positive and significant predicting power of the perceptions of innovation focused HRM towards innovative work behavior.

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Appendix A

Request for participation

Geachte heer/mevrouw,

Mijn naam is Melanie Peters en ik ben momenteel bezig met een kleinschalig onderzoek voor het afsluiten van mijn masteropleiding Bedrijfskunde, specialisatie Human Resource Management (HRM) aan de Universiteit Twente. Tegen de achtergrond dat ik ook een Bacheloropleiding in Technische Natuurkunde afgesloten heb, ben ik heel geïnteresseerd in technische innovatie en het beleid van medewerkers in technische bedrijven. Mijn onderzoek richt zich daarom op bedrijven die actief bezig zijn met innovatie in de technologiesector, waar *(naam bedrijf)* ook binnen valt. Ik wil onderzoeken in hoeverre een innovatiegericht HRM-beleid de innovatieprestatie van een bedrijf kan verhogen. Daarvoor ben ik geïnteresseerd in de percepties van medewerkers over het HRM-beleid; hoe ervaren zij de instrumenten en activiteiten die het bedrijf aanbiedt voor het aannemen, de ontwikkeling, de beloningen, de beoordeling en waardering van medewerkers? Ik hoop met het onderzoek een breed inzicht te verkrijgen in de relatie tussen de waarnemingen van medewerkers van innovatiegericht HRM-beleid, het innovatief gedrag van medewerkers (met betrekking tot creativiteit en innovatief werk gedrag) en de innovatieve resultaten van bedrijven.

Achtergrond van het onderzoek

Eerder onderzoek heeft aangetoond dat het HRM-beleid een grote rol speelt als het gaat om de resultaten van een bedrijf, onder andere ook innovatie uitkomsten. Ook werd aangetoond dat vooral de waarneming van medewerkers van belang is in deze relatie. Voor dit onderzoek hebben wij verschillende HRM-activiteiten gecombineerd die allemaal gericht zijn op de verhoging van innovatie. Wij willen nagaan in hoe verre de percepties van een dergelijke HRM-beleid daadwerkelijk invloed hebben op bedrijfsinnovatie; en in hoe verre het gedrag van medewerkers een rol speelt in deze relatie.

Hoe wordt het onderzoek uitgevoerd

Er zijn twee vragenlijsten, die eenmalig ingevuld worden door

- 15 Medewerkers uit productie, R&D, montage of dergelijke (betreffend de waarne-

ming van het HRM-beleid en hun werk gedrag)

- Één HR manager of directeur (betreffend bedrijfsinnovatie)

Het invullen van de vragenlijsten duurt ongeveer 20 minuten en voor het afnemen van de vragenlijsten kan ik graag een dag of dagdeel aanwezig zijn in uw bedrijf. Al uw gegevens zullen geheel anoniem worden verwerkt. Ze zullen niet aan u als persoon of aan uw bedrijf te koppelen zijn en alleen de onderzoekers hebben toegang tot de ruwe data.

Kosten en winsten van deelname

Deelname aan het onderzoek vraagt van u een eenmalige tijdsinvestering van minder dan een half uur. U krijgt er het volgende voor terug: een kopie van mijn rapport en een rapportage over hoe uw medewerkers in algemene zin het HRM-beleid in uw bedrijf waarnemen en wat het onderzoek over hun werkgedrag oplevert. Indien genoeg bedrijven meedoen aan het onderzoek kan ik ook een benchmarking rapport aanbieden, waarin uw bedrijf in alle onderdelen van het onderzoek vergeleken wordt met het gemiddelde van andere bedrijven uit dezelfde sector.

Contact

Als u nog vragen heeft kunt u graag met mij contact opnemen. Ik hoop van harte dat u mee wilt werken!

Met vriendelijke groeten,
Melanie Peters

Appendix B

The employee questionnaire - from theoretical contructs to questionnaire items

B.1 Perceptions of an innovation focused HRM system

Recruitment and Selection	
The extensive search for new employees using multiple recruitment sources	In our company, many different recruitment sources are used.**
	In our company, people are thoroughly assessed before they are recruited.
Selective hiring concentrating on the criteria KSA, willingness and ability to learn, flexibility and team compatibility	Team compatibility is an important recruitment criterion in our company.
	High education is an important recruitment criterion in our company.**
	Flexibility is an important recruitment criterion in our company.**
	Capability and willingness to learn are important recruitment criteria in our company.

Training and Development	
Regular developmental feedback	I get developmental feedback on a regular basis.**
Extensive training on both professional and communication/team work skills that are perceived as valuable	Our company offers or grants time to attend trainings regarding my profession.
	Our company offers or grants time to attend trainings regarding communication and team work.
	I think the training offered by our company is valuable.
Internal career opportunities offering individual career paths for high performers	Our company offers career opportunities and individual career paths to high performers.**
Training and Development is based on Performance Management	Career opportunities are closely linked to our Performance Management system (if present).*
	Mandatory training is assigned based on our Performance Management system (if present).*
Performance Management	
Perceptions of a visible, formal appraising mechanism	In our company there is a formal assessment and performance management system.**
PM recognizes processes as well as behaviors, such as the creation and implementation of new ideas or creativity and risk-taking	My performance assessment is also based on subjective indicators, such as creativity, flexibility and risk-taking.**
PM covers goal setting	My performance assessment orients itself towards specific goals that were formulated in collaboration with my supervisor.
PM is perceived as fair and balanced	Performance assessment grants me valuable feedback.
	I perceive performance management as being valuable, fair and balanced.**

Compensation	
Attractive compensation packages including PBP and profit-sharing	Our company offers attractive compensation packages including Performance-Based Pay and profit-sharing.**
Rewards, promotions and awards are based on Performance Management	In our company, rewards, promotions and awards are based on assessment and Performance Management.
There are appropriately balanced pay raises and rewards for creative performers and non-performers	Our company appropriately balances pay raises and rewards for creative performers and non-performers.*
Team Work and Job Characteristics	
Cross-functional teamwork with identifiable leadership	In our company, teams consist of representatives from a wide array of specialties.**
	Teams have an identifiable leader.**
Perceptions of high levels of (1) communication, (2) autonomy, (3) task significance, (4) task variety, and (5) task identity	In our company, high levels of communication play an important role within teams.**
	I feel autonomous and in control of my job.
	I feel my job has significance for projects and for the company as a whole.**
	I feel my job is challenging and often varies from a daily routine.**
	My job involves doing identifiable and complete pieces of work from beginning to end.

Employee Participation	
Communicating the importance and opportunities to participate	Our company attaches a lot of value to employee participation.
	I have the opportunity and autonomy to pursue my own ideas.
Comprehensive information sharing and communication	Our company attaches a lot of value to information sharing and communication.
Encouraging critical thinking regarding products and processes	I feel encouraged to participate and critically think about our company's products and processes.
Employee Participation needs to be relatively easy without making it hard through time-consuming layers of evaluation	Presenting a new idea is relatively easy and uncomplicated.
Involving employees in decision making that affects their work	I feel involved in decision making that affects my work.

* item removed from analysis due to missing values

** item removed from analysis as a result of EFA

B.2 Employee outcomes

Creativity

Expertise	
Expertise is the intellectual space that one uses to explore and solve problems. (Amabile, 1998)	I am an expert in my area of operations.
	I have knowledge and abilities that go beyond my area of operations.
	I know my way around in the organization and how to handle problems.

Creative Thinking Skills	
	I can often find new ideas and ways to do my work. (from Jiang et al., 2012)
A person will be more creative if he or she feels comfortable disagreeing with others (Amabile, 1998).	I feel comfortable disagreeing with others, even with my superiors.
A person's creativity will be enhanced if he or she "habitually turns problems upside down and combines knowledge from seemingly disparate fields" (Amabile, 1998, p.79).	I have the ability to combine knowledge from seemingly disparate fields.

Motivation	
	I enjoy tackling problems that are completely new to me. (from Jiang et al., 2012)
"Passion and interest [...] are what intrinsic motivation is all about." (Amabile, 1998, p.79)	I find my job interesting and am passionate about it.
"People will be most creative when they feel motivated primarily by the interest, satisfaction, and challenge of the work itself." (Amabile, 1998, p.79)	I find my job challenging, but satisfying.

Innovative Work Behavior

How often do you ...
... look for opportunities to improve an existing process, technology, product, service or work relationship?*
... recognize opportunities to make a positive difference in your work, department, organization , or with customers?*
... pay attention to non-routine issues in your work, department, organization, or with customers?*
... search out new working methods, techniques or instruments?**
... generate original solutions for problems?**
... find new approaches to execute tasks?**
... make important organizational members enthusiastic for innovative ideas?**
... attempt to convince people to support an innovative idea?**
... systematically introduce innovative ideas into work practices?**
... contribute to the implementation of new ideas?**
... put effort in the development of new things?**

* item adopted from Kleysen and Street (2001)
** item adopted from De Jong and Den Hartog (2010)

Appendix C

Questionnaire to employees (dutch version with cover letter and control variables)

Beste medewerker,

Mijn naam is Melanie Peters en ik ben momenteel bezig met een kleinschalig onderzoek voor het afsluiten van mijn masteropleiding Bedrijfskunde, specialisatie Human Resource Management (personeelszaken) aan de Universiteit Twente. Voor mijn afstudeeropdracht wil ik onderzoeken in hoeverre een innovatiegericht personeelsbeleid de innovatieprestatie van een bedrijf kan verhogen; en in hoeverre waarnemingen, competenties en gedrag van medewerkers een rol spelen. Hiertoe heb ik de bijgevoegde vragenlijst ontworpen.

Bij het beantwoorden van de vragen gaat het uitsluitend om jouw mening; gebaseerd op jouw gevoel, waarnemingen en ervaringen binnen dit bedrijf. Er bestaan dus geen 'goede' of 'foute' antwoorden.

Naast de vragen over de waarnemingen betreffend het personeelsbeleid en jouw werkgedrag worden er ook enkele persoonlijke gegevens gevraagd (zoals leeftijd en geslacht). Deze informatie is alleen inzichtelijk voor mij en ik ga hier vertrouwelijk mee om! Alle gegevens en antwoorden zullen geheel anoniem worden verwerkt en ze zullen niet aan jou als persoon te koppelen zijn. Het invullen van de vragenlijst zal ongeveer 15 minuten in beslag nemen, en ik wil jullie graag vragen om zo eerlijk mogelijk te zijn en de vragen zonder hulp en overleg met anderen te beantwoorden.

Alvast hartelijk dank voor jouw medewerking!

Algemene vragen

Wat is je leeftijd?

- ☐ < 20
- ☐ 20 - 30
- ☐ 31 - 40
- ☐ 41 - 50
- ☐ > 50

In welk bereik ben jij werkzaam?

- ☐ Productie
- ☐ Montage
- ☐ Engineering
- ☐ R&D
- ☐ Anders, namelijk _____

Wat is jouw geslacht?

- ☐ Mannelijk
- ☐ Vrouwelijk

Hoeveel jaar ben je bij dit bedrijf in dienst?

- ☐ Korter dan 1 jaar
- ☐ 1 - 5 jaar
- ☐ 5 - 10 jaar
- ☐ > 10 jaar

Wat is je hoogste afgeronde opleiding?

- ☐ Basisonderwijs (lagere school)
- ☐ Lager beroepsonderwijs (LBO of vergelijkbaar)
- ☐ Middelbaar beroepsonderwijs (MAVO/MULO/MBO of vergelijkbaar)
- ☐ Middelbaar voortgezet onderwijs (HAVO/MMS/VWO/HBS/Gymnasium)
- ☐ Hoger beroepsonderwijs (HBO)
- ☐ Wetenschappelijk onderwijs (WO, universitair)
- ☐ Anders, namelijk _____

Wat is je dienstverband?

- ☐ Vaste aanstelling
- ☐ Kortlopend contract
- ☐ Uitzendkracht
- ☐ Ingeleend

Onderstaande stellingen gaan over jouw waarnemingen betreffend het HRM beleid in jullie bedrijf. Geef a.u.b. aan of je het eens of oneens bent met de stellingen.

Werving en Selectie	**zeer mee oneens**	**mee oneens**	**neutraal**	**mee eens**	**zeer mee eens**	**weet niet/ niet van toepassing**
In ons bedrijf worden er vele verschillende manieren van werving gebruikt.	☐	☐	☐	☐	☐	☐
Sollicitanten worden grondig geëvalueerd voordat ze aangenomen worden.	☐	☐	☐	☐	☐	☐
Team compatibiliteit is een belangrijk wervingscriterium voor ons bedrijf.	☐	☐	☐	☐	☐	☐
Hoge opleiding is een belangrijk wervingscriterium voor ons bedrijf.	☐	☐	☐	☐	☐	☐
Flexibiliteit is een belangrijk wervingscriterium voor ons bedrijf.	☐	☐	☐	☐	☐	☐
Het vermogen en de bereidheid om te leren zijn belangrijke wervingscriteria voor ons bedrijf.	☐	☐	☐	☐	☐	☐
Training en Ontwikkeling	**zeer mee oneens**	**mee oneens**	**neutraal**	**mee eens**	**zeer mee eens**	**weet niet/ niet van toepassing**
Ik ontvang regelmatig feedback over mijn persoonlijke ontwikkeling en prestaties.	☐	☐	☐	☐	☐	☐
Ons bedrijf biedt interne trainingen over mijn vakgebied, of stelt tijd beschikbaar om een dergelijk training of bijscholing extern te volgen.	☐	☐	☐	☐	☐	☐
Ons bedrijf biedt interne trainingen over communicatie en teamwerk, of stelt tijd beschikbaar om een dergelijk training of bijscholing extern te volgen.	☐	☐	☐	☐	☐	☐
Volgens mij zijn de door het bedrijf aangeboden trainingen waardevol.	☐	☐	☐	☐	☐	☐
Ons bedrijf biedt carrière-mogelijkheden en individuele loopbaantrajecten aan voor werknemers met hoge prestaties.	☐	☐	☐	☐	☐	☐

Carrièremogelijkheden zijn nauw verbonden met ons prestatiemanagement systeem (indien aanwezig).	☐	☐	☐	☐	☐	☐
Verplichte trainingen of bijscholingen zijn gebaseerd op ons prestatiemanagement systeem (indien aanwezig).	☐	☐	☐	☐	☐	☐
Performance Management en Compensatie	**zeer mee oneens**	**mee oneens**	**neutraal**	**mee eens**	**zeer mee eens**	**weet niet/ niet van toepassing**
Ons bedrijf maakt gebruik van een formeel beoordelings- en prestatie management systeem.	☐	☐	☐	☐	☐	☐
De beoordeling van mijn prestatie is ook gebaseerd op subjectieve indicatoren zoals creativiteit, flexibiliteit en het nemen van risico.	☐	☐	☐	☐	☐	☐
De beoordeling van mijn prestatie richt zich op het behalen van specifieke doelen, die geformuleerd werden in samenwerking met mijn supervisor.	☐	☐	☐	☐	☐	☐
De beoordeling van mijn prestatie geeft me waardevolle feedback.	☐	☐	☐	☐	☐	☐
Ik ervaar prestatiebeoordeling als fair en evenwichtig.	☐	☐	☐	☐	☐	☐
Ons bedrijf biedt aantrekkelijke beloningspakketten aan, waaronder prestatiebeloning en winstdeling.	☐	☐	☐	☐	☐	☐
Beloningen, promoties en gunningen zijn gebaseerd op prestatiebeoordeling.	☐	☐	☐	☐	☐	☐
Binnen ons bedrijf zijn de gegeven salarisverhogingen en beloningen fair en even-wichtig tussen creatieve en niet-creatieve medewerkers.	☐	☐	☐	☐	☐	☐
Teamwerk en baankenmerken	**zeer mee oneens**	**mee oneens**	**neutraal**	**mee eens**	**zeer mee eens**	**weet niet/ niet van toepassing**
Teams binnen ons bedrijf bestaan uit vertegen-woordigers uit een breed spectrum van functies.	☐	☐	☐	☐	☐	☐

Teams hebben een identificeerbare leider.	☐	☐	☐	☐	☐	☐
Een hoog communicatieniveau speelt een belangrijke rol in het teamwerk van ons bedrijf.	☐	☐	☐	☐	☐	☐
Ik voel me zelfstandig en heb controle over mijn werk.	☐	☐	☐	☐	☐	☐
Mijn functie is belangrijk voor bepaalde projecten en voor het bedrijf als geheel.	☐	☐	☐	☐	☐	☐
Mijn baan is uitdagend en is vaak geen dagelijkse routine.	☐	☐	☐	☐	☐	☐
In mijn functie ben ik bezig met herkenbare en complete werkstukken van begin tot eind.	☐	☐	☐	☐	☐	☐
Inspraak van werknemers	**zeer mee oneens**	**mee oneens**	**neutraal**	**mee eens**	**zeer mee eens**	**weet niet/ niet van toepassing**
Ons bedrijf hecht veel waarde aan inspraak van werknemers.	☐	☐	☐	☐	☐	☐
Ik heb de mogelijkheid en zelfstandigheid om mijn eigen ideeën te vervolgen en te gebruiken in mijn werk.	☐	☐	☐	☐	☐	☐
Ons bedrijf hecht veel waarde aan het delen van informatie en communicatie.	☐	☐	☐	☐	☐	☐
Ik voel me aangemoedigd om mee te praten en kritisch na te denken over de producten en processen van ons bedrijf.	☐	☐	☐	☐	☐	☐
Het indienen van een nieuw idee is relatief eenvoudig en ongecompliceerd.	☐	☐	☐	☐	☐	☐
Ik voel me betrokken bij de besluitvorming die mijn werk beïnvloed.	☐	☐	☐	☐	☐	☐

Onderstaande stellingen gaan over jouw creatieve vaardigheden. Geef a.u.b. aan of je het eens of oneens bent ment de stellingen.

Creativiteit	zeer mee oneens	mee oneens	neutraal	mee eens	zeer mee eens	weet niet/ niet van toepassing
Ik ben een expert in mijn werkterrein.	☐	☐	☐	☐	☐	☐
Ik heb kennis en vaardigheden die verder gaan dan mijn werkterrein.	☐	☐	☐	☐	☐	☐
Ik ben goed op de hoogte van de werkzaamheden binnen het bedrijf en weet hoe ik problemen aan moet pakken.	☐	☐	☐	☐	☐	☐
Ik bedenk vaak nieuwe ideeën en manieren om mijn werk te doen.	☐	☐	☐	☐	☐	☐
Ik voel me comfortabel het oneens met iemand te zijn, ook als het mijn supervisor is.	☐	☐	☐	☐	☐	☐
Ik heb de vaardigheid om kennis te combineren van schijnbaar ongelijksoortige velden.	☐	☐	☐	☐	☐	☐
Ik geniet van het aanpakken van problemen en uitdagingen die helemaal nieuw voor me zijn.	☐	☐	☐	☐	☐	☐
Ik vind mijn baan interessant en ben er gepassioneerd over.	☐	☐	☐	☐	☐	☐
Ik vind mijn baan uitdagend, maar wel bevredigend.	☐	☐	☐	☐	☐	☐

Onderstaande vragen gaan over jouw innovatief werk gedrag. Geef a.u.b. een antwoord op de volgende vragen: Hoe vaak….

Innovatief Werk Gedrag	nooit	zelden	soms	regelmatig	(vrijwel) altijd	weet niet/ niet van toepassing
…zoek jij naar mogelijk-heden om een bestaand proces, technologie, product, service of werkrelatie te verbeteren?	☐	☐	☐	☐	☐	☐
…herken jij mogelijkheden om een positief verschil te maken in je werk, afdeling, bedrijf of met klanten?	☐	☐	☐	☐	☐	☐
…besteed jij aandacht aan niet-routine dingen in je werk, afdeling, bedrijf of de markt?	☐	☐	☐	☐	☐	☐
…stel jij nieuwe werkwijzen, technieken of methoden voor?	☐	☐	☐	☐	☐	☐
…bedenk je originele oplossingen voor problemen?	☐	☐	☐	☐	☐	☐
…zoek jij naar nieuwe manieren om taken uit te voeren?	☐	☐	☐	☐	☐	☐
…maak jij sleutelfiguren enthousiast voor vernieuwingen?	☐	☐	☐	☐	☐	☐
…probeer jij mensen over de streep te trekken om vernieuwingen te steunen?	☐	☐	☐	☐	☐	☐
…voer jij vernieuwingen planmatig in?	☐	☐	☐	☐	☐	☐
…lever jij een bijdrage aan de invoeringen van vernieuwingen?	☐	☐	☐	☐	☐	☐
…span jij je in om vernieuwingen gerealiseerd te krijgen?	☐	☐	☐	☐	☐	☐

Einde vragenlijst! Hartelijk dank voor de deelname!

Appendix D

HR System Factor Analysis Output and Intra Correlation Coefficients

KMO and Bartlett's Test for the HRM System

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,738
Bartlett's Test of Sphericity	Approx. Chi-Square	256,913
	df	136
	Sig.	,000

Rotated Component Matrix for the HRM System

	Component				
	1	2	3	4	5
RS2 - In our company, people are thoroughly assessed before they are recruited.	,059	,130	**,823**	,209	,138
RS3 - Team compatibility is an important recruitment criterion in our company.	,368	-,341	**,622**	,009	-,131
RS6 - Capability and willingness to learn are important recruitment criteria in our company.	,286	,143	**,659**	-,054	,066
TD2 - Our company offers or grants time to attend trainings regarding my profession.	,171	**,781**	-,101	,110	-,062
TD3 - Our company offers or grants time to attend trainings regarding communication and team work.	,210	**,761**	-,012	-,148	-,048
TD4 - I think the training offered by our company is valuable.	,074	**,755**	,254	,263	-,030
PM3 - My performance assessment orients itself towards specific goals that were formulated in collaboration with my supervisor.	,033	-,004	,002	**,851**	,094
PM4 - Performance assessment grants me valuable feedback.	,264	,174	,139	**,786**	-,175
C2 - In our company, rewards, promotions and awards are based on assessment and Performance Management.	,094	,376	,156	**,408**	,301
TJC4 - I feel autonomous and in control of my job.	,136	-,078	,244	-,201	**,819**
TJC7 - My job involves doing identifiable and complete pieces of work from beginning to end.	,164	-,045	-,166	*,430*	**,668**
EP1 - Our company attaches a lot of value to employee participation.	**,770**	,364	,157	,129	,036
EP2 - I have the opportunity and autonomy to pursue my own ideas.	**,585**	*,433*	,256	,147	,122
EP3 - Our company attaches a lot of value to information sharing and communication.	**,751**	,247	,109	,104	-,064
EP4 - I feel encouraged to participate and critically think about our company's products and processes.	**,822**	,153	,273	,014	,199
EP5 - Presenting a new idea is relatively easy and uncomplicated.	**,765**	-,074	-,072	,192	,106
EP6 - I feel involved in decision making that affects my work.	**,742**	,041	,356	-,027	,123

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaizer Normalization

Communalities for the HRM System

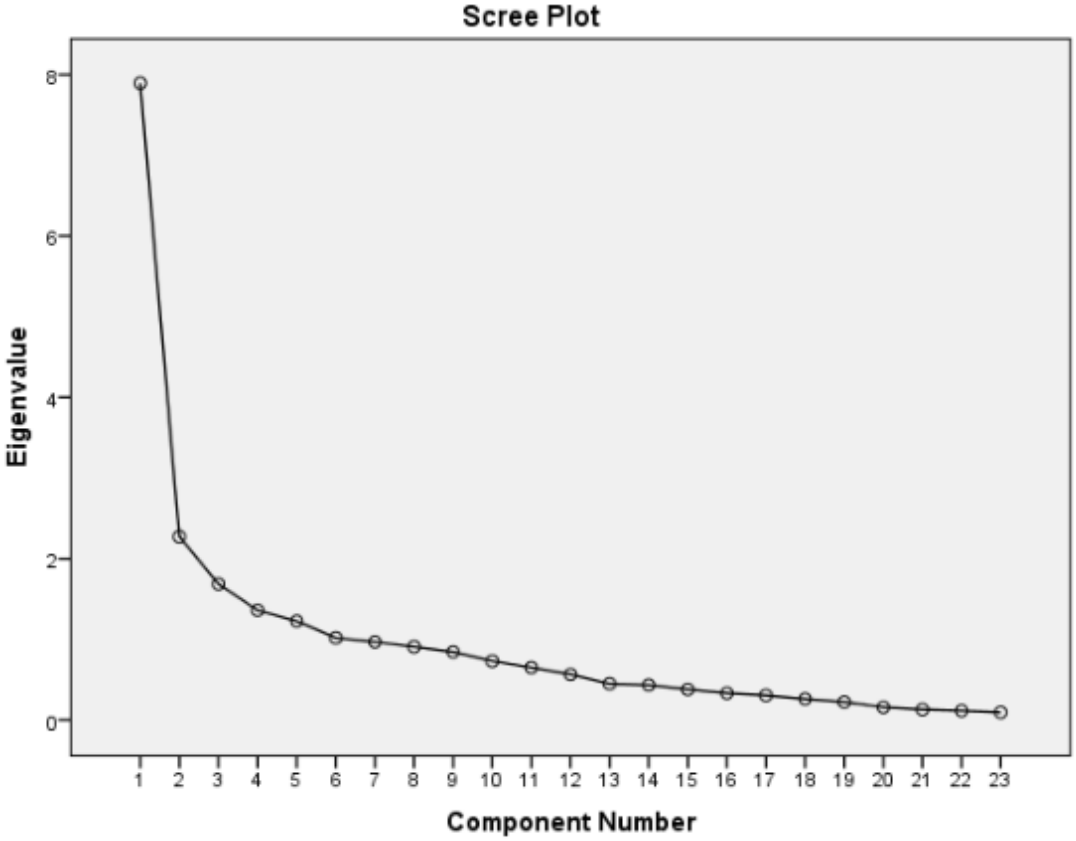
	Initial	Extraction
RS2 - In our company, people are thoroughly assessed before they are recruited.	1,000	,760
RS3 - Team compatibility is an important recruitment criterion in our company.	1,000	,655
RS6 - Capability and willingness to learn are important recruitment criteria in our company.	1,000	,544
TD2 - Our company offers or grants time to attend trainings regarding my profession.	1,000	,665
TD3 - Our company offers or grants time to attend trainings regarding communication and team work.	1,000	,648
TD4 - I think the training offered by our company is valuable.	1,000	,711
PM3 - My performance assessment orients itself towards specific goals that were formulated in collaboration with my supervisor.	1,000	,734
PM4 - Performance assessment grants me valuable feedback.	1,000	,768
C2 - In our company, rewards, promotions and awards are based on assessment and Performance Management.	1,000	,531
TJC4 - I feel autonomous and in control of my job.	1,000	,795
TJC7 - My job involves doing identifiable and complete pieces of work from beginning to end.	1,000	,688
EP1 - Our company attaches a lot of value to employee participation.	1,000	,767
EP2 - I have the opportunity and autonomy to pursue my own ideas.	1,000	,632
EP3 - Our company attaches a lot of value to information sharing and communication.	1,000	,652
EP4 - I feel encouraged to participate and critically think about our company's products and processes.	1,000	,813
EP5 - Presenting a new idea is relatively easy and uncomplicated.	1,000	,644
EP6 - I feel involved in decision making that affects my work.	1,000	,696

Extraction Method: Principal Component Analysis.

Total Variance Explained for the HRM System

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,404	31,791	31,791	5,404	31,791	31,791	3,735	21,972	21,972
2	2,107	12,391	44,183	2,107	12,391	44,183	2,504	14,731	36,703
3	1,657	9,748	53,931	1,657	9,748	53,931	2,012	11,838	48,541
4	1,274	7,495	61,426	1,274	7,495	61,426	1,970	11,585	60,126
5	1,160	6,825	68,252	1,160	6,825	68,252	1,381	8,126	68,252
6	,869	5,113	73,365						
7	,766	4,505	77,870						
8	,734	4,315	82,185						
9	,577	3,392	85,577						
10	,545	3,209	88,785						
11	,450	2,647	91,433						
12	,386	2,273	93,706						
13	,298	1,750	95,456						
14	,242	1,426	96,882						
15	,209	1,228	98,110						
16	,176	1,034	99,144						
17	,146	,856	100,000						

Extraction Method: Principal Component Analysis.



Intra Correlation Coefficients for the HRM System

Factor	1	2	3	4	5	system
ICC(1)						
Company A	0.154	0.379	0.248	0.147	0.288	0.162
Company B	0.312	-0.037	-0.124	0.531	0.496	0.184
Company C	0.573	0.528	0.440	0.150	0.652	0.391
Company D	0.550	0.149	-0.007	-0.493	0.563	-0.038
ICC(2)						
Company A	0.354	0.646	0.497	0.257	0.708	0.767
Company B	0.577	-0.119	-0.493	0.694	0.855	0.793
Company C	0.801	0.771	0.702	0.260	0.918	0.916
Company D	0.786	0.344	-0.023	-1.947	0.885	-1.597

Appendix E

Employee Outcomes Factor Analysis Output and Intra Correlation Coefficients

Rotated Component Matrix for Creativity

	Component			
	1	2	3	4
E1 - I am an expert in my area of operations.	**,418**	**,734**	-,005	,120
E2 - I have knowledge and abilities that go beyond my area of operations.	**,590**	**,590**	-,068	,105
E3 - I know my way around in the organization and how to handle problems.	-,228	**,829**	,228	,028
CTS1 - I can often find new ideas and ways to do my work.	**,605**	,388	,290	-,203
CTS2 - I feel comfortable disagreeing with others, even with my superiors.	,053	,092	,092	**,927**
CTS3 - I have the ability to combine knowledge from seemingly disparate fields.	**,628**	,048	,071	,363
M1 - I enjoy tackling problems that are completely new to me.	**,829**	-,066	,249	-,033
M2 - I find my job interesting and am passionate about it.	,119	,206	**,851**	,053
M3 - I find my job challenging, but satisfying.	,188	-,028	**,917**	,076

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaizer Normalization

Intra Correlation Coefficients for Creativity

	Company A	Company B	Company C	Company D
ICC(1)	0.184	0.456	0.258	-0.004
ICC(2)	0.670	0.883	0.758	-0.034

KMO and Bartlett's Test for Innovative Work Behavior

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,862
Bartlett's Test of Sphericity	Approx. Chi-Square	234,025
	df	55
	Sig.	,000

Rotated Component Matrix for Innovative Work Behavior

	Component	
	1	2
oppexp1 - How often do you look for opportunities to improve an existing process, technology, product, service or work relationship?	,284	**,699**
oppexp2 - How often do you recognize opportunities to make a positive difference in your work, department, organization, or with customers?	,398	**,677**
oppexp3 - How often do you pay attention to non-routine issues in your work, department, organization, or with customers?	,021	**,755**
ideagen1 - How often do you search out new working methods, techniques or instruments?	*,463*	**,554**
ideagen2 - How often do you generate original solutions for problems?	,335	**,643**
ideagen3 - How often do you find new approaches to execute tasks?	,306	**,669**
champ1 - How often do you make important organizational members enthusiastic for innovative ideas?	**,874**	,075
champ2 - How often do you attempt to convince people to support an innovative idea?	**,620**	,344
appl1 - How often do you systematically introduce innovative ideas into work practices?	**,705**	,398
appl2 - How often do you contribute to the implementation of new ideas?	**,721**	,343
appl3 - How often do you put effort in the development of new things?	**,770**	,254

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaizer Normalization

Communalities for Innovative Work Behavior

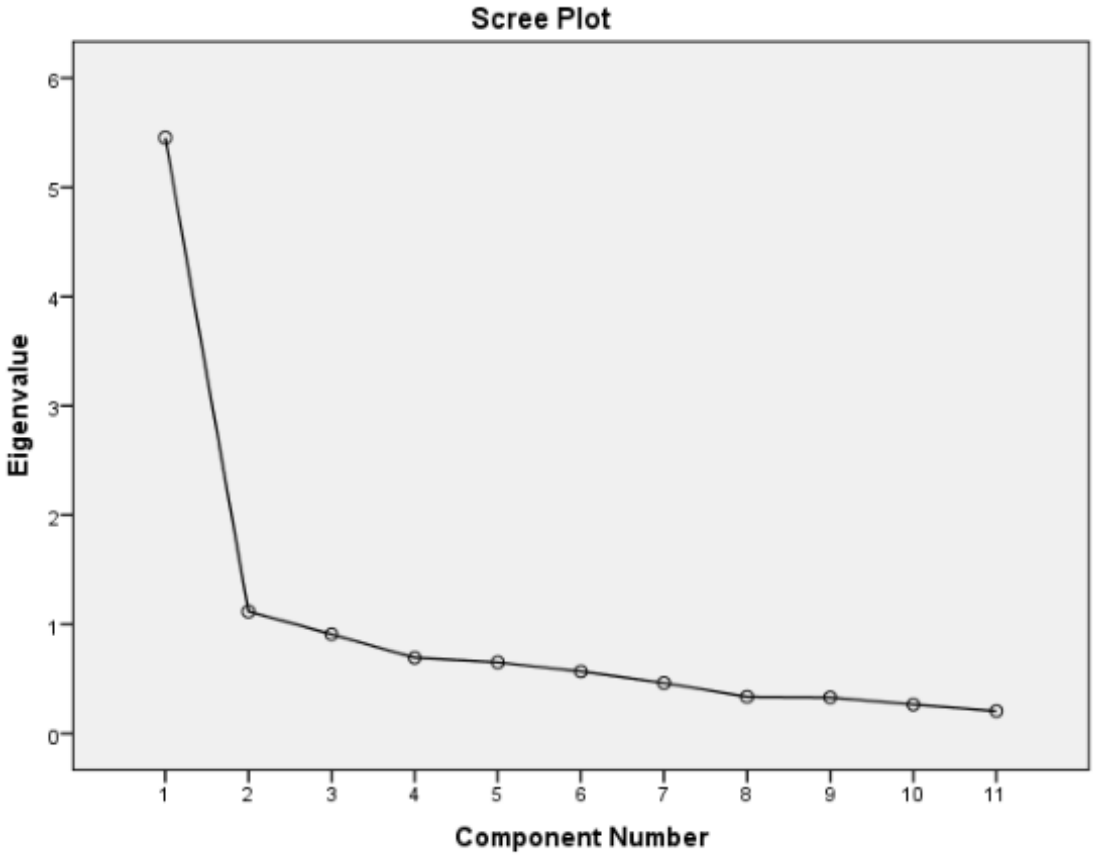
	Initial	Extraction
oppexp1 - How often do you look for opportunities to improve an existing process, technology, product, service or work relationship?	1,000	,570
oppexp2 - How often do you recognize opportunities to make a positive difference in your work, department, organization, or with customers?	1,000	,617
oppexp3 - How often do you pay attention to non-routine issues in your work, department, organization, or with customers?	1,000	,570
ideagen1 - How often do you search out new working methods, techniques or instruments?	1,000	,522
ideagen2 - How often do you generate original solutions for problems?	1,000	,526
ideagen3 - How often do you find new approaches to execute tasks?	1,000	,542
champ1 - How often do you make important organizational members enthusiastic for innovative ideas?	1,000	,770
champ2 - How often do you attempt to convince people to support an innovative idea?	1,000	,503
appl1 - How often do you systematically introduce innovative ideas into work practices?	1,000	,656
appl2 - How often do you contribute to the implementation of new ideas?	1,000	,638
appl3 - How often do you put effort in the development of new things?	1,000	,657

Extraction Method: Principal Component Analysis.

Total Variance Explained for Innovative Work Behavior

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,453	49,577	49,577	5,453	49,577	49,577	3,420	31,092	31,092
2	1,117	10,155	59,732	1,117	10,155	59,732	3,150	28,640	59,732
3	,910	8,269	68,001						
4	,694	6,310	74,310						
5	,652	5,930	80,241						
6	,569	5,172	85,413						
7	,463	4,213	89,627						
8	,337	3,063	92,689						
9	,332	3,015	95,704						
10	,266	2,419	98,123						
11	,206	1,877	100,000						

Extraction Method: Principal Component Analysis.



Intra Correlation Coefficients for Innovative Work Behavior

Factor	implementation stage	initiation stage	IWB
ICC(1)			
Company A	0.519	0.675	0.483
Company B	0.527	0.112	0.240
Company C	0.358	0.526	0.519
Company D	0.245	0.558	0.331
ICC(2)			
Company A	0.866	0.912	0.911
Company B	0.870	0.388	0.777
Company C	0.770	0.847	0.922
Company D	0.660	0.863	0.845

Appendix F

List of manager questionnaire items

Is Innovation part of your strategie, mission and vision?	☐ yes ☐ no
What percentage of your current revenue is related to enterily new or recently adapted products, systems or services? (introduced within the past two years)?	
What is the number of entirely new or recently adapted products, systems or services, that were produced or offered by your company within the past two years)?	
What percentage of these were due to planned innovation activities?	
What is the number of entirely new or adapted technologies*, processes or working methods that were introduced in your company within the past two years?	
What percentage of these were due to planned innovation activities?	
What is average age of technology* within your company?	☐ $<$ 5 years ☐ 5–10 years ☐ 10–20 years ☐ $>$ 20 years
What is the number of entirely new or adapted administrative working methods that were introduced in your company within the past two years?	

* The term 'technology' refers to computers, machines, equipment and suchlike.

Appendix G

Questionnaire to HR managers (dutch version with control variables)

Vragenlijst Bedrijfsinnovatie

Algemene vragen:

Wat is het aantal werknemers van uw bedrijf?

- ☐ < 100
- ☐ 100 - 500
- ☐ 500 - 2.000
- ☐ 2.000 - 10.000
- ☐ > 10.000

Hoe lang bestaat uw bedrijf?

- ☐ < 1 jaar
- ☐ 1 – 3 jaar
- ☐ 3 – 5 jaar
- ☐ 5 – 10 jaar
- ☐ > 10 jaar

Was het bedrijf winstgevend in het afgelopen fiscale jaar?

- ☐ Ja
- ☐ Nee

Bedrijfsinnovatie:

Is 'innovatie' onderdeel van uw strategie, missie en visie?	☐ Ja ☐ Nee
Welk percentage van het huidige omzet is te relateren aan geheel nieuwe of onlangs aangepaste producten, systemen of diensten? (geïntroduceerd in de afgelopen twee jaar)	%
Wat is het aantal geheel nieuwe of aangepaste producten, systemen of diensten, die in de afgelopen twee jaar geproduceerd of aangeboden werden door uw bedrijf?	
Welk percentage stammen hiervan van geplande innovatieactiviteiten af?	%
Wat is het aantal geheel nieuwe of aangepaste technologieën*, processen of werkwijzen, die in de afgelopen twee jaar binnen uw bedrijf geïntroduceerd werden?	
Welk percentage stammen hiervan van geplande innovatieactiviteiten af?	%
Wat is de gemiddelde leeftijd van de technologie* in uw bedrijf?	☐ <5 jaar ☐ 5-10 jaar ☐ 10-20 jaar ☐ >20 jaar
Wat is het aantal geheel nieuwe of aangepaste administratieve werkwijzen, die in de afgelopen twee jaar binnen uw bedrijf geïntroduceerd werden?	

*De term "technologie" verwijst naar computers, machines, apparatuur en dergelijke

Appendix H

Interview with a CEO

The Interviewee is managing director of a distributor und importer of computer- and communication-components. The interview was held on first of november, 2012 via telephone call. The version printed here is translated into english from german and filtered for useful information regarding the research at hand. It applies to a slightly different version of the model, in which the innovation focused HRM system was less developed and it included two additional mediators (proactive work behavior and climate).

Me:

Thank you very much for helping me out with this interview. First of all: what is your current position, and how long have you been doing it?

CEO:

I am the managing director and I have been doing this since first of march, 1991, when the company emerged out of a hard- and software company that was founded it 1982. We are a distributor and importer of computer- and communication components. In particular, we import components, assemble them and distribute customized systems, whereby our clients are 60% specialized dealers and IT-specialists and 40% industry- and commercial clients. I am also the managing director of other daughter companies that distribute other products.

Me:

I'd like to concentrate on the main company and not the daughter companies. How many employees does the company have?

CEO:

We have about 40 regular workers, with 10 of them being trainees and about 50 temporary workers.

Me:

What is the company's goal for the coming years?

CEO:

This depends very much on how the market will develop. The minimum goal is of course to keep being profitable and, if possible, to keep growing as a company.

Me:

Do you think that the way in which people are managed is important for innovative outcomes?

CEO:

Yes, very important. However, we have no activities that aim at resulting in innovation, because we felt that it didn't pay off to do so. So all improvements have to be evoked by employees in every day work. We experience, however, that it is very difficult to motivate people to pay attention to potential problems or short-comings and especially to make them voice their perceptions. The three main problems are that employees think its too much work, that they don't want to squeal or calumniate colleagues because they fear negative consequences for one single employee, and that they think that nothing will change anyway.

Me:

For Recruitment and Selection, what do you recommend to find the right people?

CEO:

Because we are a small company, we have no real system. We look of course at the certificates and degree a potential employee has, make a logic-test and investigate specialized knowledge and expertise a person states to have. This happens in a very practical way, by showing the person one of our products, a mainboard for instance, and he has to tell apart the different components and show what he or she knows. This part depends very much on the department. In marketing for instance, a candidate has to make a short marketing concept for one of our products.

Me:

Can you say something about the things I included in my model?

CEO:

Motivation and willingness to learn as well as flexibility are things that are judged subjectively. For this reason it makes very much sense to have a second person from the company present at job interviews, because he might perceive those subjective things in a wholly different manner. Many sources of recruitment are not so important for us, but we still have a very diverse workforce. This is for us not necessarily an advantage for innovation but it surely doesn't hurt either.

Me:

What can you recommend to effectively manage performance? How do you include qualitative things, such as innovative behavior and creativity?

CEO:

This is very difficult and mostly dependent on the department. In production it is quite simple since you can measure how fast one is in assembling a system. However, there are also the 'problem solvers', who handle the more complicated systems. And since nearly all systems are customized, it is not always easy to compare two people, since they might have had totally different orders. Distribution is also relatively simple, since successful sales can be counted. But again, it might be that two employees have different conditions to work with. Assessment is thus always relative to some extent.

Qualitative things are in any case recognized, but in a subjective manner. I sit with the department's line managers and talk about the employees in his team. We experienced, by quantizing qualitative things, we work against them. For instance, we want our employees to spend much time calling clients and talking to them on the phone. But, if we start measuring telephone times, it might be that employees start calling clients for no reason, and talk to them about their vacation, etc. This would thus make things worse.

Me:

What can you tell me about compensation practices? How can you induce innovation with these practices?

CEO:

Especially in distribution we work with provision oriented compensation. Our top sellers have two thirds variable income and we experience it as very helpful. In addition, individual bonuses are given for innovative ideas, but it is always difficult to put a number on an idea. There is an additional bonus system that counts for the whole workforce. At the beginning of each month we formulate goals. If those goals can be achieved a bonus for the whole workforce will be paid. With regard to innovation, it is our policy to share the profit of an idea with the one who has the idea. This is all we can do with compensation to induce innovation.

Me:

How effective are trainings? Would you recommend doing trainings in technical things as well as in things such as communication?

CEO:

Training in technical things makes very much sense and we do it quite often, because it is important to keep my employees 'up to date'. In areas such as communication it is very difficult to reach people. General things, like what information must an email contain, better use the answer function in emails than writing a new mail, etc are frequently communicated and employees are reminded of those things via mail. Real formal

trainings in communication are experienced to not make much sense, since people are very hard to reach on that level. If employees are not interested (which they are mostly not) it doesn't make sense to provide that kind of training or to make it even mandatory. They are however allowed to participate such training at any time.

Me:

Do you provide your employees with internal career opportunities and what are your experiences with that?

CEO:

Yes, and I would love to give that opportunity to everyone, but there are but so many positions to be filled and there are more people who want a promotion than people who can have one. However, every line manager in my company was previously a regular employee. My experiences are very good, it is mostly accepted, also when a former part of a team becomes suddenly the head of the team. Mostly the people I choose are highly respected anyway and also others think he deserves to be in that position. I made very good experiences with offering internal career opportunities.

Me:

Lastly, the participation of employees: How do you make sure employees have the opportunity to participate and that they use these opportunities.

CEO:

There are different possibilities. All employees are encouraged to report problems and short comings. Client reclamations are mandatory to report, whereby internal critique is more on a voluntary base. There are forms for every kind of critique that can even be handed in anonymously for internal things. We also provide trainings for handling client reclamations. Besides the forms that can be handed in there are regular meetings on different levels in which time is reserved for conflict and problem management. However, we experience a problem with motivation here. Often those meetings are skipped, because line managers feel they have too much other work to do.

Regarding complaints, it is important to make sure that complaints never have negative consequences for a single employee. This is sometimes a real challenge, but we force ourselves to stick to that rule in order to take care of employees' fear of calumniating a colleague or to get into trouble themselves. We don't want accusations, we want solutions.

Information sharing is another important part where we have much internal training regarding newest developments in the market and especially new products in our company.

Me:

Regarding the presented model, do you think the mediators are reasonable?

CEO:

I am afraid that I cannot really help you with this. From my point of view the three employee outcomes do make sense, but I would add something that includes employees' openness towards change if it isn't part of one of the variables yet. Climate as a mediator does not really make sense to me since the practices we discussed are not really responsible for a climate in the end, are they? I would rather say that the line managers and employees themselves are responsible for the climate. I have no ideas about other additional possible mediators.

Me:

How would you measure creativity, innovative or proactive behavior?

CEO:

I am not a big fan of measuring and quantizing qualitative things. Maybe the number of improvements that were made due to one employee or even only the number of critiques one employee hands in. But then again, this might result in more critiques with less content. So, in fact, I wouldn't measure it at all.

Me:

How would you measure organizational innovation?

CEO:

We only assess our progress in terms of whether we achieved our monthly goal. You could maybe measure it in number of improvements? I don't really know.

Me:

How could I convince you to take part in a research like this one? How do I need to approach companies to make them participate?

CEO:

Not at all. I get weekly inquiries to participate in studies and I decline them all. The number of studies has become so big in the last few years and no research that was presented to me included something that I couldn't find out myself or that I couldn't have read in management literature. So I am sorry, but I would not participate in any study at all.

Me:

Thank you very much for your time and the rich information you gave me.