MASTER THESIS

THE CONTRIBUTION OF HRM PRACTICES TO FIRM INNOVATIVENESS:

A STRUCTURED LITERATURE REVIEW

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Summary

In order to keep up with increasing competition, companies have to express innovative capability. Since people are among a company's valuable resources, HRM can make a serious contribution in achieving innovativeness. This research addresses the effect of HRM practices on firm innovativeness. By means of a structured literature review we try to find and explore all effects that HRM practices have on different forms of innovativeness and categorize these effects on the basis of the research of Laursen and Foss (2003). A total of 47 publications have been thoroughly analyzed on different HRM practices and their effects on product, process and firm innovativeness.

From all HRM practices studied, training and performance-related pay contribute the most on firm innovativeness. Besides the HRM practices described by Laursen and Foss (2003), we found two other practices influencing firm innovativeness. Recruitment has a positive effect on firm innovativeness and can therefore be considered as an important practice in a HRM policy fostering innovativeness. We also found type of contract as an important factor in the HRM and firm innovativeness link; consulting/contracting firms indicated a positive influence on firm innovativeness, short-term hires showed a negative impact on firm innovativeness.

This study really contributes to science by providing an overview of researches in the field of HRM practices and innovativeness. Besides, the findings give direction for future research in terms of which HRM practices should get the most attention.

For managers and other professionals responsible for HRM policy this study provides an advise on which HRM practices should be adopted when considering to achieve firm innovativeness through the use of HRM.

More research has to be done to elaborate on the effects of HRM practices on firm innovativeness, especially when it comes to the bundling of HRM practices. Besides, the growing popularity of external flexibility asks for deeper analysis on the effect this HRM practice has on firm innovativeness.

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1. Introduction

In today's globalizing world, companies tend to have more competitors than before. In order to stay ahead (or at least keep up) with this intensified competition and the rapidly changing environment, companies have to possess innovative capability. In fact, employees are the ones who can deliver this innovative capability, whether it is related to processes, administrative procedures or products. Therefore human resources can be of importance in predicting innovative performance; making human resource management (HRM) crucial in exerting firm innovativeness (Shipton et al., 2006).

Up to now, many research has been done on the effects of several HRM concepts on organizational performance (Arthur, 1994; Delaney & Huselid, 1996; Wright et al., 2001). Also the effect of innovativeness on organizational performance has often been researched (Damanpour, 1991; Han et al., 1998; Hull et al., 2004). The effect of HRM on firm innovativeness has been getting more attention since the 2000s, making the topic relatively new (Becker & Matthews, 2008).

According to existing literature in the field of innovativeness, numerous constructs can be identified. Especially innovation and innovativeness seem to be used interchangeably. In their literature review on this terminology, Garcia and Calantone (2002) define innovation as '*an iterative process initiated by the perception of a new market and/or new service opportunity for a technology-based invention which leads to development, production, and marketing tasks striving for the commercial success of the invention*' (page 112). Innovativeness often refers to the newness of a certain innovation (Garcia & Calantone, 2002). However, firm- or organizational innovativeness is mostly described as the ability to come up with and implement new ideas that contribute to the value of the firm (Garcia & Calantone, 2002). Following this line of argument, it can be stated that innovations lead to firm innovativeness.

Because of the fact that different constructs have been used interchangeably within existing research, also other constructs than firm innovativeness have been researched in this study. Besides firm innovativeness, we distinguish the following two forms of innovativeness.

Product (or technological) innovativeness or -innovation refers to the improvement of existing products and the creation and implementation of new products; also known as new product development (Lee et al., 2010).

Process (or administrative) innovativeness or -innovation refers to the enhancement or introduction of new processes that have to contribute to the overall performance (De Saá-Perez & Díaz-Díaz, 2010).

Some researches distinguish between incremental and radical innovativeness or -innovation, whereby incremental innovativeness refers to minor improvements and adjustments on existing

products and processes and radical innovativeness implies major changes that represent revolutionary changes in technology (Chang et al., 2011). In this research we do not make distinction between incremental and radical innovativeness.

So far, we do know that HRM contributes to firm innovativeness. We will continue with describing some researches that address this contribution.

For example, Camelo-Ordaz et al. (2011) found evidence for an indirect, positive effect of HRM practices through knowledge sharing on innovation performance. Knowledge has been indicated as a mediating variable by other researches such as Donate and Quadamillas (2011) and Chiang and Shih (2011), who put emphasis on a knowledge-oriented HR configuration that consists of a '*cooperative work design, a way of recording work related experiences, appraisal and compensation systems that emphasize collective achievements, and human-capital activities concerning the training and staffing of new product development personnel'*. (p. 3206, Chiang & Shih, 2011).

Other researches addressed a direct link. Santangelo and Pini (2011) found a positive effect of HRM practices on exploitative innovation at the shopfloor level. They focused on new HRM practices, which refers to '*team-based work, continuous learning, decentralization of decision rights and incentives, systems for mobilizing employees' proposals for improvements, quality circles and emphasis on knowledge dissemination'* (p. 611, Santangelo & Pini, 2011).

In their research on the impact of HRM practices and their complementarities on innovative capability, Laursen and Foss (2003) identified nine HRM practices. Two of these practices ('*integration of functions'* and *'firm-internal training*') exposed an individual, significant effect on innovative capability. However, when applied jointly, the practices appeared to have a strong influence on the innovative capability of the firm.

1.1 Framework of Laursen and Foss (2003)

As described above, numerous studies found an effect of different HRM practices on innovativeness. However, this effect remains a point of discussion because of the fact that different constructs on innovativeness and innovation have been used in existing literature. What is missing in the literature is a comprehensive overview that provides synthesis of these current research fields. This research aims to fill this gap, thereby contributing to the literature examining the effect that HRM practices have on firm innovativeness.

In their study, Laursen and Foss (2003) explore the positive effect of complementarities between HRM practices and innovation performance, using data from a survey among 1,900 firms in Denmark. They identify two systems consisting of nine HRM practices that affect innovation performance positively. The first system involves seven equal significant HRM practices; the second system consists of two HRM practices. The research by Laursen and Foss (2003) was one of the first in the research

field ‘HRM and innovativeness’ that found an influence of HRM practices to firm innovativeness. Therefore we try to categorize HRM practices named in other researches according to the HRM practices named by Laursen and Foss (2003). All practices have been described in Table 1.

Table 1. *HRM practices by Laursen and Foss (2003)*

Practice	Description
Interdisciplinary workgroups	Employees with different professional backgrounds work together in teams
Quality circles	Small teams of employees define and solve quality or performance related problems
Systems for collection of employee proposals	Formalized way of gathering employee suggestions about both products and processes
Planned job rotation	Employees are moved between jobs in a scheduled way
Delegation of responsibility	Sharing or transfer of authority to employees
Integration of functions	Amalgamation of two or more functions into one function
Performance-related pay	Employees are (partly) being paid according to their output
Firm-internal training	Employees are being trained by someone who is on the company's payroll
Firm-external training	Employees are being trained by someone who is not on the company's payroll

In the following section we will give a detailed description of these practices.

1.1.1 Interdisciplinary workgroups

Each employee holds certain knowledge. When working together in teams, employees are encouraged to share knowledge with other team members. This knowledge sharing could lead to process innovativeness (at the shop floor level) and product innovativeness (at the R&D level). When employees with different functions together compose a team most contribution can be expected.

1.1.2 Quality circles

Employees are being held responsible for problem solving within their own discipline. This may increase their sense of responsibility, contributing to the innovativeness of the company.

1.1.3 Systems for collecting employee proposals

Employees could have ideas about the tasks they perform or even other issues in the organization. A system could help to reveal those ideas. Probably these ideas could lead to a better performance of certain tasks, supporting the overall innovativeness.

1.1.4 Planned job rotation

When employees rotate between jobs every now and then, the knowledge they have will spread through the organization. Employees will learn from each other and will become better at performing tasks. This may contribute to the innovativeness of the organization.

1.1.5 Delegation of responsibility

When employees at the shop floor level (instead of a management layer) are being held responsible for problem solving so that problem solving is being done by employees with substantial knowledge, these employees may better investigate local knowledge in the organisation, leading to innovativeness.

1.1.6 Integration of functions

When two or more functions integrate, the employee gets more responsibility. Again, the problem solving will be closer near the relevant, substantial knowledge which could possibly contribute to innovativeness.

1.1.7 Performance-related pay

Employees can be rewarded on the basis of the contributions they have in the organization. Innovativeness can be supported when employees are being paid for responsibilities in their work.

1.1.8 Training

Laursen and Foss (2003) distinguished between internal- and external training. However, most researches in our dataset did not make this distinction. Therefore the decision was made to categorize all training initiatives into one HRM practice 'Training'.

Training increases the level of the workforce; employees will become better at doing their jobs. When employees are better at performing their tasks, they may also act beyond their tasks, fostering both process- and product innovativeness.

1.2 Types of innovativeness

As stated before, different types of innovativeness have been described in the literature. In this study the HRM practices that Laursen and Foss (2003) described will be linked to the following types of innovativeness.

1.2.1 Product innovativeness

Numerous researches emphasize on the development of products, using different definitions (product and technological). By improving products or creating new products companies are able to satisfy diverse market demands and differentiate from competitors (Walsworth and Verma, 2007). Lee et al. (2010) indicate that innovation and improvement of (quality of) products is essential for firms to stay competitive. Product innovativeness can therefore be classified as the improvement of existing products and the creation of new products.

1.2.2 Process innovativeness

Companies can also enhance or introduce new processes. This will improve efficiency and effectiveness so that firms can compete with lower-cost competition and gain access to new markets (Walsworth and Verma, 2007). De Saá-Perez and Díaz-Díaz (2010) point out that in order to act innovative, companies have to create the correct context for individuals to feel motivated and committed to generate and share new ideas. Consequently process innovativeness can best be considered as the continuous improvement of all work processes within the company, in order to encourage employees to be innovative. Process innovation could therefore stimulate product innovativeness.

1.2.3 Firm innovativeness

Most researches do not differentiate between product and process innovativeness. They classify firm innovativeness as the ability to come up with and implement new ideas that contribute to the value of the firm (Perdomo-Ortiz et al., 2009; Martínez-Sánchez et al., 2011). Because diverse terms have been used to describe the same issue, all these labels were grouped under the category firm innovativeness, which can be seen as combination of product and process innovativeness.

1.3 Research question and objectives

In order to structure the research process the following research question and associated sub questions are formulated:

In what way do HRM practices contribute to different forms of firm innovativeness?

- How do the HRM practices, as described by Laursen and Foss (2003), relate to these types of firm innovativeness?
- What HRM practices could be added to HRM practices that Laursen and Foss (2003) describe?

1.4 Theoretical contribution

This research will provide an overview of existing literature in the field of HRM and innovativeness. Different constructs for innovativeness have led to a lack of clarity. This structured literature review will help to give guidance and uniformity in the research topic “HRM and firm innovativeness”.

1.5 Practical contribution

Since firm innovativeness is getting more and more important for companies, it will be very useful for those companies to know which intended HRM practices contribute to firm innovativeness. In that

way companies will know on which HRM practice(s) they should focus if they want to improve their innovative capability.

2. Methodology

To come to our final dataset and analysis, the following approach have been used.

Table 2. *Methodology approach*

Step 1	Step 2	Step 3
Key words database search	Selection of articles	Analysis of articles

2.1 Key words database search

In order to locate and effectively judge existing research in the topic of HRM and firm innovativeness, a structured literature review was conducted. To successfully include all existing research, a list of multiple search items was created (Table 2). All combinations of search items resulted in 66 search queries (11*6), which were entered in the ISI Web of Science online database.

Table 3. *Search terms*

variable 1	**variable 2**
HRM	firm innovativeness
HR	organizational innovativeness
Human Resource Information Systems	innovativeness
Human Resource Practices	innovation
Human Resource Politics	firm innovation
Strategic Human Resource Management	organizational innovation
Human Resource Systems	
Personnel Function	
Personnel Management	
Personnel Administration	
Human Resource Technology	

2.2 Selection of articles

Once all search queries were entered and duplicates in the results were removed, remaining results were judged based on titles. After that, we decided to individually scan a sample of abstracts to develop criteria that abstracts had to meet in order to get included in the dataset. We decided that units of analysis had to be companies since we are interested in how companies can foster innovativeness thru HRM practices. Besides, more than one HRM practice had to be involved in the researches so that unilateral researches were omitted. Lastly, researches had to be empirically tested because of the theoretical nature of our research. Both quantitative and qualitative studies were taken into account. Although this criterion limited the number of researches in the dataset, it did not exclude main topics since these are also covered in most empirical publications. Some full texts were

not accessible through our databases and were excluded for that reason. The complete data selection process can be found in Table 4.

Table 4. *Selection process*

Results based on search queries		6041
Duplicates	-	3152
Results after deduplication		2889
Selection based on titles	-	2667
Results based on titles		222
Selection of abstracts based on criteria	-	162
Results based on criteria		60
Full text not accessible	-	12
Results based on availability		48
Laursen & Foss (2003)	-	1
Total number of texts		**47**

The final dataset contained 47 publications. There appeared to be a large diversity in sources; researches were published in 21 different journals. Detailed information on sources can be found in Table 5.

Table 5. *Sources*

Journal	Number of publications
IJHRM	16
IJM	5
IJTM	3
HRM	2
Other	21

The primary statement on the innovativeness of the research topic 'HRM and firm innovativeness' could be supported by the final dataset, since 47% of the researches was published since 2011 and only 9% appeared before 2004. For detailed information on publication years, see Table 6.

Table 6. *Publication years*

Period	Number of publications
1998-2004	4
2005-2007	5
2008-2010	16
2011-2013	22

2.3 Analysis of articles

As mentioned before, all articles will be analyzed on the basis of the framework of Laursen and Foss (2003). There was not a clearly defined approach to come to this categorization; researches were categorized on the basis of iterations. Because of the fact that all practices have clearly been defined by Laursen and Foss (2003), there was no uncertainty on categorizing practices that were named in the dataset.

3. Results

The final dataset for the review and analysis comprises 47 publications. All researches have been ordered on the basis of publication year in Table 7.

Table 7. *Dataset*

Number	Author(s)	Title	Journal
1	Ceylan (2013)	Commitment-based HR practices, different types of innovation activities and firm innovation performance	The International Journal of Human Resource Management
2	Zhou, Liu & Hong (2012)	When Western HRM constructs meet Chinese contexts: validating the pluralistic structures of human resource management systems in China	The International Journal of Human Resource Management
3	Petroni, Venturini & Verbano (2012)	Open innovation and new issues in R&D organization and personnel management	The International Journal of Human Resource Management
4	Oke, Walumbwa & Myers (2012)	Innovation strategy, human resource policy, and firms' revenue growth: the roles of environmental uncertainty and innovation performance	Decision Sciences
5	Jiang, Wang & Zhao (2012)	Does HRM facilitate employee creativity and organizational innovation? A study of Chinese firms	The International Journal of Human Resource Management
6	Griese, Pick & Kleinaltenkamp (2012)	Antecedents of knowledge generation competence and its impact on innovativeness	Journal of Business & Industrial Marketing
7	Bornay-Barrachina, De la Rosa-Navarro, López-Cabrales & Valle-Cabrera (2012)	Employment relationships and firm innovation: the double role of human capital	British Journal of Management
8	Yang & Konrad (2011)	Diversity and organizational innovation: the role of employee involvement	Journal of Organizational Behavior
9	Wei, Liu & Herndon (2011)	SHRM and product innovation: testing the moderating effects of organizational culture and structure in Chinese firms	The International Journal of Human Resource Management
10	Santangelo & Pini (2011)	New HRM practices and exploitative innovation: a shopfloor level analysis	Industry and Innovation
11	Sánchez Quirós & García-Tenorio Ronda (2011)	The relationship among innovation strategy, human resources practices and commitment generation in the biotechnology sector	African Journal of Business Management
12	Martínez-Sánchez, Vela-Jiménez, Pérez-Pérez & de-Luis-Carnicer (2011)	The dynamics of labour flexibility: relationships between employment type and innovativeness	Journal of Management Studies
13	Lin (2011)	Electronic human resource management and organizational innovation: the roles of information technology and virtual organizational structure	The International Journal of Human Resource Management

14	Kuo (2011)	How to improve organizational performance through learning and knowledge?	International Journal of Manpower
15	Jørgensen, Becker & Matthews (2011)	The HRM practices of innovative knowledge-intensive firms	International Journal of Technology Management
16	Donate & Guadamillas (2011)	Organizational factors to support knowledge management and innovation	Journal of Knowledge Management
17	Chiang & Shih (2011)	Knowledge-oriented human resource configurations, the new product development learning process, and perceived new product performance	The International Journal of Human Resource Management
18	Chang, Gong & Shum (2011)	Promoting innovation in hospitality companies through human resource management practices	International Journal of Hospitality Management
19	Camelo-Ordaz, García-Cruz, Sousa-Ginel & Valle-Cabrera (2011)	The influence of human resource management on knowledge sharing and innovation in Spain: the mediating role of affective commitment	The International Journal of Human Resource Management
20	Cabello-Medina, López-Cabrales & Valle-Cabrera (2011)	Leveraging the innovative performance of human capital through HRM and social capital in Spanish firms	The International Journal of Human Resource Management
21	Bonet, Armengot & Martín (2011)	Entrepreneurial success and human resources	International Journal of Manpower
22	Al-Laham, Tzabbar & Amburgey (2011)	The dynamics of knowledge stocks and knowledge flows: innovation consequences of recruitment and collaboration in biotech	Industrial and Corporate Change
23	Matías-Reche, García-Morales & Martín-Tapia (2010)	Staffing services quality and innovativeness in pharmaceutical companies	International Journal of Selection and Assessment
24	Lee, Ooi, Tan & Chong (2010)	A structural analysis of the relationship between TQM practices and product innovation	Asian Journal of Tecnology Innovation
25	De Winne & Sels (2010)	Interrelationships between human capital, HRM and innovation in Belgian start-ups aiming at an innovation strategy	The International Journal of Human Resource Management
26	De Saá-Pérez & Díaz-Díaz (2010)	Human resource management and innovation in the Canary Islands: an ultra-peripheral region of the European Union	The International Journal of Human Resource Management
27	Cooke & Saini (2010)	(How) does the HR strategy support an innovation oriented business strategy? An investigation of institutional context and organizational practices in Indian firms	Human Resource Management
28	Chen & Wang (2010)	High performance work systems and organizational innovative capabilities in the PRC: the mediating role of intellectual capital	Proceedings of PICMET 2010
29	Perdomo-Ortiz, González-Benito & Galende (2009)	An analysis of the relationship between total quality management-based human resource management practices and innovation	The International Journal of Human Resource Management

30	Martínez-Sánchez, Vela-Jiménez, Pérez-Pérez & de-Luis-Carnicer (2009)	Innovation and labour flexibility - a Spanish study of differences across industries and type of innovation	International Journal of Manpower
31	Lopez-Cabrales, Pérez-Luño & Valle Cabrera (2009)	Knowledge as a mediator between HRM practices and innovative capability	Human Resource Management
32	Chen & Huang (2009)	Strategic human resource practices and innovation performance - the mediating role of knowledge management capacity	Journal of Business Research
33	Zhong, Fang, Li & Sun (2008)	Human resource slack and technological innovation: evidence from Henan province in China	Proceedings of the IEEE International Conference on Engineering, Services and Knowledge Management 2008
34	Zanko, Badham, Couchman & Schubert (2008)	Innovation and HRM: absences and politics	The International Journal of Human Resource Management
35	Jiménez-Jiménez & Sanz-Valle (2008)	Could HRM support organizational innovation?	The International Journal of Human Resource Management
36	Hyland, Becker, Sloan & Jørgensen (2008)	CI in the work place: does involving the HRM function make any difference?	International Journal of Technology Management
37	Camelo-Ordaz, de la Luz Fernández-Alles & Valle-Cabrera (2008)	Top management team's vision and human resource management practices in innovative Spanish companies	The International Journal of Human Resource Management
38	Beugelsdijk (2008)	Strategic human resource practices and product innovation	Organization Studies
39	Walsworth & Verma (2007)	Globalization, human resource practices and innovation: recent evidence from the Canadian workplace and employee survey	Industrial Relations
40	Liu, Zhu & Tang (2007)	Organizational innovation and human resource practice: a view of strategic human resource bundling	Proceedings of the International Conference on Service Systems and Service Management 2007
41	Li, Zhao & Liu (2006)	The relationship between HRM, technology innovation and performance in China	International Journal of Manpower
42	Cano & Cano (2006)	Human resources management and its impact on innovation performance in companies	International Journal of Technology Management
43	Wang & Zang (2005)	Strategic human resources, innovation and entrepreneurship fit - a cross-regional comparative model	International Journal of Manpower
44	Michie & Sheehan (2003)	Labour market deregulation, 'flexibility' and innovation	Cambridge Journal of Economics
45	Storey, Quintas, Taylor & Fowle (2002)	Flexible employment contracts and their implications for product and process innovation	The International Journal of Human Resource Management
46	Hull, Coombs & Peltu (2000)	Knowledge management practices for innovation: an audit tool for improvement	International Journal of Technology Management
47	Zanko, Couchman, Badham, Schubert & Zainuddin (1998)	The role of human resource management in concurrent engineering approaches to product innovation: Australian and Indonesian experiences	Human Factors and Ergonomics in Manufacturing

In the following section we aim to answer the sub questions as described in the introduction.

3.1 Effects of HRM practices on different types of firm innovativeness

The first sub question addresses the effect of several HRM practices (as described by Laursen and Foss (2003)) on different types of firm innovativeness. First, an overview quickly addresses all effects that have been investigated (Table 8). Unfortunately most researches did not publish values and significance levels. However, in case values and significance levels were present we incorporated those in the table so that strengths of effects could be compared.

Table 8. *Effects of HRM practices on innovativeness*

		Innovativeness		
Practices	**Publication**	Firm	Product	Process
Interdisciplinary workgroups	Jiang et al. (2012)		+**	+**
	De Winne & Sels (2010)	+		
	Perdomo-Ortiz et al. (2009)	0.367***	0.353***	
	Cano & Cano (2006)	~		
Quality circles	Santangelo & Pini (2011)	+		
	Cooke & Saini (2010)	+		
Employee proposals	Santangelo & Pini (2011)	+		
	Cooke & Saini (2010)	+		
Job rotation	Martínez-Sánchez et al. (2011)	0.251***		
	Beugelsdijk (2008)		3.29 n.s.	
	Cano & Cano (2006)	~		
Delegation of responsibility	Santangelo & Pini (2011)	+		
	Cabello-Medina et al. (2011)	+*		
	Cooke & Saini (2010)	+		
Integration of functions	-			
Performance-related pay	Jiang et al. (2012)		+**	+**
	Santangelo & Pini (2011)	+		
	Kuo (2011)	+		
	Jørgensen et al. (2011)	+		
	Cooke & Saini (2010)	+		
	Chen & Huang (2009)		0.29**	0.12 n.s.
	Beugelsdijk (2008)		8.78*	
	Walsworth & Verma (2007)		-0.187***	0.014 n.s.
	Li et al. (2006)		-0.628**	
	Cano & Cano (2006)	+		
	Storey et al. (2002)	+		
Training	Jiang et al. (2012)		+ n.s.	+ n.s.
	Kuo (2011)	+		
	Chang et al. (2011)	+		
	De Winne & Sels (2010)	+		
	Cooke & Saini (2010)	+		
	Perdomo-Ortiz et al. (2009)	0.328***	0.329***	
	Chen & Huang (2009)		0.01 n.s.	0.09 n.s.
	Beugelsdijk (2008)		5.28**	
	Walsworth & Verma (2007)		0.177***	0.067 n.s.
	Li et al. (2006)		0.464*	
	Hull et al. (2000)	+		

°	p<0.1	¹	Indirect relationship
*	p<0.05	+	positive
**	p<0.01	-	negative
***	p<0.001	~	no causation
n.s.	not significant		

Each effect will now be discussed individually.

3.1.1 Interdisciplinary workgroups

In four researches an effect of interdisciplinary workgroups on innovativeness has been investigated.

Table 9. *Interdisciplinary workgroups and innovativeness*

	Innovativeness		
Article	**Firm**	**Product**	**Process**
Jiang et al. (2012)[1]		+**	+**
De Winne & Sels (2010)	+		
Perdomo-Ortiz et al. (2009)	0.367***	0.353***	
Cano & Cano (2006)	~		

°	p<0.1	[1]	Indirect relationship
*	p<0.05	+	positive
**	p<0.01	-	negative
***	p<0.001	~	no causation
n.s.	not significant		

Based on our dataset, the HRM practice *interdisciplinary workgroups* has an effect on innovativeness. Two researches found a direct positive effect on innovativeness, two found a positive effect on product innovativeness (one direct and one indirect) and one research found a direct positive effect on process innovativeness.

Perdomo-Ortiz et al. (2009) hypothesized that "*human resource management focused on total quality management has direct positive effects on business performance in innovation*" (p. 1197). Results based on a survey among 106 firms in Spain show that working in teams has a positive direct effect on both firm innovativeness and product innovativeness. For firm innovativeness this effect is also found by De Winne & Sels (2010), who hypothesized that the use of a broad range of HRM practices has a positive effect on innovative output. In their study among 294 Belgium start-ups they found significant evidence for confirming this hypothesis and mention team work in this context. In their study on human resource management and its impact on innovation performance, Cano and Cano (2006) conducted a survey among 367 Spanish industrial companies that are known for their innovative activity. They assumed a positive effect on innovation performance if companies organize their R&D in teams. However, they did not find significant evidence to support this statement. Lastly, Jiang et al. (2012) explored that working in teams enhances the level of employee creativity, which leads to innovation. Based on their data on 106 Chinese firms, they found significant evidence for this indirect effect for both administrative (process) and technological (product) innovation.

Conclusion

Based on our results we can see that the use of interdisciplinary workgroups contributes to firm- and product innovativeness. Therefore, for companies willing to be (more) innovative it would be useful to incorporate this kind of teamwork in their work processes.

3.1.2 Quality circles

In three researches a relationship between quality circles and firm innovativeness has been investigated (see Table 10).

Table 10. *Quality circles and firm innovativeness*

Article	Firm innovativeness
Santangelo & Pini (2010)	+
Cooke & Saini (2010)	+

Both researches reported a positive effect of the HRM practice *Quality circles* on firm innovativeness. No other construct for innovativeness have been addressed.

In their study based on a questionnaire among 166 Italian firms, Santangelo and Pini (2011) found evidence for the statement that the introduction of new HRM practices contributes to innovativeness on the lowest level of an organization. The use of quality circles is one of these new HRM practices. The study of Cooke and Saini (2010) explores the HRM practices that have been used to support an innovation oriented strategy, applied by Indian firms. Based on the experiences of middle-managers of 54 firms, Cooke and Saini (2010) conclude that quality circles have been applied to support an innovation oriented strategy.

Conclusion

Since quality circles did not get much attention in our dataset, we would like to say that the application of these quality circles is not of high importance when prospering innovativeness. However, both researches recorded a contribution to firm innovativeness, so the application of this HRM practice would not be harmful either.

3.1.3 Systems for collection of employee proposals

Two researches explored the effect of these systems for collection of proposals on firm innovativeness.

Table 11. *Systems for collection of employee proposals and firm innovativeness*

Article	Firm innovativeness
Santangelo & Pini (2011)	+

Cooke & Saini (2010)	+

These researches reported a positive effect of these systems on firm innovativeness. Surprisingly, exactly the same articles and effects were found for the use of quality circles.

Santangelo and Pini (2011) refer to channels for employee suggestions, whereas Cooke and Saini (2010) speak about suggestion schemes. In our opinion both concepts basically address the same HRM practice named as systems for collection of employee proposals by Laursen and Foss (2003).

Santangelo and Pini (2011) found evidence for the positive effect between the introduction of new HRM practices and firm innovativeness. Channels for employee suggestions is one of those new HRM practices. Cooke and Saini (2010) mention that middle managers of Indian firms indicate that suggestion schemes support an innovation oriented business strategy.

Conclusion

There was not much attention for these systems in our dataset. That is why we would not directly recommend to apply for systems for collecting employee proposals; we will not advise against these systems either since both researches that addressed these systems recorded a positive contribution to firm innovativeness.

3.1.4 Planned job rotation

Three researches investigated the effect of job rotation on innovativeness.

Table 12. *Planned job rotation and innovativeness*

	Innovativeness	
Article	**Firm**	**Product**
Martínez-Sánchez et al. (2011)	0.251***	
Beugelsdijk (2008)		3.29 n.s.
Cano & Cano (2006)	~	

°	p<0.1	¹	Indirect relationship
*	p<0.05	+	positive
**	p<0.01	-	negative
***	p<0.001	~	no causation
n.s.	not significant		

These articles reported rather mixed effects. Two researches indicated a positive effect (from which one the results were not significant) and the other research did not found an effect. These results indicate uncertainty on the effect of planned job rotation on innovativeness.

In their study on labour flexibility and innovativeness, Martínez-Sánchez et al. (2011) hypothesized that the more functional flexible a company is, the more the company is able to exert innovativeness.

Planned job rotation is an important aspect of functional flexibility. The results, based on a survey among 123 Spanish firms in the automotive industry, show a significant effect of functional flexibility on firm innovativeness, indicating an important role for job rotation. Cano and Cano (2006) hypothesized that rotating R&D workers contributes to innovation performance. However, results of the 367 Spanish firms known for their innovative behaviour surveyed did not provide evidence for this statement. In his study on strategic human resource practices and product innovation, Beugelsdijk (2008) expects a positive relation between task rotation and product innovations. However, his results based on surveying 988 Dutch firms are not significant even though a positive effect was reported.

Conclusion

Because of the rather mixed results and therefore uncertainty about the contribution of planned job rotation on innovativeness, we would like to conclude that companies better focus on other HRM practices than planned job rotation.

3.1.5 Delegation of responsibility

Three researches investigated the relation between delegation of responsibility and firm innovativeness.

Table 13. *Delegation of responsibility and firm innovativeness*

Article	Firm innovativeness
Santangelo & Pini (2011)	+
Cabello-Medina et al. (2011)[1]	+*
Cooke & Saini (2010)	+

°	p<0.1	[1]	Indirect relationship
*	p<0.05	+	Positive
**	p<0.01	-	Negative
***	p<0.001	~	no causation
n.s.	not significant		

All articles showed a positive effect, from which one of them was indirect.

By surveying 85 Spanish firms, Cabello-Medina et al. (2011) researched several HRM practices and their indirect effects on innovative performance. They found a significant indirect effect of empowerment to innovative performance, which in turn contributes to firm performance, through unique human capital and a significant indirect effect through social capital and unique human capital. The earlier mentioned researches of Santangelo and Pini (2011) and Cooke and Saini (2011)

assigned delegation of responsibility to the new HRM practices that contribute to firm innovativeness.

Conclusion

According to these results, delegation of responsibility is of medium importance. Companies could intend to delegate responsibility, but should not give first priority to this HRM practice.

3.1.6 Integration of functions

Surprisingly, no research identified an effect of integration of functions on innovativeness.

3.1.7 Performance-related pay

Eleven researches considered an effect of performance-related pay on innovativeness.

Table 14. *Performance-related pay and innovativeness*

	Innovativeness		
Article	**Firm**	**Product**	**Process**
Jiang et al. (2012)[1]		+**	+**
Santangelo & Pini (2011)	+		
Kuo (2011)	+		
Jørgensen et al. (2011)	+		
Cooke & Saini (2010)	+		
Chen & Huang (2009)		0.29**	0.12 n.s.
Beugelsdijk (2008)		8.78*	
Walsworth & Verma (2007)		-0.187***	0.014 n.s.
Li et al. (2006)		-0.628**	
Cano & Cano (2006)	+		
Hull et al. (2000)	+		

°	p<0.1	[1]	Indirect relationship
*	p<0.05	+	positive
**	p<0.01	-	negative
***	p<0.001	~	no causation
n.s.	not significant		

Six researches explored the effect of performance-related pay on firm innovativeness; they all found a positive effect. For product innovativeness the effect is not as clear since three articles found a positive effect and two others found a negative effect. For process innovativeness the effect seems to be positive, but we have to mention the little effects and the lack of significance in two out of three articles.

According to the research of Kuo (2011), who surveyed 208 technological firms in Taiwan, HRM positively influences organizational innovation and performance-related pay is part of an organizations' human resource policy. This is in line with the research of Cooke and Saini (2010), who found significant evidence for the positive effect of HRM on innovation, with a substantial role for performance-related pay in the HR policy. Chen and Huang (2009) hypothesized that strategic human resource practices have a positive effect on innovation performance. By means of a questionnaire among 146 Chinese firms they found significant evidence for this statement; they describe performance-related pay as one of these practices. Santangelo and Pini (2011) classified performance-related pay as one of the new HRM practices that significantly contribute to exploitative innovation (representing the ability and willingness to be innovative). Also Cano and Cano (2006) researched the influence new HRM practices have on innovation performance. However, they hypothesized *'Financial reward based on the contribution of individual workers has a positive effect on innovation performance' (p. 15, Cano & Cano, 2006)* individually and accepted this statement based on their findings of 367 Spanish industrial firms. In their study on HRM practices of innovative knowledge-intensive firms, Jørgensen et al. (2011) expected that companies they studied would make use of performance-related pay, but surprisingly there were only a few employees being (partly) paid on the basis of their contribution. In the case study Jørgensen et al. (2011) conducted among four knowledge intensive firms three out of four firms considered the identification and usage of mechanisms to reward workers as important for boosting innovation. One company solely uses performance-related pay R&D workers; for the other two firms it is not exactly clear which employees receive (part of) their salary based on performance.

Conclusion

Many researches addressed the influence that performance-related pay has on innovativeness, and they (almost) all found a positive contribution. Therefore it can be said that companies should intent to incorporate performance-related pay in their HRM policy when thriving for innovativeness.

3.1.8 Training

Laursen and Foss (2003) distinguished between internal- and external training. However, most researches in our dataset did not make this distinction. Therefore the decision was made to categorize all training initiatives into one HRM practice 'Training'. Eleven researches explored an effect of training on innovativeness.

Table 15. *Training and innovativeness*

	Innovativeness		
Article	**Firm**	**Product**	**Process**
Jiang et al. (2012)[1]		+ n.s.	+ n.s.
Kuo (2011)	+		
Chang et al. (2011)	+		
De Winne & Sels (2010)	+		
Cooke & Saini (2010)	+		
Perdomo-Ortiz (2009)	0.328***	0.329***	
Chen & Huang (2009)		0.01 n.s.	0.09 n.s.
Beugelsdijk (2008)		5.28**	
Walsworth & Verma (2007)		0.177***	0.067 n.s.
Cano & Cano (2006)		0.464*	
Hull et al. (2000)	+		

°	p<0.1	[1]	Indirect relationship
*	p<0.05	+	positive
**	p<0.01	-	negative
***	p<0.001	~	no causation
n.s.	not significant		

Most researches focussed on an effect on firm innovativeness; seven found a direct positive effect. For both product and the effect of training seems to be positive, with four out of six researches finding significant results (Perdomo-Ortiz et al., 2009; Beugelsdijk, 2008; Walsworth & Verma, 2007; Li et al., 2006). Two other researches (Jiang et al., 2012; Chen & Huang, 2009) explored an effect on both product and process innovativeness but did not come up with significant results. Walsworth and Verma (2007) also discovered an effect for product and process innovativeness, but only found significant evidence for product innovativeness.

In their study on innovation in hospitality companies Chang et al. (2011) hypothesized that training of customer contact employees would be beneficial to both radical and incremental innovations. Based on a survey among 196 hotels and restaurants in China both statements were accepted. Since Chang et al. (2011) explored both product and process innovations but did not make a distinction between these constructs, we categorize the effects they found as positive for firm innovativeness. Hull et al. (2000) indicate the importance of knowledge management practices for innovation. Based on a questionnaire and case studies on 5 companies they developed an audit tool, which can be used by companies willing to be innovative through the use of knowledge management practices. Training is of the practices described by Hull et al. (2000). In their empirical research Perdomo-Ortiz et al. (2009)

found significant evidence for a positive effect of training on firm innovativeness. Different forms of training (product-specific and skills-specific) are being distinguished, but unfortunately Perdomo-Ortiz et al. (2009) do not measure these different forms individually. Other, earlier discussed researchers also found a direct effect of training on firm innovativeness (Kuo, 2011; De Winne & Sels, 2010; Cooke & Saini, 2010).

As said before, a total of six researches addressed the effect of training on product innovativeness. Li et al. (2006) studied the relationship between HRM and technological innovation. 194 Chinese high-tech firms were being surveyed, because that sector is known for its innovative character. Results show that employee training has a significant positive impact on technological innovativeness. Other researchers agree with this statement, supported with empirical evidence with high significance levels (Perdomo-Ortiz et al., 2009; Beugelsdijk, 2008; Walsworth & Verma, (2007).

Unfortunately no significant effect on process innovativeness have been found, although three researches explored this effect (Jiang et al. 2012; Chen & Huang, 2009; Walsworth & Verma, 2007).

Conclusion

Training received much attention in our dataset. All researches that addressed training found a positive contribution and therefore companies have to prioritise training in the HRM policy.

3.2 Other HRM practices

In the dataset we found some HRM practices with an effect on innovativeness that were not described by Laursen and Foss (2009). In the following paragraphs we will describe two HRM practices that were found in several researches.

3.2.1 Recruitment

Each company is willing to attract the best in class personnel, or the most suitable people. Therefore, it is of interest to see how this personnel can be recruited and retained.

According to Matías-Reche et al. (2010) the quality of the staffing services plays a role in the innovativeness a company possesses. Results based on a questionnaire completed by 164 pharmaceutical companies showed a significant effect on innovativeness. These findings of are in line with the research conducted by Kuo (2011), who found a direct effect from human resource management on organizational innovation. Kuo (2011) based his research on a questionnaire filled out by 218 employees of electronic industrial firms in Taiwan. Respondents valued the presence of different HRM constructs. Out of five constructs investigated (personnel staffing, performance appraisal, reward and compensation, training and development and employee participation)

personnel staffing represented the highest value, indicating the importance of personnel staffing in the human resource management of the companies studied.

Other researchers agree on the importance of attracting and maintaining the most suitable employees. For example Cabello-Medina et al. (2011), who explored the influence of HRM practices on innovative performance, mediated by the social capital (valuable knowledge accessible through the network of people) and human capital (valuable knowledge of people) of the firm. This human capital can be obtained by staffing suitable personnel, By means of a questionnaire filled out by managers of 85 Spanish technological firms Cabello-Medina et al. (2011) concluded that (1) selection based on relational skills positively influences social capital, (2) social capital contributes to the uniqueness of human capital, and (3) unique human capital positively influences innovative performance. Also De Winne and Sels (2010) addressed the role of human capital in their research on HRM and innovation. However, their conclusions differ from Cabello-Medina et al. (2011). Based on survey data from managers/owners of Belgian start-ups they (also) state that human capital contributes to innovative output. On top of that they conclude that the use of a broad range of HR practices (recruitment and selection being one of them) positively influences innovative output. This second effect is mediated by human capital (De Winne & Sels, 2010). Also Jiang et al. (2012) address the effect that hiring and selection have on organizational innovation. In their study based on 125 innovation minded companies in China they found employee creativity as a variable that fully mediates this relationship. Lastly, the work of Cook and Saini (2010) investigates different strategic human resource management techniques that have to support a strategy based on innovation. The results based on the qualitative study on 54 managers from Indian companies showed that recruitment based on creativity potential is believed to be beneficial to innovation.

3.2.2 Type of contract

There are numerous ways to arrange the workforce. In the results section on job rotation we have seen that internal flexibility (job rotation) could contribute to firm innovativeness. Some researches in the dataset also address external flexibility as a way to influence innovativeness. For example Storey et al. (2000) studied the implications of flexible labour on process and product innovation. Based on the eight case studies Storey et al. (2000) conducted it can be stated that external flexibility is not really applied to achieve innovation, but more to deal with fluctuations in production or to cut costs for labour. Martínez-Sanchez et al. (2011) also investigate the effect that labour flexibility has on innovativeness, making a distinction between 'short-term hires' and consulting/contracting firms'. Short term hires (when people a hired temporarily for completing a task) influences innovativeness negatively whereas consulting/contracting firms (when external, specialized companies become responsible for certain business processes) has a positive effect on innovativeness.

3.2.3 Conclusion

We can say that recruitment and type of contract are important factors to consider in the HRM policy thriving for innovativeness. However, on the basis of our dataset it is not exactly clear how these HRM practices should be configured. Creative employees tend to be beneficial to innovativeness, so companies should take creativity into account in the recruitment process. In case of external flexibility of the workforce a company should opt for consulting/contracting firms since it can have a positive contribution on innovativeness.

4. Discussion

This study tries to provide structure in the research field of HRM and innovation by reviewing literature that address effects of different HRM practices on firm innovativeness. Lots of intended HRM practices have been raised over time; we would like to know which HRM practices can contribute to firm innovativeness. In order to effectively group all practices found in the literature, we used the categorization by Laursen and Foss (2003). Back in the early 2000s they were one of the first linking HRM practices to innovativeness. The HRM practices they found to influence innovation performance form the basis of this literature review. For innovativeness different constructs have been used interchangeably. Especially innovation(s), innovative capability/performance and innovativeness seem to be used almost randomly. Also differences occur between product/technological innovativeness, process/administrative innovativeness and firm- or organizational innovativeness. We tried to clarify these different constructs in order to categorize all publications. Although different forms of innovativeness do overlap each other, we do think that it is important to cover these different forms of innovativeness. Product innovativeness covers the innovativeness of the product(s) a company produces; process innovativeness has to do with innovations in business methods and procedures and therefore covers the 'way of working'; firm innovativeness can be seen as the sum of the former two, covering all innovativeness of a company.

According to Laursen and Foss (2003), all nine HRM practices have an (almost) equal influence on the innovation performance. However, in our dataset some practices received more attention than others and also effects were not always univocal. Within this section the main findings will be discussed, what will lead to limitations of the study and directions for future research.

Training and performance-related pay received most attention in the dataset, with publications from 2000 until 2012. Based on these observations we can argue that these have been popular HRM

practices in the HRM firm innovativeness link. For training all publications found a positive effect on innovativeness, although some results were not significant. This finding justifies the popularity of training in the HRM practices – firm innovativeness relation. Performance-related pay positively influences innovativeness in all publications that expected that effect, except the study of Li et al. (2006) and Walsworth and Verma (2007), who found a negative effect of performance-related pay on product innovativeness. A possible reason for this contradiction could be the use of different criteria. If employees are being paid for new ideas, these new ideas could lead to innovativeness. If employees are paid on the basis of the amount of products they produce, the employee might not be bothered to come up with new ideas.

Besides the research of Laursen and Foss (2003) no research has taken integration of functions into account. Two possible reasons come to mind; (1) integration of functions is an outdated concept and lost its value over time and is therefore not of interest for both companies and researchers; (2) integration of functions has evolved into a trendy newer HRM practice. Moreover, these issues could be the case with other HRM practices, since the research of Laursen and Foss (2003) was conducted more than ten years ago. However, during the analysis of articles all possible HRM practices were filed and elaborated on. The only way we could have missed new, trendy HRM practice is if the research addressing that HRM practice was not in the dataset.

Effects of other HRM practices (interdisciplinary workgroups, quality circles, systems for employee proposals, planned job rotation, and delegation of responsibility) have been studied by three to five researches. Moreover, all HRM practices addressed a positive effect to innovativeness. This is (partially) in line with the findings of Laursen and Foss (2003) who concluded that 7 HRM practices are (almost) equally significant in their innovative HRM system.

Besides HRM practices that have been described by Laursen and Foss (2003), this literature review found another practice that has a positive effect on firm innovativeness. Recruitment was taken into account by five researches; all of them found a positive effect on innovativeness. It therefore seems legitimate to add recruitment to the intended HRM practices beneficial to firm innovativeness. Of course almost all companies already staff personnel, but to contribute to firm innovativeness companies should focus on creativity during this recruitment process.

Lately, labour markets have been changing from fixed to flexible. More people change jobs over time than before and flexible contracts are catching up on fixed contracts. According to our literature review, we can say that flexible labour could contribute to firm innovativeness, as long as other companies are consulted or contracted for certain processes; short-term contracts have a negative influence on the innovativeness of the firm and are therefore not advised.

4.1 Limitations and future research

Although definitions for the HRM practices and different constructs of innovativeness seem to be quite clear, we made categorizations based on iterations. We could have interpret things differently than the original researchers did. Therefore an article might have come in another category than it should be. Therefore, we have to be careful with generalizing the results. Fortunately, the main goal of this study was not to generalize but to discover all intended HRM practices that could influence firm innovativeness.

Concerning the collection of our sample, we used the *ISI Web of Science database.* For a limited number of articles we did not have full text access. With omitting these researches we might have neglected some interesting insights. However, really interesting topics are often covered in various articles so that these topics had to be remarked through articles that we did have access to.

Although Laursen and Foss (2003) already found the complementarity between the HRM practices, within this research the HRM practices are individually discussed because we wanted to know which intended HRM practice(s) contribute(s) to firm innovativeness. There has been research on HRM systems as well. An interesting direction for future research could be to explore which HRM practices would have to be bundled in a system to foster firm innovativeness.

Also, with flexible labour becoming a serious force, the effect of this labour flexibility on firm innovativeness is interesting to investigate. Within our research we found evidence that consulting/contracting firms could be beneficial to firm innovativeness and short-term hires expose a negative influence to firm innovativeness. However, under different circumstances (industry, country etc.) these effects might differ.

4.1.1 Theoretical implications

This study tried to provide an overview of research in the field of HRM and innovativeness. The main findings suggest that some HRM practices (performance-related pay, training) contribute more to firm innovativeness than others. It would be interesting to discover whether this statement still holds when it is empirically tested in a current setting.

4.1.2 Practical implications

When companies want to achieve (a higher level of) firm innovativeness, they should clearly focus there HRM policy on training and performance-related pay. Of course, other practices will not be omitted (because they are already in practice and they contribute to firm innovativeness) but priority has to be given to training and performance-related pay.

5. Conclusion

The main goal of this research was to find and explore intended HRM practices that positively influence firm innovativeness. To structure this research, we formulated a central research question: '*In which way do HRM practices contribute to firm innovativeness?*'. In this section we answer that question, drawing on findings of our research.

We can conclude that HRM practices, as defined by Laursen and Foss (2003), all contribute to firm innovativeness except integration of functions. Focus is on the HRM practices *training* and *performance-related pay* since these practices have been researched most often. Besides the HRM practices named by Laursen and Foss (2000) personnel staffing (with a focus on creativity) was found to have a positive effect on firm innovativeness.

In summary, the HRM practices training, performance-related pay, personnel staffing, delegation of responsibility, interdisciplinary workgroups, quality circles, planned job rotation and systems for collection of employee proposals have a positive effect on firm innovativeness, with a clear priority to training and performance related pay.

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