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Innovative Work Behavior: To What Extent and How Can HRM Practices Contribute to Higher Levels of Innovation Within SMEs?

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Abstract

In this chapter, the influence of HR practices and more specifically the Ned Herrmanns development tool HBDI on the development of innovative work behavior (IWB) is described. Innovative work behavior today is important for organizations to stay in a competitive position. Also for small and medium-sized enterprises (SMEs), like the case study in this chapter, innovation is essential to keep the SME's competitive advantage. As people are the most important resource in service companies, and they can contribute to innovation via their motivation and skills, the role of human resource management is important. In this book chapter, we analyze the positive influence of various HR practices on IWB. One of these HR practices is the HBDI tool, a specifically designed questionnaire which gives people insight into their problem-solving styles. The outcomes of the study in this chapter show that both HR practices and also the HBDI tool have a positive influence on developing innovative work behavior and on innovation performance.

Keywords: innovative work behavior, innovation performance, HR practices, Hermann Brain Dominance Instrument, small and medium-sized enterprises

1. Introduction

Today, innovation is important for firms to stay alive. Some changes in the business environment, such as the growing importance of services, knowledge, creativity, the developments in information technology, digitalization, globalization, and the surge of intellectual property, have created a new kind of economy [1]. In this new economy, intangible resources such as knowledge, creativity, corporate reputation, and innovation become more important.

Furthermore, one of the challenges that organizations face can be defined as follows: *“the requirement to innovate, not just occasionally but often, quickly and with a solid success rate”* [2]. Evidence is found that innovation leads to operational excellence, market advantage, company image and reputation, and the satisfaction of employees [3]. This means that innovation can help firms by shaping the future of their industries [2].

Small and medium-sized enterprises (SMEs) are an important driving force for economic growth and employment throughout the European Union [4]. For these SMEs, it is important to innovate. Research suggests that small firms which innovate increase their chances of survival and growth [3]. In fact, small firms have some advantages over large firms. Small firms have for instance a higher degree of flexibility [5]. This flexibility can create the right networking connections, seize the opportunities provided by the markets, and adapt quickly to changes in demand [6].

After acknowledging the importance of innovation, particularly for SMEs, the next step is to find out how firms can actually achieve the desired innovation and what is the role of HRM in supporting innovation. There are a couple of studies that investigated innovation in SMEs. To summarize, these studies emphasize the importance of market orientation and learning [7], the importance of training [8], the importance of initiative taking, and the importance of the knowledge of employees [9] for innovation in SMEs. Most of the above-mentioned aspects are included in today's human resource management (HRM) practices. Furthermore, the literature offers some important findings with regard to the direct link between HRM and innovation in SMEs. First, SMEs without in-house resource and development (R&D) activities can still achieve the same innovation success as R&D performers by actively using HRM and team work [10]. Second, it was confirmed that the more SMEs invest in formal HRM systems, the better their innovation performance becomes [8].

This study will focus on the role HRM plays in supporting innovative work behavior (IWB) of employees to finally contribute to the innovation performance of a company. IWB is closely related to the organizational culture, *“the stronger and more developed an organization's culture is towards supporting the innovative behavior of employees, the greater will be the individual's innovative behavior”* [11]. Another study showed that cross-functional teams are a critical organizational design for stimulating creativity and innovation [12]. These studies show that human resource management (HRM) practices related to innovation supportive corporate values (culture) and the use of teams (team design) can positively influence the IWB of employees which is supposed to have an effect on the innovation performance of the company in general [13].

The contribution of this study is that it generates insights with regard to the relationship between HRM and innovation in one SME case organization. This study will test the influence of HR practices on the IWB of employees in an IT-related small and medium-sized enterprise. This will fill the gap with regard to the scarcity of knowledge about the relationship between HRM in small and medium-sized enterprises and IWB and innovation performance and may be helpful for managers who attempt to stimulate innovation within similar companies.

The above-mentioned information leads to the following research question: *“To what extent could HRM practices and the use of the HBDI learning tool stimulate the innovative work behavior of employees and finally the innovation performance of SMEs?”* Next, a literature review and hypotheses will be provided. After a quantitative analysis, finally results and discussion follow.

2. Innovation in SMEs

Innovation is important for SMEs. On one side, innovation in SMEs is considered to be driven by profit margin, product life cycle, business model, short-term gain, quality, funding, a qualified workforce and external sources. On the other side, it is driven by pride, a desire to be successful and to improve working conditions [3]. Innovation among SMEs constitutes the lifeblood of economic growth. The power of this lifeblood depends on the degree to which SMEs consider innovation as their main operational strategy for gaining a competitive advantage over large companies [14]. This means that innovation should gain attention in the management process of SMEs and especially about the role of HRM in stimulating this innovation. After acknowledging the importance of innovation for SMEs, the challenge for firms is to actually achieve the desired innovation by the use of organizational supporting mechanisms [15], such as HRM practices, for example, the HBDI learning tool. Several studies are conducted with attention to this challenge. A first study suggests that active learning as in information sharing, in employee involvement, in team-based management, and in the development of competent personnel, is an important driver for innovative performance in SMEs [7]. This active learning focus is entirely embedded in the domain of HRM. In a second study, the importance of training for innovation within SMEs is emphasized [8]. The authors mention that some scholars argue that in modern and competitive firms, training investments are necessary because of the increasingly strategic role of knowledge and human capital in building and sustaining competitive advantages. However, they also acknowledge that training is not the only important practice that impacts the effectiveness of the innovation process. Other factors, such as rewards, communication, organizational support, and time availability, are also important for SMEs [8]. Also, these factors are all HRM driven.

3. Innovative work behavior

So far, the importance of innovation for firms and in particular for SMEs became explicitly clear in the previous sections. However, some scholars argue that innovation activities, in their turn, increase firms' need to provide employees with the adequate skills to change their attitudes towards innovation and increase their acceptance of innovation [8] and enlarge their capabilities. Furthermore, management of innovation is studied at various levels, at organizational, work group, network, and individual level [16]. The innovativeness of employees is a main source of organizational effectiveness that gained much attention among organizational researchers [17]. Finally, many practitioners and academics state that organizations should maintain, develop, and use the innovative potential of their employees as means to organizational success [18]. In this study, we focus on the role of HRM practices to support individuals in stimulating IWB.

IWB can be defined as follows: *"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"* [16]. Today, the IWB of employees is essential for the success of a company because a company cannot be innovative without their employees [13]. This means that

the IWB of employees is a specific key asset for the success of a firm in a fast-changing business. An important question is how firms can simulate the IWB of employees. The stronger and more developed an organization's culture is towards supporting the innovative behavior of employees, the greater will be the IWB of employees [11]. Another research indicated that flexible job design is a condition for showing IWB [18]. This flexible job design refers to the degree to which the job enables the employee to assist or even replace colleagues in unpredictable situations that arise during the daily work processes. Furthermore, another study's results [16] confirmed that participative leadership, external work contacts, and the innovation output of employees correlate with the IWB of employees. Finally, a research focused on the relationship between HRM and IWB was conducted [13]. The results of this study showed that HRM is able to contribute to the IWB of employees.

First, the importance of employees' IWB for the innovation performance of a firm became clear. Second, the positive influence of HRM on the IWB of employees has been confirmed. This would indicate that IWB mediates the relationship between HR practices and the innovation performance of an SME. This leads to the following hypothesis.

H1: The IWB of employees mediates the influence of HR practices on the innovation performance of SMEs.

4. HRM and innovation in SMEs

HRM can be seen as communication from the employer to the employee about important organizational objectives and employee outcomes [13]. "Human resource advantage" consists of human capital advantage and human process advantage [19]. To gain these advantages, the resources in an organization need to be valuable, unique, and in-imitable. This is also true for the human resources, taking an ever larger part of the total costs of today's organizations due to the knowledge intensive character of many (service) organizations [20]. However, to fully realize the competitive advantage, these resources and capabilities need to be organized in order to be fully exploited. This is where human resource management comes in. HRM here can be perceived as an umbrella term, referring to HR practices, such as recruitment, selection, training, and development, to formal HR policies constraining the development of these HR practices, and to HR philosophies that define the values that are the basis for HR policies and practices [20]. We focus in this chapter on the HR practices of an organization. Innovation can be considered as the output variable of HRM investments [8]. HRM aims at increasing incentives for managers and employees to engage in innovation activities and develop skills needed for effective innovation efforts [10].

There is little agreement about which practices should be combined for effective HRM [21]. A combination of HR practices is called "*a bundle of HR practices*". The authors investigated what the optimal bundle of HR practices is to stimulate innovation. This bundle is slightly different than the usual combination of HR practices. The HR bundle for increasing innovation consists of: performance appraisal, employee involvement, team working, job design, training, and development and provision of information [21]. They further argue that performance

appraisal is the most important practice and is possibly linked to aspects of goal setting and feedback. Furthermore, job design and team working have an impact on innovation within the workforce, stressing the importance of opportunity to participate. This is in line with an earlier study [10], of which the authors argue that recruiting methods to identify the right people for promoting innovation within an organization, training for handling innovation challenges, reward systems, performance management systems, and career development tools help in the formation of innovative ideas of employees.

HRM practices do also exist and are applied in SMEs. However, they are generally not formalized and extremely diverse, which means they resist generalization [22]. Furthermore, the (financial) resources that SMEs can offer to their employees are limited in comparison with large organizations [23]. As the HR strategy of SMEs differs from large organizations' HR strategy, specific research is needed about HRM in SMEs.

SMEs without in-house R&D activities can still achieve a similar innovation success as R&D performers [10]. R&D is a costly and risky activity that needs a minimum amount of resources and time in order to achieve results. However, HRM and cross-functional teams are innovation management tools that can help SMEs to gain similar innovation success [10]. Other studies confirmed that the more SMEs invest in formal HRM systems, the better their innovation performance becomes [8]. So, the literature emphasizes that HR practices lead to a higher degree of IWB of employees. Furthermore, the literature suggests that a specific bundle of HR practices can stimulate innovation within a company. Therefore, it is predicted that:

H2a: A bundle of HR practices has a positive influence on the IWB of employees.

H2b: A bundle of HR practices has a positive influence on the innovation performance of SMEs.

Finally, a positive relationship between the IWB of employees and the innovation performance of a company is expected. Therefore, the following hypothesis is proposed:

H3: The IWB of employees has a positive influence on the innovation performance of SMEs.

5. The HBDI

A specific HR development instrument that has not gained much attention in the HR literature is the HBDI®. The HBDI® is a self-evaluating tool that enables people to understand their own mental preferences. It evaluates and describes the degree of thinking of individuals in each of four brain quadrants [24]. The HBDI® and new ways of using it effectively have been developed over more than twenty years [25]. The four clusters of mental preferences are: upper left, characterized by logical, analytical, mathematical and technical preferences; lower left, characterized by organized, sequential, carefully controlled and managed thinking, planning and acting; lower right, characterized by preference for interpersonal relations, sensitivity to emotions and musical interests; and upper right, characterized by synthesizing, holistic, innovative, more risk-taking preferences [26].

The HBDI is a useful tool for investigating the interaction between humans [27]. Furthermore, awareness of the human mental preferences enables individuals to develop themselves in the area of problem solving, leadership, communication, and collaboration. It is a starting point of innovative thinking and generates new ways of working [24]. The HBDI is not only useful by diagnosing how people learn, but also by showing them how to enhance their learning. Finally, it involves growth and development, especially in creativity, and emphasizes that learning styles are not fixed personality traits but mostly learned patterns of behavior [25].

Since it is proposed that the use of the HBDI will lead to a higher degree of innovative thinking, it can be stated that the HBDI leads to a higher degree of employees' IWB. However, this could also be related to the innovation performance of SMEs. This is why the following hypotheses have been formulated:

H4a: The use of HBDI® as an HR practice has a positive influence on the IWB of employees.

H4b: The use of HBDI® as an HR practice has a positive influence on the innovation performance of SMEs.

Finally, just as the hypotheses concerning the HR practices, the employees' IWB is proposed as a mediator. This leads to the final hypothesis.

H5: The IWB of employees mediates the influence of the HBDI® on the innovation performance of SMEs.

6. Methodology

6.1. Research and design

This research is conducted by using both interviews and a survey. The purpose of the interviews was to generate some more in-depth insights about the company that has been investigated. With the help of the interviews, a survey has been designed. A total of 79 employees participated in the survey. The study has been conducted for the company RoutIT. RoutIT is a Dutch company that offers software solutions to SMEs. The company offers services in the area of Internet, mobile communication, connectivity, and cloud [28]. The company has approximately 1500 partners and 105 employees. It is a fast-growing company, and it is market leader of SMEs in the same sector [29].

Two statistical analyses were used for generating the results: a correlation analysis and a multiple regression analysis. During the analysis, the bundle of HR practices and the HBDI is the independent variables, and the innovation performance of SMEs is the dependent variable. The IWB of the employees is the mediator. Furthermore, department, level of education, age, gender, and function have been added as control variables.

6.2. Measures

6.2.1. Bundle of HR practices

Training, performance appraisal, and staffing are variables that were operationalized by making use of the items of former research [30]. Furthermore, the variable participation mentioned

in their study has been used for testing the employee's involvement. The variable training includes four items which indicate the availability of formal training activities, comprehensive training policies and programs, training for new hires, and training for problem-solving ability. Staffing consists of three items regarding selectivity in hiring, selection for expertise and skills, and selection for future potential. Furthermore, the variable participation consists of three items. The items are as follows: the degree to which firms allow the employees to make decisions, the opportunity for employees to suggest improvements into their work, and the voice of employees. Finally, performance appraisal consists of three items including developmental focus, results-based appraisal, and behavior-based appraisal [30].

The variable team working has been operationalized by using existing research items [12]. This variable consists of five items including problem-solving sessions, team building, quality circles, quality improvement, and leadership training. However, the item quality circles have been deleted since RoutIT does not make use of this. Furthermore, the variable job design is operationalized by using existing items [31]. This variable consists of the dimensions job control and problem demand. Job control and problem demand consist each of three items. This means that the variable job design in total consists of six items.

The research of Holman et al. [31] was the only one that provided clear questions for measuring the variable "job design." Furthermore, it was the only research that involved employees as respondents. The variables of the other researches were measured by answers of managers or top executives. This means that these items have been converted into questions suitable for employees. Furthermore, all variables were measured by a seven-point Likert scale with answers ranging from "strongly disagree" to "strongly agree." This method is more effective at generating responses than directly asking respondents to provide exact figures [12].

6.2.2. HBDI®

The studies with regard to the HBDI® are mainly concerned with the content of the instrument. No valid measurement scale has been found in the literature with regard to employees' outcomes when using the HBDI®. Therefore, the researchers themselves developed a measurement scale. This scale consists of four dimensions and nine items. The first dimension is the awareness of the instrument and consists of two items. The second dimension is related to the purpose in the use of the instrument within RoutIT. The purpose of the HBDI® within RoutIT is to make employees aware of their own thinking style and the thinking styles of others [29]. This dimension also consists of two items. The third dimension concerns the learning aspect of the HBDI® and consists of two items. The final dimension concerns work-related outcomes of employees when using the instrument. Employee work outcomes can be divided into three aspects [32]. These aspects are quality, productivity, and satisfaction. Each of these aspects has been used as an item in this study. To measure this variable, a seven-point Likert scale has been used with a range from totally disagree to totally agree.

6.2.3. IWB

For the measurement scale of the IWB, an existing scale has been used [18]. This scale consists of two dimensions: creativity-oriented work behavior and implementation-oriented work

behavior. Creativity-oriented work behavior consists of ten items and implementation-oriented work behavior of six items. In total, the scale consists of sixteen items. A seven-point Likert scale has been used with a range from totally disagree to totally agree.

6.2.4. *Innovation performance*

For measuring the innovation performance, an existing measurement scale has been used [33]. This measurement scale consists of the dimensions product innovation and process innovation. The items for measuring product and process innovation are based on several criteria that have been conceptualized and used in previous empirical studies of innovation [33]. These criteria consist of the number of innovations, the speed of innovation, the level of innovativeness (novelty or newness of the technological aspect), and being the “first” in the market. Product innovation includes five items, and process innovation includes four items. So the whole measurement scale of innovation performance consists of nine items. A five-point Likert scale with a range from 1 “worst in industry” to 5 “best in industry” has been used.

7. Results

7.1. Descriptive statistics

The sample includes 79 respondents. Of these respondents, 86.1% is male and 13.9% is female. The age of the respondents varies between 19 and 60 with a mean of 35. Most of the respondents are working at the operations department (41.7%). Respectively, the others are working at Partner Support (15.3%), Network Operations Centre (13.9%), Product Management (11.1%), Software (9.7%), and Business Services (8.3%). Furthermore, 19.4% of the respondents have a managerial function, which means that 80.6% do not have a managerial function. Most of the respondents have an MBO diploma (40.3%), a HBO diploma (26.4%) or a WO diploma (16.7%).

7.2. Correlation and regression analysis

Before conducting the regression analysis, a correlation matrix has been generated in order to gain some insights about the relationships between the variables (see **Table 1**). The table shows that there are significant correlations between the two independent variables, between HR practices and IWB, and between HR practices and innovation performance of SMEs. Furthermore, a significant correlation exists between the HBDI® and innovation performance of SMEs. However, there is no significant correlation between the HBDI® and IWB and between the IWB and innovation performance of SMEs. Finally, the only control variable that involves significant correlations is the variable “function.” Therefore, the decision has been made to include only this control variable in the analyses.

Model and control variables	M	SD	1	2	3	4	5	6	7	8	9
1. HR practices	.542	.66									
2. HBDI	.495	.89	.536**								
3. IWB	.541	.67	.416**	.202							
4. Innovativeness	3.91	.62	.325**	.333**	-.044						
5. Gender	.806	.40	.067	-.088	-.011	.181					
6. Age	35.4	10	.088	.116	.211	.177	.202				
7. Department	–	–	.179	.112	.050	.197	.086	.231			
8. Function	1.81	.40	-.127	-.112	-.414**	.133	-.006	-.404**	-.035		
9. Education	.472	.50	-.094	-.021	.022	-.141	.089	.059	-.213	-.116	

Notes: * $p < .05$, ** $p < .01$. This table contains Pearson correlations. Variables 5, 8 and 9 are dummy variables (for variable 5: 1=male, for variable 7: 1=no managerial function and for variable 9: 1= below MBO). Variable 7 contains six categories and because it is a nominal variable, no mean and SD have been provided. Variables, 1,2, and 3 are 7-point scales and variable 4 is a 5-point scale. Variable 6 runs from 19 to 60.

Table 1. Inter-correlations of model and control variables ($n = 79$).

8. Models

During the analysis, two different models have been tested. The first model tests the mediating effect of the IWB on the relationship between the HR practices and the SME’s innovation performance. The second model is the same as the first model but instead of the HR practices, the HBDI® has been used as dependent variable (see **Figure 1**).

Model 1: The first model generated the following output (see also **Figure 2**):

- 1. Relationship HR practices—innovation performance: confirmed
- 2. Relationship IWB—innovation performance: not confirmed
- 3. Relationship HR practices—IWB: confirmed
- 4. Relationship HR practices * IWB-innovation performance: not confirmed

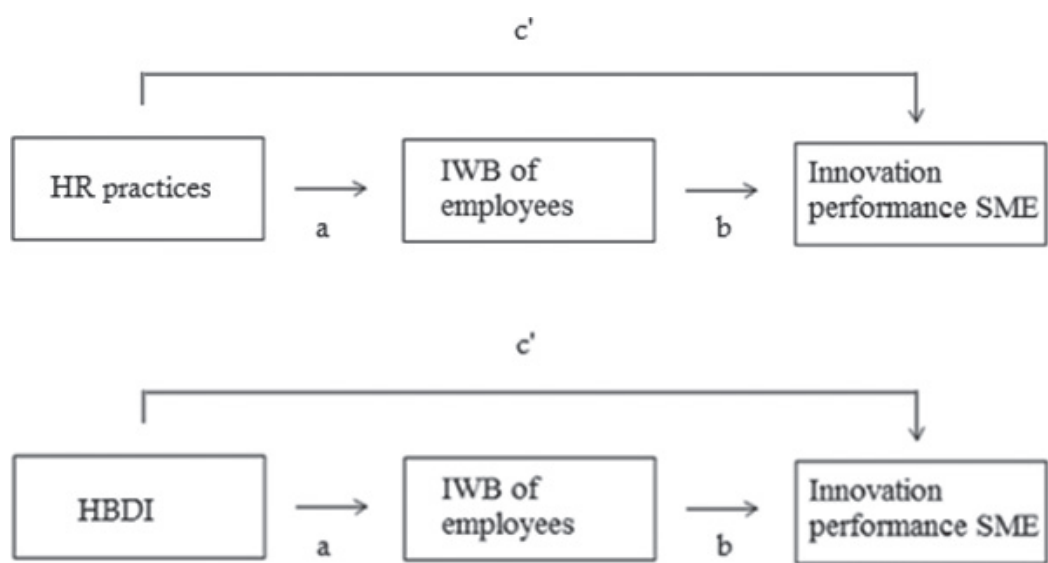


Figure 1. Regression models.

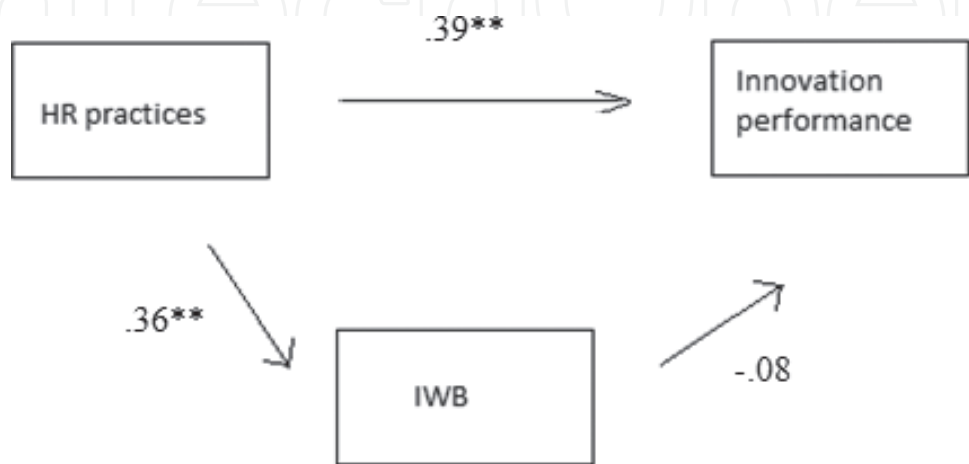


Figure 2. Outcomes regression analysis using process with HR practices as independent variable. Notes: * $p < .05$, ** $p < .01$ confidence interval = 95%, $R = .55$, $p = .00$.

To summarize, the HR practices have a significant effect on the IWB but the IWB in turn does not have a significant effect on the innovation performance. Furthermore, HR practices do have a significant effect on innovation performance. However, there is no mediating effect of the IWB of employees.

To generate some insights about the separate HR practices, two hierarchical regression analyses have been generated. The first one takes all the separate HR practices as independent variables and the IWB as dependent variable. In the second analysis, the innovation performance of SMEs has been taken as a dependent variable. Hierarchical regression has been used to be able to control for the covariate “function.”

When looking at the separate HR variables, only “job design” is significant ($p = .00$) and explains 45.3% of the dependent variable, the IWB of employees. This means that the other HRM practices do not make a significant unique contribution to the prediction of the dependent variable [34]. However, the regression analysis showed that the HR practices combined do have an effect on the IWB. Furthermore, the control variable “function” is significant ($p < .01$).

When looking at the significance levels of separate HR variables, only “team development” is significant ($p \leq .01$) and explains 40.2% of the dependent variable. This means that the other variables do not make a significant unique contribution to the prediction of the dependent variable [34]. However, the regression analysis showed that the HR practices combined do have an effect on the innovation performance of SMEs. Furthermore, the control variable “function” is insignificant ($p = .13$) which means that there is no difference between employees who do and who do not have a managerial function with regard to the relationship between HR practices and the innovation performance of SMEs.

Model 2: The second model generated the following output (**Figure 3**):

1. Relationship HBDI®—innovation performance: confirmed
2. Relationship IWB—innovation performance: not confirmed
3. Relationship HBDI®—IWB: confirmed
4. Relationship HBDI® * IWB-Innovation performance: not confirmed

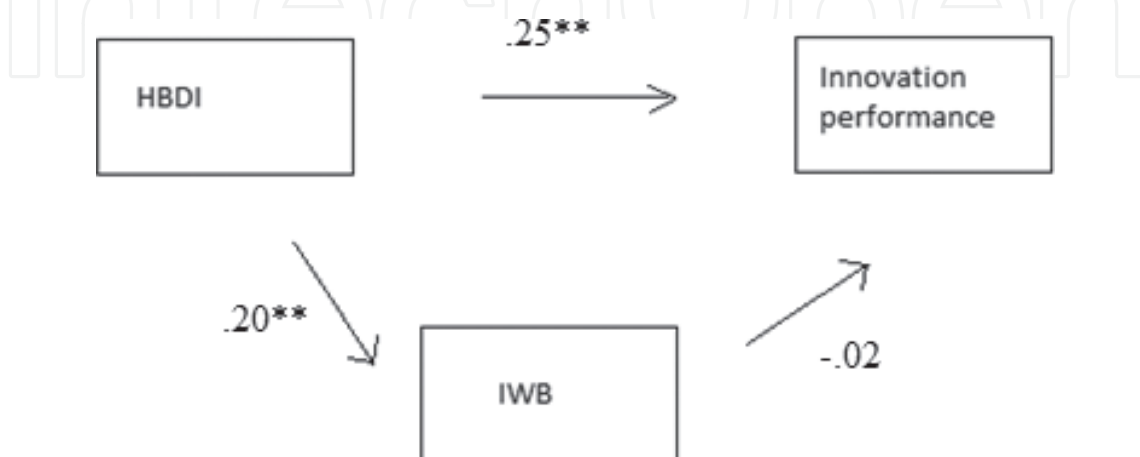


Figure 3. Outcomes regression analysis using process with HBDI® as independent variable. Notes: * $p < .05$, ** $p < .01$ confidence interval = 95%, $R = .50$, $p \leq .01$.

To summarize (see also **Table 2**), the HBDI® has a significant effect on the IWB but the IWB in turn does not have a significant effect on the innovation performance. Furthermore, the HBDI® does have a significant effect on the innovation performance. However, there is no mediating effect of the IWB of employees.

Hypotheses	Outcomes
Hypothesis 1	Rejected
Hypothesis 2a	Confirmed
Hypothesis 2b	Confirmed
Hypothesis 3	Rejected
Hypothesis 4a	Confirmed
Hypothesis 4b	Confirmed
Hypothesis 5	Rejected

Table 2. Outcomes of the hypotheses.

9. Conclusion

The results revealed that the innovative work behavior does not mediate the proposed relationship which means that hypotheses 1a and 1b were rejected. However, both HR practices and the HBDI® positively influence the innovative work behavior of employees. This means that both hypothesis 2a and 3a were confirmed. Furthermore, both HR practices and the HBDI® positively influence the innovation performance of a company which means that both hypothesis 2b and 3b were confirmed. Unfortunately, the expected positive relationship between the IWB of employees and the innovation performance of SMEs turned out to be insignificant so hypothesis 4 has been rejected. This means that the IWB of employees does not influence the innovation performance of a SME.

10. Discussion

During this study, the positive influence of HR practices on the IWB of employees has been confirmed. This is in line with the results of an earlier study [13] of which the authors showed that HRM is able to contribute to the IWB of employees. A remarkable aspect is that when the effects of the separate HR practices on the IWB of employees are measured, only the practice “job design” is significant. This means that this practice has such a strong influence that it affects the mean of all the HR practices in such a way that it becomes significant in relation to the IWB. This finding is in line with a former study [21] of which the authors argue that “job design” has an impact on innovation within the workforce. Innovation within the workforce involves the innovativeness of employees which is related to the IWB of employees.

An explanation for this effect is that job design is related to the characteristics of an employee's job [31], and the IWB of employees is related to an individual's behavior [16]. When an employee assesses the job characteristics more positively, he/she will be more motivated and will probably come up with new ideas and initiatives which will increase his/her IWB. In fact, this means that job design has to do with the intrinsic motivation of employees which makes it a very important HR variable.

Secondly, the relationship between the HR practices and the innovation performance of SMEs has been confirmed. This is in line with another study [8] the authors of which argue that innovation is perceived as an output variable of HRM investments. However, it is remarkable that when testing the effects of the separate HR practices on the innovation performance of SMEs, only the practice "team development" is significant. This means that this practice has such a strong influence that it affects the mean of all practices in such a way that the relationship between HR practices and innovation performance becomes significant. This finding is in line with an earlier study [12], in which it was argued that team development leads to a company's innovation development. A possible explanation for this effect is that working in teams bundles the knowledge of employees by which powerful ideas can arise, and finally, the innovation performance of the company can increase. Furthermore, "team development" includes items such as "having problem-solving sessions" and "making use of quality improvement" which seem to be reasonably related to innovation since they are focused on improvement and development.

Furthermore, the literature suggests that the use of the HBDI® will lead to a higher degree of innovative thinking of employees [24]. The results of this study showed that the HBDI® positively influences the IWB of employees. A possible explanation is that when employees are aware of their own strengths and weaknesses, they probably will try more actively to improve themselves. This will also make them more aware of the improvement opportunities within the company which will stimulate their idea generation and finally will increase their IWB. However, the company within this study uses the HBDI® as a static tool. That means that the HBDI® profiles of employees are not expected to change over time. When managers are willing to believe that employees are able to change, the tool can be used dynamically which might lead to an even stronger relationship between the HBDI® and IWB of employees. Furthermore, the HBDI® has a significant influence on the innovation performance of SMEs. Although this has never been empirically confirmed in the literature before, a reasonable explanation can be given for this relationship. Using the HBDI® might give employees the feeling that the company is up-to-date and is aware of the most relevant instruments available for employees. That is why they assess the company as more innovative compared to other companies.

For the relationship between the HBDI® and the IWB of employees, the control variable "function" turned out to influence this relationship. This relationship is stronger for employees who do have a managerial function than employees who do not have a managerial function. This might be explained by the reasoning that employees with a managerial function are more aware of the strategy of a company and therefore more receptive for the practices the company offers. When they are more receptive for the HR practices and the HBDI®, this will probably influence their IWB more rapidly than employees that are less receptive for these

practices. Another explanation is that employees with a managerial function might have a more challenging job which makes them more motivated. Also, the level of autonomy might play a role here. When they are more motivated and have autonomy, they are more willing to gain new experiences which mean that it is more likely they will be positively influenced by the practices the company offers.

Finally, the positive relationship between the IWB of employees and the innovation performance of a company is suggested in the literature [13]. This actually suggests that the innovation performance of a company finds its existence in the IWB of the employees of the company. This relationship has been tested during this study in which the IWB of employees was proposed as a mediator on the relationship between HR practices/HBDI® and the innovation performance of SMEs. However, the main finding of this research is that there is no mediating effect of the IWB on the relationship between the HR practices/HBDI® and the innovation performance of SMEs. This finding is in contradiction with the existing literature. An explanation for this outcome might be related to the industry in which the investigated company is operating in. During this study (by means of the interviews), it became clear that the IT service sector does not come up with radical innovations but mainly with incremental ones. Therefore, the innovation performance within this sector is relatively low. Furthermore, most innovations arise from developments in the market which means that innovation comes from outside the firm so the employees have less impact on the innovation performance of the firm. Therefore, they are not able to affect the innovation performance of a company significantly. Moreover, during the interviews, it became clear that management does not believe that the employees of most departments are able to affect the innovation performance of the company. Only a few employees of some specific departments (e.g., R&D) are supposed to do this. Therefore, the IWB of employees in general cannot influence the innovation performance of the company.

11. Managerial implications

This study offers some useful insights for companies and especially for HR managers. The study shows the effect of using strategic HR practices on the IWB of employees and on the innovation performance of SMEs. Respectively, “job design” and “team development” turned out to be particularly effective for increasing the IWB of employees and the innovation performance of SMEs. This means that HR managers can effectively use these practices to obtain both employees with a higher IWB and a more innovative company. Furthermore, this study shows the positive effect of the HBDI® on the IWB of employees. This means that managers can use the HBDI®, which makes employees more aware of their own thinking styles, to stimulate their innovative work behavior. More specifically, by underlining the innovative part of the HBDI® (the yellow quadrant), employees will become more aware of their innovative capabilities which will stimulate their IWB. Furthermore, the insight may lead to developing one or more of the other three quadrants. Finally, it turned out that the relationship between HBDI® and IWB has a stronger impact on employees with a managerial function. This means that managers should give special attention to the employees without a managerial function

in their HR strategy to achieve the desired level of innovative work behavior. This can be done for instance by making these employees more aware of the strategy and goals of the company and showing them which tools (e.g., the HBDI®) can help achieve these goals.

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References

- [1] Kamasak R. Determinants of innovation performance: A resource-based study. *Procedia—Social and Behavioral Sciences*. 2015;**195**:1330–1337.
- [2] Lawson B, Samson D. Developing innovation capability in organisations: a dynamic capabilities approach. *International Journal of Innovation Management*. 2001;**5**(3):377–400. p. 380.
- [3] Laforet S. A framework of organisational innovation and outcomes in SMEs. *International Journal of Entrepreneurial Behavior & Research*. 2011;**17**(4):380–408.
- [4] Del Brio J, Junquera B. A review of the literature on environmental innovation management in SMEs: Implications for public policies. *Technovation*. 2003;**23**(12):939–948.
- [5] Verdú-Jover AJ, Lloréns-Montes FJ, García-Morales VJ. Environment–flexibility coalignment and performance: an analysis in large versus small firms. *Journal of Small Business Management*. 2006;**44**(3):334–349.
- [6] Dutta S, Evrard P. Information technology and organisation within European small enterprises. *European Management Journal*. 1999;**17**(3):239–251.
- [7] Salavou S, Baltas G, Lioukas S. Organisational innovation in SMEs: The importance of strategic orientation and competitive structure. *European Journal of Marketing*. 2004;**38**(9/10):1091–1112.
- [8] Antonioli D, Della Torre E. Innovation adoption and training activities in SMEs. *The International Journal of Human Resource*. 2015;**27**(3):311–337.
- [9] Van de Vrande V, de Jong J, Vanhaverbeke W, de Rochemont M. Open innovation in SMEs: Trends, motives and management challenges. *Technovation*. 2009;**29**(6):423–437.
- [10] Rammer C, Czarnitzki D, Spielkamp A. Innovation success of non-R&D-performers substituting technology by management in SMEs. *Small Business Economics*. 2009;**33**(1):35–58.

- [11] Xerri M, Brunetto Y, Schacklock K. The innovative behaviour of employees within a small to medium sized enterprise: A social capital perspective. *Sustainability Management and Marketing*. 2009;**1**–**16**:11.
- [12] Lau C, Ngo H. The HR system, organizational culture, and product innovation. *International Business Review*. 2004;**13**(6):685–703.
- [13] Abstein A, Spieth P. Exploring HRM meta-features that foster employees' innovative work behaviour in times of increasing work–life conflict. *Creativity and Innovation Management*. 2014;**23**(2):211–225.
- [14] Nowacki R, Staniewski M. Innovation in the management of SMEs in the service sector in Poland. *Amfiteatru Economic*. 2012;**14**:755–773.
- [15] McEvily S, Eisenhardt K, Prescott J. The global acquisition and protection of technological competencies. *Strategic Management Journal*. 2004;**25**(8/9):713–722.
- [16] De Jong J, Den Hartog D. Measuring innovative work behaviour. *Creativity and Innovation Management*. 2010;**19**(1):23–36. p. 24.
- [17] Young L. How to promote innovative behavior at work? The role of justice and support within organizations. *The Journal of Creative Behavior*. 2012;**46**(3):220–243.
- [18] Dorenbosch L, van Engen M, Verhagen M. On-the-job innovation: the impact of job design and human resource management through production ownership. *Creativity and Innovation Management*. 2005;**14**(2):129–141.
- [19] Boxall P. The strategic HRM debate and the resource-based view of the firm. *Human Resource Management Journal*. 1996;**6**(3):59–75.
- [20] Schuler RS, Jackson SE. *Strategic Human Resource Management*. 2nd ed. Malden, MA: Blackwell Publishing; 2007.
- [21] Conway N, Dewe P. Using sequential tree analysis to search for 'bundles' of HR practices. *Human Resource Management Journal*. 2004;**14**(1):79–96.
- [22] Brand M, Bax E. Strategic HRM for SMEs: Implications for firms and policy. *Education and Training Journal*. 2002;**44**(8/9):451–463.
- [23] Saridakis G, Munoz Torres R, Johnstone S. Do human resource practices enhance organizational commitment in SMEs with low employee satisfaction? *British Journal of Management*. 2013;**24**(3):445–458.
- [24] Hermann International Europe ©. *Het HBDI®: een instrument voor management, wervingsselectie*. 2016. Seen on march 1, 2016, from Herrmann International Netherlands: www.herrmann-europe.com/nl/onze-gereedschappen/het-hbdi
- [25] Coffield F, Moseley D, Hall E, Ecclestone K. Should we be using learning styles? UK: Learning and Skills Research Centre; 2004.

- [26] Barclay L. Literature Review of the Herrmann Brain Dominance Instrument® (HBDI®). Herrmann International, Lake Lure, US; 2004.
- [27] Wolters, M., D. Reitsma, A. Lamme, B. Hop & E.J. Reitsma (2007) HBDI vs. BSR: Een kritische vergelijking van twee segmentatiemodellen. Leusden: The SmartAgent Company.
- [28] Rout IT. Internal format source. Ede, 2016.
- [29] Kwee JST. Interview RoutIT. (E. v.d. Horst, Interviewer). Ede, 2016.
- [30] Chen C, Huang J. Strategic human resource practices and innovation performance—The mediating role of knowledge management capacity. *Journal of Business Research*. 2009;**62**(1):104–114.
- [31] Holman D, Totterdell P, Axtell C, Stride C. Job design and the employee innovation process: the mediating role of learning strategies. *Journal of Business and Psychology*. 2012;**27**(2):177–191.
- [32] Mathew, J., Ogbonna, E. and Harris, L. 2012. 'Culture, Employee Work Outcomes and Performance: an Empirical Analysis of Indian Software Firms'. *Journal of World Business*, 47, 194–203.
- [33] Prajogo D, Ahmed P. Relationships between innovation stimulus, innovation capacity, and innovation performance. *R&D Management*. 2006;**36**(5):499–515.
- [34] Pallant J. *SPSS survival manual, a step by step guide to data analysis using SPSS for windows*. 3 ed. Sydney: McGraw Hill; 2007. p. 179–200.

