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**Is human resource management profitable  
for small firms?**

**The impact of high performance work systems on  
labour productivity and profit of small and medium-  
sized enterprises**

dr. J.M.P. de Kok  
prof. dr. D. den Hartog

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# Summary

## Introduction

A substantial body of HRM research has investigated the relationship between HRM and organizational performance. Recent work tends to study the effects of integrated 'systems' or 'configurations' of HRM practices on different indicators of firm performance. A high performance work system (HPWS) can be defined as a set of distinct but interrelated HRM practices that together select, develop, retain, and motivate a workforce

- that has superior knowledge, skills and abilities;
- that applies their abilities in their work-related activities;
- whose work-related activities result in these firms achieving superior intermediate indicators of firm performance (i.e., indicators over which the workforce has direct control) and sustainable competitive advantage.

Overall, the results of the work on HPWS and performance suggest substantial benefits from effectively managing human resources. Nevertheless, many questions remain unanswered. In particular: do these findings hold for all organizations, irrespective of their size? In this study, we address this issue and examine whether the relationship between a high performance work system and different indicators of firm performance also holds in a small business context.

## Research framework

In general, smaller firms are less likely to use formalized HRM practices than larger firms. Nevertheless, it does seem intuitively likely that HRM will also matter in small firms, even though the specific practices that are relevant and the specific benefits yielded (e.g. performance, innovativeness, growth) may differ. However, only few studies so far have focused on HPWS and their effectiveness in small and medium-sized enterprises (SMEs). In this study, we examine the relationship of HPWS with different firm performance indicators (firm profit, labour productivity and labour turnover) in a sample of Dutch SMEs. We expect that the application of a high performance work system will be positively related with the level of labour productivity and firm profit, and negatively with labour turnover and sickness absence.

We furthermore expect that these relationships may be moderated by the innovativeness, leadership style and size of the firm. In today's competitive marketplace, innovativeness may be required to ensure firm performance. Merely having an adequate level of productivity is not sufficient for SMEs: they must also ensure sufficient productivity growth. Thus, SMEs need to continuously renew and improve their product offerings, services and work processes to secure long-term survival, profitability, and growth. Firm performance in SMEs may also be influenced by their top managers' leadership style. Previous research suggests that transformational leadership may improve performance and innovativeness. Managers exhibit transformational leadership if they have vision, stimulate employees intellectually and use individualized consideration and mentoring to help them develop their full potential. Such leadership goes beyond the cost-benefit exchange of transactional leadership by motivating and inspiring subordinates to perform beyond expectations. In this study, we explore how HPWS, innovative-

ness and leadership style interact with each other and with firm size, and to which extent these interactions affect firm performance

## Research methodology

To examine these expectations, we use the EIM policy panel. This is a panel of Dutch SMEs (stratified by size and sector) who participate in telephonic 15-minute interviews on different topics several times a year. We use data from several consecutive interviews during which information was obtained on performance indicators, HRM practices, leadership style of the entrepreneur and several characteristics of the enterprise and the entrepreneur. We selected all firms from this panel that met the following criteria: the work force must consist of more than 5 people (including the entrepreneur) and the owner or general manager in charge must have answered the questions. This resulted in a working sample of 909 enterprises (with the largest firm employing 175 people).

Our measure for the presence of HPWS is based on a previous study amongst SMEs from the US. The HPWS indicator that is used in this US study includes items on extensiveness of staffing, performance based pay, pay level, job rotation, training, participation and self-directed work teams. Due to differences in institutional setting and sampling, this indicator needed some modifications. In particular, in testing the questionnaire we found that gathering information on self-directed teams in Dutch SMEs was not possible as this concept is not yet known among or used in Dutch SMEs. We therefore had to drop items on self-directed teams. Thus, our HPWS indicator combines 6 rather than 7 HRM practice areas. A few smaller differences also exist.

For 3 of the 6 components of the HPWS indicator, information is missing for over 50 organizations. For example, 60 organizations hadn't recruited any new employees in the past three years, and hence couldn't answer questions on extensiveness of staffing practices. As a result, any analysis on the full HPWS indicator is limited to organizations that have recruited employees in the last three years. This is most likely not a random selection of SMEs. In particular, we find this to be related to firm size (smaller firms are less likely to have recruited new employees recently). As a result, the full HPWS indicator can only be defined for 525 organizations. We limit this problem by defining the HPWS indicator in an alternative way: not as the average score over all 6 HPWS components, but as the average score of all available HPWS components, provided that information is available for at least 5 components. This increases the number of valid observations from 525 to 828. For each HPWS component the correlation with both HPWS indicators is very similar, suggesting that the alternative indicator is acceptable for use in subsequent analyses.

We also measure leadership. Ideally, employees should rate leadership. Here however, we were only able to gather self-ratings of leader behaviour. Various performance measures are included in this study: labour turnover, labour productivity (per full-time equivalent), profit (per full-time equivalent), and recent innovativeness. We also include controls such as firm size, educational level of the entrepreneur and sector.

## Results and Conclusions

The general picture that emerges from previous studies is that firm size is positively related to the adoption of many HR instruments. Smaller firms are less likely to use formal HRM practices than larger firms are. This not only applies at the level of individual HR instruments, but also at the level of configurations of HR instruments. The findings of this study confirm that this also applies to the set of HR instruments that define a high performance workplace system. Larger firms have on average a higher score on our HPWS index than smaller firms do.

In addition, we find that firms where the entrepreneur's leadership style is more transformational also tend to have a higher score on our HPWS index. Furthermore, the score on the HPWS index is also positively related to labour productivity and profit per fte. Contrary to expectations, transformational leadership is not related to labour productivity or profit. To further examine the relationships between these variables, we ran various multivariate regression analyses.

Our hypotheses regarding labour turnover are partially supported. The probability that an organization has a high labour turnover rate does not depend on HPWS but rather on leadership style: transactional leadership is associated with high turnover levels, while transformational leadership is associated with low turnover levels. These two main effects are the only significant effects of leadership style that we found in our study.

Regarding innovation, the results show that larger firms and firms with a highly educated entrepreneur were more likely to have innovated more in the recent past than other firms. Also, some sector differences exist. As expected, we also find a significant positive effect of the HPWS indicator. Increased attention for HPWS in SMEs is associated with an increased likeliness of firm innovativeness.

Labour productivity varies between sectors of industry and tends to increase with the educational level of the entrepreneur. In line with previous studies amongst larger firms, we find that also for small firms an increased attention for HPWS improves labour productivity. This positive effect of HPWS on labour productivity is not due to an indirect effect through innovation or labour turnover. Also, it is independent of firm size.

For profit, we find a positive effect of labour productivity and a negative effect of high rates of sickness absence. We find no direct main effects of HPWS and leadership styles, but we do find a positive interaction effect between HPWS and firm size. Thus, HPWS has more impact on the profitability of larger firms than of smaller firms. Although the results suggest that labour productivity mediates the relationship between a high performance work system and profits, further analysis shows that this is not the case. While the indirect effect of a high performance work system (through its effect on labour productivity) is independent of firm size, the direct effect is strongly related to firm size.

Finally, we find no relationship between HPWS and sickness absence. This may be due to our focus on SMEs. Generally speaking, sickness absence may be due to a lack of ability or a lack of motivation to attend to work. HPWS may reduce sickness absence levels, to the extent that it increases the motivation of employees to attend to work. However, in the case of small firms it is likely that sickness absence is mainly the result of a lack of ability to attend rather than a lack of motivation to attend.





# 1 Introduction

## *The importance of managing human resources properly*

Running a successful organization requires finding, retaining and motivating the right employees. Current changes in the economic and demographic structure of Western societies, such as the increased role of knowledge, the ageing of the workforce and a decreasing inflow of entrants into the workforce, further increase the importance of the management of the (internally and externally) available human resources. This holds for all organisations, irrespective of their size.

Recent years have witnessed an increased flow of scientific papers on the relationship between various firm (and employee) performance measures, and how these firms manage their human resources. The general consensus of these studies is that HRM matters: employing the right HRM policies and practices is likely to increase organizational performance.

## *High performance work systems*

Whereas early research on human resource management (HRM) and performance tended to focus on the impact of separate HR practices on firm performance, more recent work tends to look at the combined effect of integrated sets of practices. These studies relate certain types of 'bundles', 'systems' or 'configurations' of HRM practices to different indicators of organizational performance. Some of these integrated systems of HRM practices have been labelled high involvement work systems or high performance work systems (HPWS). Such systems are thought to increase employees' abilities, commitment and motivation, which in turn enhances their and ultimately the firm's performance. Several studies suggest that such HPWS can indeed positively affect firm performance (e.g. Huselid, 1995).

Although the results of studies on HPWS yield promising results as to their effectiveness, many questions remain unanswered (e.g. Delery, 1998). For example, exactly when and how does HPWS affect performance and what is its impact on other processes in the organization? In this study we focus on several such questions. The main question we address here is whether the relationship between HPWS and firm performance also holds in a small business context.

## *Lack of information on the situation within SMEs*

Generally speaking, HRM research tends to ignore small and medium-sized enterprises. This also holds for research on HPWS and firm performance. Only very few studies so far have focused on HPWS and their effectiveness in small and medium-sized enterprises (Way, 2002). Multi-industry HPWS research has tended to exclude firms with fewer than 100 employees, and this exclusion "has created a lack of understanding of the impact of HPWS within the .. small business sector" (Way, 2002). Other studies confirm that we know very little about the science and practice of HR in small organisations (Huselid, 2003). Yet, a large percentage of the workforce in EU countries works in the small business sector and the contribution of SMEs to the economy tends to be substantial. Thus, increasing our understanding of the

role of HPWS in SMEs in different countries is both scientifically and practically relevant.

#### *Objective and research questions*

The objective of this paper is to examine the relationship between the application of a high performance work system and the profitability of small and medium-sized enterprises in the Netherlands.

The application of a high performance work system can improve an organisation's profitability by increasing the productivity of the workforce, e.g. by increasing the knowledge, skills and / or motivation of employees. Profitability may also increase, if the application of high performance work systems reduces a firm's sickness absence and labour turnover rate.

A firm's labour productivity can be interpreted as a suitable indicator for its competitiveness. However, in today's competitive marketplace it is not sufficient to have an adequate *level* of labour productivity: firms must also ensure sufficient productivity *growth*. This implies that SMEs need to continuously renew and improve their product offerings, services and work processes to secure long-term survival, profitability and growth. The relationship between integrated systems of HRM practices and innovation in organizations may be an important moderator for the relationship between HRM and productivity. It has, however, not received much attention in the field of strategic HRM. This paper therefore also examines the relationship between HPWS and small firm innovativeness.

The research questions of this paper can therefore be formulated as follows:

- Is there a negative relationship between the application of a high performance work system and
  - the sickness absence rate?
  - the labour turnover rate?
- Is there a positive relationship between the application of a high performance work system and
  - the level of labour productivity?
  - organisational innovativeness?
  - firm profit?

#### *Moderating variables*

The impact of HPWS on performance indicators may be moderated by various contingency variables. For example, the impact of a high performance work system on organisational innovativeness or firm profit may increase with firm size. This impact may also depend on the leadership style of the owner/manager. Generally speaking, both HRM and leadership are concerned with the management of an organisation's workforce. In particular, both the application of a high performance work system and of a transformational leadership style are assumed to improve organisational performance. It is not unlikely that these two aspects of management reinforce one another.

In this study we will elaborate the suggestion that firm size and (transformational) leadership style may moderate the relationship between HPWS and organisational performance indicators. In addition, we will examine to which extent these suggestions are supported empirically.

### *Structure of the paper*

In the next chapter, we will present an overview of previous studies in this field. This overview provides a rationale for the research questions of this study, and previous examples on how to measure (the application of) high performance work systems and leadership styles. The research methodology is discussed in chapter three. The chapter starts with an overview of the relationships that we want to examine empirically. Next, information about the sample and questionnaire that have been used and on the construction of indicators for HPWS and leadership styles is presented. Chapter four presents the results of the analyses, which are discussed in chapter five. This chapter also contains the main conclusions.



## 2 Previous research

### 2.1 Scale effects in the adoption of HRM practices

Firm size is positively related to the adoption of many HR instruments (Compeer et al, 2005). Generally speaking, smaller firms are less likely to use formal HRM practices than larger firms are. This not only applies at the level of individual HR instruments, but also at the level of configurations of HR instruments. Recently, various studies have related certain types of 'bundles', 'systems' or 'configurations' of HRM practices to different indicators of organizational performance<sup>1</sup>. Smaller firms tend to score lower on scales or indexes of such HRM bundles than larger firms do (De Kok et al., 2006). Nevertheless, it seems intuitively likely that HRM will also matter in small firms, even though the exact HRM practices that larger and smaller firms benefit from, as well as the specific benefits yielded (e.g. performance, innovativeness, growth), may differ.

Some of these integrated systems of HRM practices have been labelled high involvement work systems or high performance work systems (HPWS). A high performance work system (HPWS) can be defined as a set of distinct but interrelated HRM practices that together "select, develop, retain, and motivate a workforce

- 1 that possesses superior abilities (...);
- 2 that applies their abilities in their work-related activities;
- 3 whose work-related activities (i.e., actual employee behaviours/output) result in these firms achieving superior intermediate indicators of firm performance (i.e., those indicators over which the workforce has direct control) and sustainable competitive advantage" (Way, 2002, p.765-766).

#### *HRM and the organisational life cycle*

The role of HRM in small businesses is also addressed (both empirical and theoretical) in articles on the relationship between HRM and organizational life cycle. For example, Leung (2003) focuses on strategies for recruiting core personnel (management) during the start-up and growth phase of young (and usually small) enterprises. Baird and Meshoulam (1988) suggest that HRM systems may depend on the specific life cycle of SMEs: During the start-up phase, HRM activities are loose and informal, most likely performed by the owner or founder. Activities are focused on a narrow range of HR issues related to hiring and firing. Next, during the high growth phase a formalization of the organization occurs, additional managers are introduced, including HR specialists. A shift may take place from emphasizing recruitment and selection to focusing on training and development as well as the design of compensation policies. Finally, in the mature phase, there is more attention for performance appraisal, labour relations, affirmative actions

<sup>1</sup> Examples of such studies can be found in Arthur (1992, 1994), Batt (2002), Becker and Gerhart (1996), Delery and Doty (1996), Den Hartog and Verburg (2004), Guthrie (2001), Huselid (1995), Ichniowski and Shaw (1999) and MacDuffie (1995).

and a broader role for the HR function (Baird and Meshoulam, 1988; see also Rutherford et al., 2003).

Rutherford et al. (2003) identify various problems that owners or managers of SMEs may have with the management of their human resources, in particular regarding hiring, retention and development (training). They examine whether the main problems encountered by these firms are related to the organizational life cycle and find that this is indeed the case. In particular, firms exhibiting no growth often have problems with recruiting employees, whereas high-growth firms often have problems with training.

## 2.2 HRM and performance in SMEs

Several studies amongst smaller firms suggest that HRM is indeed relevant in the small firm context. This section discusses some of these papers and ends with a discussion on the (lack of) attention for HPWS in HRM research amongst SMEs.

De Kok (2002) examines the impact of training on production, for a panel of Dutch manufacturing firms with 40 – 5.000 employees. He examines the impact that training may have on gross production and value added. He presents a model where training is measured by the number of training days per employee. The impact of training can be moderated by the amount of training support per employee (the time spent in setting up and managing the training programme) and by firm size. His results support the presence of a moderating effect of training support per employee, but find no support for a moderating effect of firm size. Instead, there is an indirect effect of firm size: smaller firms tend to provide less training support per employee than larger firms, which reduces the impact of training on gross output and value added. Even though training has a positive effect on performance, for smaller firms this positive effect may not be enough to outweigh the costs of training.

Cardon (2003) suggests that small and/or new firms are likely to have more problems in recruiting employees, because they lack both the resources and the legitimacy. Likewise, Williamson concludes that “without applicants having knowledge of a firm, its practices or its members, small firms find it harder to establish their legitimacy as a prospective employer” (Williamson, 2000). She concludes that contingent labour will be especially beneficial for small firms in pursuit of growth. In a study among 120 German enterprises with 1 – 50 employees, Rauch et al. (2005) find a significantly positive impact of HR development and utilization on employment growth. Thus, effective management of human resources in small firms may yield beneficial outcomes for small firms.

Other studies also suggest that HRM is likely to have an impact on firm performance in small firms. However, often, these studies control for size rather than focus on it. For example, Hayton (2003) finds a positive effect of HRM on entrepreneurial performance in a sample of 99 US firms with 100 – 500 employees. He gathered information on 25 HR practices. Factor analysis revealed two factors, labelled ‘traditional HRM practices’ (practices that tell employees what to do, and when, e.g. formal job descriptions and

a structured salary system) and 'discretionary HRM practices' (practices that promote discretionary behaviour of employees). The dependent variable in his study is entrepreneurial performance, which reflects the extent to which a firm is able to accept risk and be innovative or competitively aggressive. He finds a significantly positive effect of the 'discretionary HRM practices' scale on entrepreneurial performance, while traditional HRM practices do not have such an impact. Firms with fewer than 100 employees were removed from the sample since formal HRM practices were expected to be limited for these enterprises. However, this assumption is not tested.

Batt (2002) examines the impact of several HRM practices (combined in a high involvement work system) on quit rates and sales growth for U.S. call-centers with 10 or more employees (establishment level). Her results partially support the existence of both positive indirect and positive direct effect of HPWS on sales growth in the call-centers. Although this is one of the few empirical studies on the effect of HPWS on performance that includes small firms, establishment size is not treated as a relevant variable in this study. The sample is stratified in two size classes (10-99 and  $\geq 100$  employees), but no information is provided on the number of call-centers in each size class. Average total firm size is not reported, nor is it used as a control variable in the reported analyses. She does report, however, that "I considered factors such as size, age, (...). These measures, however, are highly correlated with those already in the study and did not produce any significant differences in the results". On the one hand, this suggests that firm size didn't have a significant impact as a control variable. On the other hand, it suggests that firm size is strongly related to other variables (although, unfortunately, we do not know which ones).

#### *High performance work systems and performance in small businesses*

High performance work systems are thought to increase performance. Some support for the existence and effectiveness of HPWS has been found. However, research on HPWS has mostly been done in large firms. Even in the available research in larger firms both the choice of which specific practices should be included in the HPWS and the operationalization of the chosen practices that make up the proposed system vary widely. HPWS researchers tend to stress practices in the area of employee development, autonomy and participation, as well as having a motivating reward system and incentive structure that ensures that employees hard work 'pays off', both in terms of financial compensation and career opportunities. Strict selection, work designed so that employees have discretion and opportunity to use their skills in collaboration with other workers may also be seen as part of such systems (Verburg and Den Hartog, 2006). For example, Batt (2002) states that such systems generally include "relatively high skill requirements; work designed so that employees have discretion and opportunity to use their skills in collaboration with other workers; and an incentive structure that enhances motivation and commitment" (p.587). Similarly, Delaney and Huselid (1996) mention employee participation and empowerment, job redesign including team based systems, extensive employee training, and performance-contingent incentive compensation as practices that are jointly likely to improve organizational performance.

In his study of HPWS in the US small business sector, Way (2002) focused on HRM practices in 7 specific HRM fields: extensiveness of staffing, performance based pay, pay level, job rotation, training, participation and self-directed work teams. Combined, these practices should be able to enhance the ability of small firms to select, develop, retain, and motivate a workforce that produces superior employee output. As hypothesized, he found that the HPWS comprised of these elements was associated with lower labour turnover and higher perceived productivity. However, he found no significant relationship with labour productivity (measured as the ratio between sales and labour costs).

### 2.3 HRM and leadership: the role of the psychological contract

HRM is assumed to affect firm performance by improving employee behaviour. Unfortunately, most empirical studies ignore the first part of this causal HRM chain. This may often be due to a lack of proper data regarding the abilities, motivation and / or opportunities of individual employees in HRM studies. An exception is provided by Guest (1999), who uses a dataset that contains information about the psychological contract of employees. The psychological contract is closely related to the motivation and (perceived) opportunities of employees and can therefore act as an important mediating variable between HRM and performance.

The psychological contract can be defined as "an individual's belief regarding the terms and conditions of a reciprocal exchange agreement between the focal person and another party" (Rousseau, 1989). The psychological contract differs from the more general concept of expectations in that contracts are promissory and reciprocal, offering a commitment to some behaviour on the part of the employee in return for some action on the part of the employer. A higher level of the psychological contract implies that employees expect more of their employer (regarding e.g. training, opportunities for promotion, a good working climate and competitive salaries) and - at the same time - feel more obliged to deliver good performance for their employer (for example: provide good service, perform nonobliged tasks voluntarily, work extra hours, and deliver good work in terms of quality and quantity) (Sonnenberg, 2006).

The results by Guest (1999) confirm that the psychological contract mediates in the relationship between HRM and performance. HRM is positively related to the psychological contract, and a higher level of the psychological contract is associated with improved employee performance. In his study, the single most important determinant of a positive psychological contract turned out to be the presence of a high involvement organizational climate.

In large firms, stimulating a high involvement climate may be an explicit goal of HRM strategies and policies. In smaller firms, with their more emergent process of strategy formulation, the organisational climate (or culture) may depend more strongly on the values and norms of the business owner(s). These values and norms may influence not only the goal of the enterprise, but also the strategy on how to obtain that goal (Kotey and Meredith, 1997). The organizational culture will not only be shaped by the



owner's values, norms and goals, but also by the way in which these are communicated to the employees (Marlow and Patton, 1993).

Communicating the goal of the enterprise, and the strategy on how to obtain that goal, is also the subject of theories on transformational leadership. An important aspect of leadership is providing a vision or overarching goal. This sense of direction, of knowing where one is going, helps leaders integrate and align co-workers' efforts (Den Hartog and Verburg, 1997). Developing and articulating an exciting vision of future opportunities is central to what Bryman (1992) labels the 'new' leadership approach. An important distinction is that between transactional and transformational leadership as defined in the model by Bass and his colleagues (e.g., Bass 1985; 1997; Hater and Bass, 1988; Yammarino and Bass, 1990).

- Transactional leadership is based on (a series of) exchanges between leader and co-worker. Co-workers receive certain valued outcomes (e.g., pay increases, prestige) when they act according to the leader's wishes (Burns, 1978).
- Transformational leadership is seen when leaders have vision, stimulate co-workers intellectually to see problems in new ways and use individualized consideration and mentoring to help individual co-workers develop to their full potential. It goes beyond the cost-benefit exchange of transactional leadership by motivating and inspiring co-workers to perform beyond expectations (Bass, 1985).

Theories on transformational leadership attempt to explain how certain leaders are able to achieve extraordinary levels of co-worker performance<sup>1</sup>.

## 2.4 High performance work systems and innovativeness in small businesses

The innovation literature mentions many organization level influences that are likely to play a role in the innovation process within firms. Anderson, De Dreu and Nijstad (2004), for example, mention elements such as structure, strategy, size, resources, culture and leadership. HPWS may also form an important organizational level influence on innovativeness. To enhance innovation, HRM practices need to ensure that creativity can thrive and new knowledge and skills can be created in the firms. Firms also need to maintain an environment that supports the implementation of these new ideas in the workplace. For example, Shipton et al. (2004) suggest that innovation will be promoted and sustained where HRM practices are in place to manage the creation, transfer and implementation of knowledge.

Most of the practices in high performance work systems are likely to stimulate innovation. For example, research on innovation and creativity shows that domain relevant knowledge is an important aspect of creativity (Amabile et al., 1996). Thus, organizations need to ensure that such knowledge is present. This is done through strict selection of new employees, focusing on breadth and depth of expertise (Mumford, 2000) as well as

<sup>1</sup> A more elaborate discussion of research into leadership can be found in De Jong and Den Hartog (2003).

through training and development of employees that are already in the firm to keep knowledge and skills up to date (Shipton et al., 2004).

Job design also has the potential to enhance creativity and innovation. Mumford (2000) stresses the need to define jobs in terms of broad core duties that allow employees to pursue emerging opportunities and creative production activities, rather than defining jobs narrowly in terms of administrative requirements or financial objectives. HRM practices such as involvement and participation have been stressed in the HR literature as well as ways to promote employees' commitment to the organization and its goals (including innovation). Having more influence and autonomy is proposed to lead to broader ownership of problems and a more flexible and proactive view of performance of employees. Similarly, Mumford (2000) mentions the importance of having sufficient employee autonomy and influence to stimulate creativity, for example, allowing for discretion in structuring of work activities and allocating time to core duties. Research supports this importance of autonomy and participation for innovative behaviour (e.g. Amabile, 1996).

There is also a potential role for reward systems in stimulating innovativeness. Firms could use skill- or knowledge-based pay to increase employees' acquisition of knowledge outside their immediate jobs, which may promote creativity (Guthrie, 2001). Mumford (2000) also suggests that firms should provide incentives for on-going development of knowledge and expertise to stimulate creativity. He further suggests tailoring performance objectives to the creative elements of the work and providing a mix of rewards based on progress towards objectives (rather than solely based on outcomes). On the other hand, extrinsic rewards may under certain conditions decrease the intrinsic motivation for performing creative tasks that are seen as crucial for creative performance (e.g. Amabile, 1996).

Finally, research on innovation suggests that new ideas and knowledge need to be communicated (transferred) through the organization so that they can be implemented (Damanpour, 1991). Thus, knowledge transfer is a fundamental pre-requisite for innovation implementation (Shipton et al., 2004). Transferring and implementing knowledge involves developing shared understanding between individuals and work groups. Shipton et al (2004) suggest that the frequency of contact and reciprocal interdependence of employees working together in teams is one way to promote effective coordination and knowledge dissemination.

In sum, the elements of a high performance work system may enhance both small firm productivity and innovativeness.

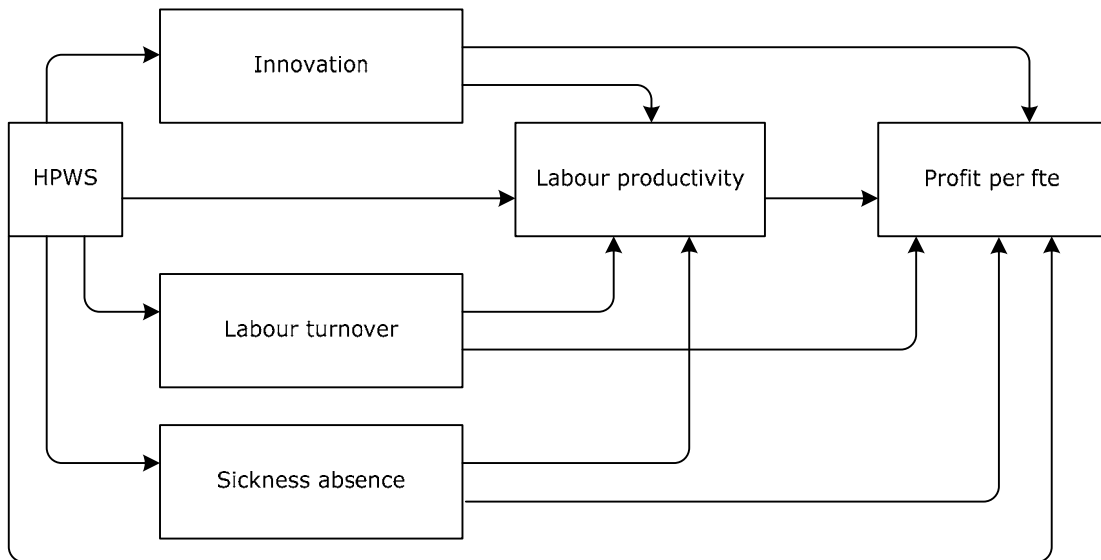
### 3 Research methodology

#### 3.1 Research framework

##### 3.1.1 Main relationships

The main relationships that we want to examine are illustrated in figure 1. The application of a high performance work system is thought to reduce labour turnover and sickness absence rates by increasing the motivation of employees. In turn, these reductions can improve labour productivity (sales per full-time equivalent). We also expect a direct effect of HPWS on labour productivity, to the extent that the application of HPWS improves knowledge, skills and / or motivation of employees.

figure 1 Research framework



A company's profit is determined by the difference between revenues (sales) and costs (wages and capital costs). Hence, profits per full-time equivalent are determined by the difference between labour productivity (sales per fte) and the average wage and capital costs per fte. This suggests that the main effect of HPWS on profit per fte will be through the impact of HPWS on labour productivity.

A direct effect of HPWS on profit is also possible. An increased attention for HPWS may motivate employees to be more cost-effective (e.g. reduce scrap rates), thus reducing the capital costs per fte. At the same time, an in-

creased attention for HPWS may be associated with higher average wages, resulting in a negative direct effect on the profits per fte.

On the other hand, for small firms the application of HPWS (in combination with transformational leadership) may imply that firms can actually pay lower wages than would otherwise be needed in order to recruit and retain valuable employees: if the organisational climate is stimulating, high wages may not be necessary to retain valuable employees.

### 3.1.2 *Moderating effects*

#### *Firm size*

The return on investments in HRM may increase with firm size. On the one hand, the relative costs of HRM investments are likely to be higher for smaller firms. The fixed development costs of high performance HRM practices are considerable (Klaas et al., 2000), which implies that larger firms can benefit from economies of scale. This is strengthened by the fact that smaller firms have fewer opportunities to increase their experience through learning by doing. Finally, smaller firms generally have fewer financial resources, and having to extract additional funding to set up a coherent HRM policy further increases the costs.

On the other hand, the benefits of HRM investments may also exhibit economies of scale. At least three different arguments can be made that suggest that HRM investments may be more profitable for larger firms than for smaller firms. First of all, the quality of the implemented HR instruments may increase with firm size. Smaller firms are likely to have less (opportunities to obtain) knowledge on HRM policies and practices and less opportunities to gain experience in the implementation and application of these policies and practices. Secondly, not all instruments that are associated with a high performance work system may be as relevant for small firms as they are for larger firms. For example, smaller firms are less likely to have narrow job definitions that are defined independent of the person performing the job (Carroll et al., 1999). This may reduce the benefits of job rotation. Finally, the psychological contract of employees tends to be higher in smaller firms. This reduces the potential benefits of any strategy (such as the introduction of a HPWS) that aims to improve the psychological contract.

#### *Transformational leadership*

Especially in small firms, the actual management of the human resources or employees may be described better by the leadership style of the entrepreneur than by the extent to which the firm applies practices that are associated with high performance work systems for large organisations. In particular, transformational leadership may have a direct positive effect on productivity and profit, and may moderate the relationship between HPWS and these performance indicators.

### *Innovativeness*

Our final moderator is innovativeness. Both the application of HPWS and innovative behaviour are assumed to improve labour productivity and firm profits. Innovations will only have a positive effect on productivity and profits, if they are properly applied by the employees. Employees that are working in a high performance work system may be more willing and able to apply these innovations than other employees. This suggests that the effect of innovations on performance may be moderated by HPWS; or, the other way around, the effect of HPWS on performance may be moderated by the innovative behaviour of the organisation.

## 3.2 Sample

The data in this study come from firms in the SME Policy Panel, a panel of Dutch SMEs who participate in telephonic interviews on different topics several times a year. The panel consists of approximately 2000 firms and is stratified by size and sector (it includes firms from all private sectors, excluding agriculture, with zero to 100 employees<sup>1</sup>). On average, 1500 of the panel members participate in each interview, which takes about 15 minutes. The questions are mostly answered by the owner, general director or plant manager.

For this study we combined information that was gathered through five consecutive interviews: three interviews in 2004 and two interviews in 2005. During these interviews, information has been obtained on various subjects, including characteristics of the enterprise and the entrepreneur, performance indicators, HRM practices and various aspects of leadership. In particular, the second interview in 2004 contained various questions regarding training and development, the third interview contained 35 questions on other HRM practices, and the second interview in 2005 contained 14 items on leadership.

We selected all firms from this panel that met the following two criteria: their work force must consist of more than 5 people (including the owner) and the questions on HRM must have been answered by the owner, general director or manager in charge. This resulted in a working sample of 909 enterprises with a work force varying between 6 and 175 people.

## 3.3 HRM questionnaire

To allow for comparison of our results with previous studies, we used the measures developed by Way (2002), translated in Dutch, as a starting point. Way's HPWS indicator includes items on extensiveness of staffing, performance based pay, pay level, job rotation, training, participation and self-directed work teams.

<sup>1</sup> The panel includes some firms with more than 100 employees; these are usually firms that employed less than 100 employees when they entered the panel, after which they crossed this size class barrier.

Due to differences in institutional settings and sampling technique, there are several differences between our measures and the ones developed by Way (2002). First of all, in testing the questionnaire, it turned out to be impossible to gather information on the occurrence of self-directed teams in Dutch SMEs. This concept is not yet widely known among or used by Dutch SME entrepreneurs. For example, a European study suggests that only 4% of the responding workplaces could be considered as team-based organisations (Benders et al., 1999)<sup>1</sup>. In the pre-test we tried explaining what using self-directed teams meant. However, within the setting of the SME Policy Panel, this didn't work well<sup>2</sup>. We therefore decided to drop questions on self-directed teams. Thus, our HPWS indicator is based on a combination of 6 rather than Way's 7 fields of HRM practices.

Next, one of Way's items on extensiveness of staffing refers to the usage of drug or alcohol screens. This is not relevant in the Dutch context (it is not commonly used as a selection tool), so we dropped this item. Likewise, we didn't collect information on the degree of unionization. Instead, we registered whether a firm is subject to a collective labour agreement or not, which is more relevant in the Dutch context.

### 3.4 Variables of interest

#### 3.4.1 *An indicator for High Performance Work Systems*

The participating enterprises answered 35 questions on HRM practices, which we subsequently used to determine an HPWS indicator with 6 underlying components that is very similar to the one developed by Way (2002). Descriptive statistics for these components are presented in table 1.

For 3 of the 6 components, information is missing for over 50 organizations. As a result, the HPWS indicator can only be defined for 525 organizations. For staffing (extensiveness of staffing practices), 60 organizations responded that they hadn't recruited any new employees in the past three years, and hence didn't need to answer the questions on this subject. Also, 220 organizations responded they were not aware of average pay levels within their sector. This explains the large number of missing values for the component paylevel. The large share of missing values for the training component (training) is due to the fact that HRM questions were spread over 2 consecutive waves of the panel (with several months in between). Information on the practice of training participation was collected during the first wave. Various organisations that participated in the second wave had not participated in the previous one, and hence no information on their training policy was available. This accounts for the largest share of missing values of the component training.

<sup>1</sup> This study is based on a survey held in 1996 amongst workplaces in different European countries, including the Netherlands. Workplaces with less than 25 employees (which form a substantial part of our sample) were excluded from this survey.

<sup>2</sup> During the test phase, various respondents became frustrated by the question on this subject.

table 1 Descriptive statistics of the components of the HPWS indicator, for firms with a workforce of 6 - 175 people (including the owner).

<i>Name</i>	<i>Components Description</i>	<i>Observations</i>		<i>Mean</i>	<i>Standard Deviation</i>	<i>Min.</i>	<i>Max.</i>
		<i>Valid</i>	<i>Missing</i>				
staffing	extensiveness of staffing	849	60	.51	0.14	0	1
perform	group-based performance pay (profit sharing, bonuses and / or share plans)	909	0	.26	0.44	0	1
paylevel	pay level below average, average or above average	689	220	.72	0.28	0	1
rotation	percentage of non-managerial employees involved in job rotation	901	8	.05	0.12	0	1
training	share of employees that followed firm-provided training	732	177	.24	0.23	0	1
participation	share of employees participating in meeting	901	8	.55	0.45	0	1
HPWS	High performance work system	525	384	2.35	0.82	.5	4.9

*Note: training refers to the situation in 2003; all other components refer to the situation in 2004.*

*Source: SME Policy Panel (EIM)*

As a result, any analysis on the full HPWS indicator is limited to organizations that have recruited employees in the last three years and are (somewhat) aware of average pay levels within their sector. This is most likely not a random selection of SMEs. In particular, the selection is closely related to firm size (smaller firms are less likely to have hired employees during the last 3 years and to be aware of average pay levels). The number of organizations in the sample for which the full HPWS indicator could be determined is presented in table 2.

table 2 Availability of the HPWS indicator, by size class

<i>Size class</i>	<i>Number of observations</i>		
	<i>Total</i>	<i>For which HPWS indicator could be determined</i>	
<i>(size of workforce)</i>	<i>Count</i>	<i>Count</i>	<i>Share</i>
6-20	495	253	51%
21-50	212	130	61%
51-100	170	121	71%
100-175	32	21	66%
Total	909	525	58%

*Note: shares represent percentages within each size class*

*Source: SME Policy Panel (EIM)*

The results in table 2 show a substantial correlation between firm size and availability of the HPWS indicator. For organizations with a work force between 6 and 20 people, information is missing for almost 50% of all enterprises. We limited this problem by defining the HPWS indicator in an alternative way: not as the average score over all 6 HPWS components, but as the average score over all available HPWS components, provided that information is available for at least 5 components. In other words, firms for which the HPWS indicator couldn't be determined as information for one of the components was missing, are now included in the definition of the HPWS indicator. This results in a substantial increase in the number of valid observations (from 525 to 828), as can be seen in table 3. The availability of this alternative HPWS indicator is still correlated with firm size, but the difference between the size classes is considerably lower.

table 3 Availability of adapted HPWS indicator, by size class

<i>Size class</i>  (size of work- force)	<i>Number of observations</i>		
	<i>Total</i>	<i>For which adjusted HPWS indicator could be determined</i>	
	<i>Count</i>	<i>Count</i>	<i>Share</i>
6-20	495	435	88%
21-50	212	198	93%
51-100	170	165	97%
100-175	32	30	94%
Total	909	828	91%

*Note: shares represent percentages within each size class*

*Source: SME Policy Panel (EIM)*

The disadvantage of this approach is that the HPWS indicator is not defined identically for all firms in the sample. The advantage is that the sample for which the adjusted indicator is available better represents the SME population. In particular, it doesn't exclude small firms that haven't recruited new employees in the past three years.

Correlations between firm size indicators (in people and in full-time equivalents), the two HPWS indicators and the underlying HPWS components are included in annex 1. For each HPWS component the correlation with both HPWS indicators is very similar. This suggests that the alternative indicator is acceptable for use in subsequent analyses. We therefore use the adjusted HPWS indicator (HPWS\_adj) in our further analyses.

#### 3.4.2 *Transactional and transformational leadership*

Ideally, the dominant leadership style within an enterprise should be determined by questioning the employees of a firm. Since the current study doesn't allow us to question employees, we have questioned the entrepreneur instead. We have presented 14 different propositions to the respondents, and asked them to which extent (on a 5-point scale) these proposi-



tions apply to their own style of leadership. An exploratory factor analysis confirmed that these 14 items could be summarized by two factors<sup>1</sup>. Based on these items, we defined two separate scales for transactional and transformational leadership (table 4). The reliability of these scales is sufficient. As expected, the correlation between these two scales is low (0.37).

table 4 Scales on transactional and transformational leadership

	<i>Scale</i>	
	<i>Transactional</i>	<i>Transformational</i>
Checking whether employees make mistakes	X	
Point out to employees when their performance is inadequate	X	
Ensure that employees know what is expected of them	X	
Stimulate that employees pursue the same goal	X	
Ensure that employees know how their work is rewarded	X	
Talk to employees about the company's vision		X
Ensure that employees are enthusiastic about their work		X
Stimulate employees to approach old problems in new ways		X
Giving employees enough space to approach old problems in new ways		X
Take account of the personal well-being of each employee		X
Let employees participate in decisions		X
Show confidence in employees		X
Let employees determine as much as possible how they carry out their activities		x
Listen to what employees consider to be important		X
Cronbach's Alpha (on standardized items)	0,67	0,75
N (Valid observations)	911	911

*Note: the reliability analysis has been performed on all enterprises that participated in the specific interview in which these questions were asked. This is a larger sample than the working sample that is used for the HPWS analysis.*

*Source: SME Policy Panel (EIM)*

Not all respondents answered our questions on leadership. About 10% of the respondents replied that they did not manage any employees themselves (in which case no further questions regarding their leadership style were asked). Of those respondents that do manage employees themselves, 50% directly manages less than a third of the total workforce.

<sup>1</sup> The factor analysis resulted in four factors with an eigenvalue exceeding 1; the scree plot, however, suggested that two factors would be adequate to summarize the items.

### 3.4.3 *Performance measures*

We include various performance measures in this study: sickness absence and labour turnover, labour productivity (per full-time equivalent), profit (per full-time equivalent), and the innovativeness of an organization.

It is very difficult to obtain reliable estimates of sickness absence rates through telephonic interviews. Rather than asking respondents for a specific percentage, we have presented eight different classes of absence rates (ranging from 0% and less than 2% to more than 10%), and asked the respondents in which class the absence rate of their firm (excluding maternity leave) fell. The resulting variable is an ordinal variable with 8 different categories. To simplify the analysis, we have created a dummy variable that indicates whether the sickness absence rate is at least 4% (which is the case for 23% of the enterprises). Logistic regressions can be used to determine whether firms with a high performance work system are less likely to have a relatively high level of sickness absence.

The measurement of labour turnover (and its relationship with human resource management practices) is also not without difficulties. Especially for a sample that includes many small firms, a large share of the enterprises is likely to report no labour turnover for the past year. Indeed, we find that 35% of all enterprises in our sample reported no labour turnover of any kind. As a consequence, labour turnover cannot be examined by means of a straightforward linear regression.

More importantly, there is also a theoretical argument against the usage of OLS to examine determinants of labour turnover. Labour turnover is a relevant outcome variable, since it is assumed to be related to performance measures such as productivity and profit. In this respect, a firm's optimal turnover rate can be defined as the rate that maximizes productivity or profit. It is likely that this optimal rate is not zero, but somewhat larger than zero. The exact optimal rate is, however, unknown, and may vary between firms and over time. This makes it very difficult to formulate a hypothesis regarding the relationship between HPWS and labour turnover that can be examined with a regression model. Instead, we formulate a more modest hypothesis: more attention for HPWS will reduce the likelihood that a firm is confronted with a relatively high percentage of labour turnover. In this study, we define 'relatively high' as having a labour turnover that belongs to the top 25% of the relevant size class<sup>1</sup>. This hypothesis can be tested by means of a logistic regression.

Labour productivity is measured by (the natural log of) sales per full-time equivalent in 2004, and profit by (the natural log of) profit per full-time equivalent in 2004<sup>2</sup>. The innovativeness of an organization is represented by a dummy variable that indicates whether or not the company introduced

<sup>1</sup> In addition, we correct labour turnover for turnover due to (pre)retirement. This source of labour turnover is more related to the age profile of the workforce than to the management of the work force.

<sup>2</sup> To be exact, profit is defined as  $\text{LN}(\text{profit}/\text{fte} + \text{MIN})$ , where MIN is the minimum observed level of profit/fte; this ensures that our profit measure is also defined for firms with a negative profit.

product or process innovations during the past three years. As indicated, we expect positive relationships between the HPWS and these indicators.

Descriptive statistics of the main variables of interest of this study are presented in table 5.

table 5 Descriptive statistics on main variables of interest

<i>Variables</i>	<i>Scale</i>	<i>Mean</i>	<i>St. dev</i>	<i>Valid obser- vations</i>
High performance work system	0-1	,38	,15	828
transactional leadership	1-5	2,95	,74	611
transformational leadership	1-5	3,25	,60	593
High sickness absence (at least 4%)	dummy	,22	,41	656
High labour turnover (in top 25% of relevant size class)	dummy	,25	,43	896
sales per fte (x 1.000 Euro, 2004)	continuous	246	737	749
profit per fte (x 1.000 Euro, 2004)	continuous	25	74	409
Innovativeness (2002-2004)	dummy	,69	,46	908

*dummies are coded as 0 (no) or 1 (yes); the mean value thus represents the share of the sample that answered 'yes'.*

#### 3.4.4 *Control variables*

An important control variable is employment in 2004, measured as the log of the number of full-time equivalents. Sectoral differences are accounted for by including dummies for 14 different sectors of industry. In addition, we control for the presence of a collective labour agreement. The educational level of the entrepreneur is represented by a dummy whether or not the entrepreneur has obtained a higher vocational or university degree.

We have also examined the relevance of the share of employees that are highly educated (higher vocational or university degree). Since this information is often lacking, and preliminary analyses suggested that it was not related to the dependent variables in our study, we have not included this variable in the final analyses that are included in this study. Likewise, we have examined the relevance of the presence of an HRM department and /or official. This information is also often lacking, and we therefore only include it in our final estimates if it has a significant effect.

#### 3.4.5 *Interaction variables*

An important part of this study is to explore the presence of moderating effects. We test for the presence of such effects by including interaction variables in the regression equations that we estimate. These interaction variables are defined as the product of our adjusted HPWS indicator with the available measures of firm size, transformational leadership and innovative-

ness. To reduce the risk of multicollinearity<sup>1</sup>, the interaction variables are based on the standardized values of the relevant variables<sup>2</sup>.

### 3.5 Removal of outliers

Once all relevant variables are defined and some preliminary analyses are performed, we are able to identify a limited number of outliers for the various analyses. We exclude companies with a very low or very high productivity level (for example, 6 companies have a productivity level of less than € 10.000 / fte). Preliminary analyses show that these observations can be considered as outliers. For the analysis on profitability we exclude companies with a profit of less than € 10.000 per fte or more than € 10 mln per fte.

<sup>1</sup> This would occur if the interaction variable is highly correlated with (a linear combination of) the underlying variables.

<sup>2</sup> The variables are standardized to a mean of zero and a standard deviation of one.

## 4 Results

### 4.1 Correlations

The correlations between the main variables of interest are presented in table 6. The main independent variables are the application of a high performance work system (HPWS), the scales on transactional and transformational leadership of the entrepreneur and firm size; the main dependent variables are labour productivity and profit per full-time employee.

table 6 Correlations between main dependent and independent variables (observations included in regression analyses)

		<i>HPWS</i> <i>_adj</i>	<i>Trans-</i> <i>act</i>	<i>Trans-</i> <i>form</i>	<i>Firm</i> <i>size</i>	<i>Sales</i> <i>per fte</i>	<i>Profit</i> <i>per fte</i>
<i>Adjusted HPWS indicator</i> <i>(HPWS_adj)</i>	Correlation	1	-,002	,203 **	,082 *	,193 **	,127 *
	Valid obs.	667	506	496	667	667	373
<i>Transactional leadership</i> <i>(Transact)</i>	Correlation		1	,397 **	-,011	-,054	,015
	Valid obs.		546	522	546	546	356
<i>Transformational leadership</i> <i>(Transform)</i>	Correlation			1	,011	,018	,015
	Valid obs.			534	534	534	351
<i>Number of full-time equivalents in 2004</i> <i>(Firm size)</i>	Correlation				1	-,021	-,089
	Valid obs.				725	725	394
<i>Sales per fte</i>	Correlation					1	,433 **
	Valid obs.					725	394
<i>Profit per fte</i>	Correlation						1
	Valid obs.						394

Observations are included in this table if they meet the following criteria: more than 5 people employed in 2004; respondent was owner or general manager; sales per fte lie between € 10.000 and € 10 mln, the number of establishments is less than 100.

\*significance level < 0.05; \*\* significance level < 0.01

As expected, HPWS is positively correlated with all variables except transactional leadership. A high score on this HRM index is more likely amongst larger firms and amongst firms where the leadership style of the entrepreneur resembles transformational leadership. The score on the HPWS index is also positively related to labour productivity and profit per full-time equivalent.

Contrary to our expectations, transformation leadership is only related with our HPWS index. Entrepreneurs of small firms are just as likely to report a transformational leadership style as larger firms are. Moreover, transformational leadership is not related to labour productivity or profit per employee.

To further examine the relationships between these variables, the following sections present the results of various multivariate regression equations in the following sections. Amongst others, we find that the two scales on leadership styles are often not related to the dependent variables of the various equations. Since including these leadership styles results in a considerable loss of valid observations, the tables in the rest of this section only include

results on leadership styles if these are found to be significant. Otherwise, these scales are excluded from the reported regression analyses<sup>1</sup>.

## 4.2 Labour turnover and sickness absence

We hypothesize a significant (negative) relationship between HPWS on the one hand and labour turnover and sickness absence on the other hand. To test these hypotheses, we estimate logistic regressions to examine determinants of the probability that a firm has a relative high labour turnover rate (amongst the highest 25% of the relevant size class) and a high sickness absence rate (at least 4%). The results of these regressions do not support our hypotheses (table 7).

table 7 Results of logistic regression on labour turnover and sickness absence

<i>Variables</i>	<i>High labour turnover (in top 25% of relevant size class) (2004)</i>	<i>High sickness absence (at least 4%) (2004)</i>
<i>Control variables</i>		
Ln (Firm size)	-0.20	0.67 **
Collective Labour Agreement present	0.14	-0.05
Educational level entrepreneur	-0.06	0.11
Sector dummies	yes **	yes
<i>Main and interaction effects</i>		
HPWS (adjusted)	-0.44	-0.78
Transactional leadership	0.32 *	-
Transformational leadership	-0.46 *	-
HPWS * ln (firm size)	0.047	0.11
HPWS * transactional	0.11	-
HPWS * transformational	-0.02	-
<i>Goodness of fit measures</i>		
% predicted correctly	73.3 a)	77.9 b)
R <sup>2</sup> (Nagelkerke)	0.168	0.178
Chi <sup>2</sup> -test for main effects	6.537 #	0.60
Valid observations	483	544

a) as compared to 74.0 % in the empty model

b) as compared to 76.4 % in the empty model

#  $p < 0.1$  ; \* $p < 0.05$ ; \*\*  $p < 0.01$

The probability that an organization's labour turnover rate has a relatively high level does not seem to depend on the presence of a high performance work system. Instead, it depends on the style of leadership: transactional leadership is associated with high turnover levels, while transformational leadership is associated with low turnover levels. These two main effects are the only significant effects of leadership style that we have encountered in our study.

<sup>1</sup> Excluding these scales increases the number of valid observations on average with more than a third. Regression results including the leadership scales are reported in annex II.

Larger firms are more likely to have a high sickness absence rate, which is consistent with the well-known fact that sickness rates decrease with firm size (De Kok, 2005). Otherwise, none of the variables (including the sectoral dummies) have a significant relationship with the dependent variable. We have also estimated an alternative model, where we use a linear regression analysis to explain the underlying (8-point) ordinal variable that represents different classes of sickness absence. Also here, none of the independent variables has a significant effect.

A possible explanation for this result is that sickness absence rates tend to be relatively low in small firms (De Kok, 2005). Sickness absence rates are determined by both the motivation and ability of employees to attend at work (Steers and Rhodes, 1978). Studies into sickness absence tend to focus on the motivation of employees to attend, assuming that a substantial share of sickness absence is due to a lack of motivation rather than a lack of ability. This assumption may be less relevant for small firms. The relatively low absence levels may be the result of relatively high levels of employee commitment (Guest, 1999), suggesting that sickness absence in small firms is mainly due to a lack of ability to attend rather than a lack of motivation. Under these circumstances, absence rates are more likely to be affected by policies to improve working conditions rather than HPWS-related practices.

#### 4.3 Innovativeness

We have estimated a logistic regression to examine determinants of the probability of firms to be innovative. The results show that larger firms and firms with a highly educated entrepreneur were more likely to have innovated in the recent past than other firms (table 8). Also, the share of innovative enterprises differs by sector. As expected, we also find a significant positive effect for the relationship with our HPWS indicator. This suggests that, also for firms with a work force between 6 and 175 people, an increased attention for HPWS is associated with an increased likeliness of innovativeness of the firm.

We also find support for interaction between HPWS and firm size. Contrary to our expectations, the sign of this interaction term is negative. This relationship is significant at a 10% significance level<sup>1</sup>. This suggests that for large firms the positive relationship between HPWS and innovativeness is less strong than for smaller firms.

How can we explain this result? It is possible that our argument for a positive interaction effect is only valid for those employees that are actually involved in innovative activities. In that case, we would expect a stronger interaction effect for firms where a larger share of employees is involved in innovative activities. In particular, if the share of employees that is involved in innovative activities (within innovative firms) would decrease with firm size, this would explain the negative interaction effect that we observe.

<sup>1</sup> If we include the leadership scales in the model, the negative effect of the interaction term becomes significant at the 5% significance level (see table 12 in annex II).

Since this share of employees is not observed, we cannot examine this possibility further.

table 8 Results of logistic regression on innovativeness

<i>Variables</i>	<i>Innovations introduced in past 3 years</i>
<i>Control variables</i>	
Ln (firm size)	0.36 **
Collective Labour Agreement present	-0.46
Educational level entrepreneur	0.58 **
Sector dummies	yes*
<i>Main and interaction effects</i>	
HPWS (adjusted)	2.81 **
HPWS * Ln (firm size)	-0.24 #
<i>Goodness of fit measures</i>	
% predicted correctly	79.1 a)
R <sup>2</sup> (Nagelkerke)	0.133
Chi <sup>2</sup> -test for main and interaction effects	12.64 **
Valid observations	666

a) compared to 77.9.0 % in the empty model

#  $p < 0.1$  ; \* $p < 0.05$ ; \*\*  $p < 0.01$

#### 4.4 Labour productivity and profit

##### *Labour productivity*

As expected, labour productivity varies between sectors of industry and tends to increase with the educational level of the entrepreneur (table 9). We find a small negative elasticity of firm size, which indicates that if the number of full-time equivalents increases with 10%, labour productivity decreases with 0.7%<sup>1</sup>.

In line with previous studies amongst larger firms, we find that also for small firms an increased attention for HPWS is associated with higher labour productivity levels. This is apparent from the significant positive effect of HPWS.

This positive effect of HPWS on labour productivity is not due to an indirect effect through innovation, sickness absence or labour turnover. While HPWS has a positive impact on innovation and leadership styles are related to labour turnover, none of these mediating variables have a significant impact on labour productivity<sup>2</sup>. Hence, we do not report the outcomes of this model specification here. Likewise, there is no support for any relationship be-

<sup>1</sup> Since both the number of full-time equivalents and sales per fte are measured in logarithms, the estimated parameter is an elasticity.

<sup>2</sup> In addition, a chi-square test on model improvement rejects the hypothesis that the R<sup>2</sup>-rate reduces significantly if these three variables are added to the model.



tween transactional and transformational leadership and labour productivity. This holds for the main effects as well as the interaction effects. Since removing the leadership scales from the model results in a substantial increase of valid observations, we only report the results of the model without leadership.

Including the presence of an HRM department or official results in somewhat different results (table 9, third column). We find a significant positive effect of the presence of such an official / department, indicating that firms with relatively high levels of labour productivity are more likely to have an HRM official or department. Surprisingly, the interaction effect between HPWS and firm size is negative, implying that amongst smaller firms, the productivity differences between firms with high and low scores on the HPWS index are larger than for large firms. The size of this interaction effect is however relatively small, as compared to the size of the main effect of HPWS on labour productivity.

table 9 Results of OLS regression on labour productivity

<i>Variables</i>	<i>Labour productivity (ln (sales per fte) )</i>	
<i>Control variables</i>		
Ln (firm size)	-0.07 #	-0.17 **
Educational level entrepreneur	0.24 **	0.19 **
Collective Labour Agreement present	0.12	0.16 #
Sector dummies	yes **	yes **
<i>Main and interaction effects</i>		
HPWS (adjusted)	1.35 **	1.69 **
HPWS * ln (firm size)	-0.05	-0.10 *
HPWS * innovativeness	-0.06	-0.06
HRM department / official present		0.20 **
Model R2 (adjusted)	0.22	0.25
F-test for main and interaction effects	0.03 **	0.01 *
Model F	11.173 **	11.360 **
N	666	607

#  $p < 0.1$  ; \* $p < 0.05$ ; \*\*  $p < 0.01$

### *Profit*

The results of our regression analysis on profit are presented in table 10. As expected, we find a significantly positive effect of labour productivity and negative effects of high rates of sickness absence and labour turnover (final column in table 10). The negative effect of labour turnover is, however, not significant (at the 5% confidence level). We find no main effects of HPWS and leadership styles, but we do find a positive effect of the interaction between HPWS and firm size. This suggests that HPWS has a larger impact on the profitability of larger firms than for smaller firms.

HPWS is positively related with labour productivity (table 9), which, in turn, is positively related with the profitability of enterprises (see the final column in table 10). This suggests that labour productivity mediates the rela-

relationship between HPWS and profitability. To examine whether this is the case, we have estimated the regression equation stepwise by subsequently introducing the relevant variables of the model: starting with the control variables, then adding the main effects, interaction effects and finally the mediators. The results of these steps are reported in columns 2 to 5 of table 10.

table 10 Results of stepwise OLS regression on profit

Variables	Profit (Ln (profit per fte))			
	Step 1	Step 2	Step 3	Step 4
<i>Step 1: control variables</i>				
Ln (firm size)	-0.09 *	-0.10 *	-0.11 **	-0.07
Educational level entrepreneur	-0.01	-0.02	-0.02	-0.06
Collective Labour Agreement present	-0.05	-0.01	-0.00	-0.04
Sector dummies	yes *	yes #	yes #	yes #
<i>Step 2: main effects</i>				
HPWS (adjusted)		0.62 *	0.13	-0.15
Transactional leadership		-0.04	-0.04	-0.02
Transformational leadership		0.11 #	0.12 #	0.10
<i>Step 3: interaction effects</i>				
HPWS * ln(firm size)			0.10 *	0.11 *
HPWS * transactional			0.02	0.04
HPWS * transformational			0.02	-0.00
HPWS * innovativeness			0.03	0.04
<i>Step 4: mediators</i>				
Ln (sales per fte)				0.17 **
Innovativeness				0.07
High sickness absence (at least 4%)				-0.16 *
High labour turnover (in top 25% of relevant size class)				-0.15 #
Model R2 (adjusted)	0.040	0.064	0.069	0.130
R2 change	0.087 *	0.031 *	0.017	0.068 **
Model F	1.875 *	2.183 **	2.057 **	2.798 **
N	313	313	313	313

#  $p < 0.1$  ; \* $p < 0.05$ ; \*\*  $p < 0.01$

First of all, we find a significant positive effect of HPWS on firm profits if we include only the main effects in the model (step 2). Once we introduce the interaction effect between HPWS and firm size, the main effect reduces and becomes insignificant (step 3). The estimated parameter decreases further if labour productivity is added to the regression equation (from 0.13 to -0.15, see steps 3 and 4). This is consistent with the idea of labour productivity mediating the relationship between HPWS and profits. However, the magnitude of this decrease is less than one standard deviation of the esti-

mated HPWS parameter of step 3. Furthermore, for neither of these steps (step 3 and step 4) can we reject the hypothesis of no effect of HPWS on profits. We therefore conclude that there is no support for a mediating role of labour productivity in our model<sup>1</sup>.

There are some weak indications that transformational leadership has a positive effect on profits. In step 2 we find a positive effect of transformational leadership that is significant at a 10% confidence level. Furthermore, transformational leadership reduces the likeliness of high labour turnover rates (see table 7). According to step 4, this would have a positive effect on profits (the negative relationship between high labour turnover and firm profits is significant at a 10% confidence level). However, since none of these effects on profitability is significant at a 5% confidence level, we conclude that our present data set does not support the hypothesis of a positive relationship between transformational leadership and firm profits.

<sup>1</sup> Since the parameter of the interaction between HPWS and firm size does not decrease if labour productivity is added to the model (step 4), labour productivity also does not mediate the relationship between this interaction effect (of HPWS and firm size) and profits.

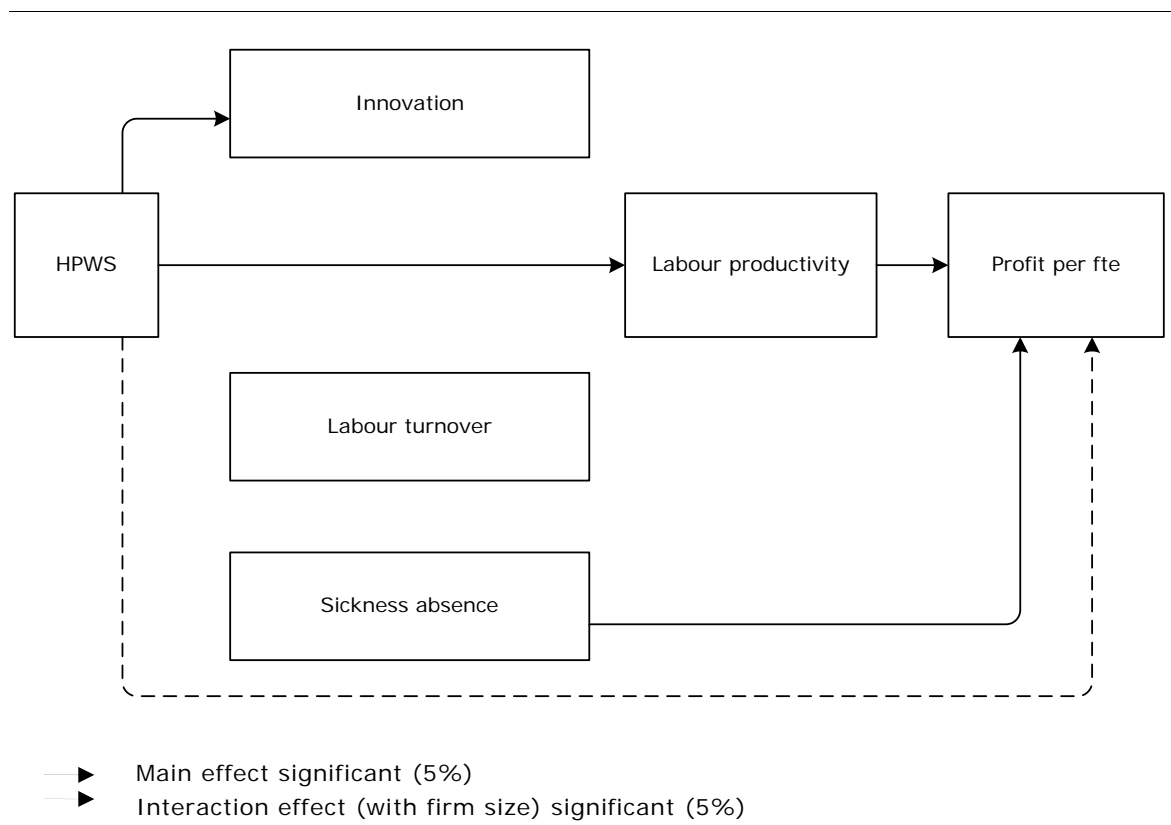


## 5 Discussion and conclusion

### *Main conclusions*

The main findings of this study are summarized in figure 2. First of all, we find a positive relationship between HPWS and innovativeness in small firms. To enhance innovation, HRM practices that firms have in place need to ensure that an environment exists where employee creativity can thrive and in which new knowledge and skills can be created as well as successfully implemented. Our results suggest that HPWS may well help provide such an environment. Through creating an able and motivated workforce HPWS may help build the needed capacities for successful innovation that is so crucial to small firms.

figure 2 Main findings



In addition, we find that an increased attention for HPWS is associated with higher levels of labour productivity in small firms. The positive relationship between HPWS and labour productivity is independent of firm size. Labour productivity, in turn, has a positive effect on the profitability of organisations. Although this suggests that labour productivity mediates the relationship between a high performance work system and profits, further analysis shows that this is not the case. While the indirect effect of a high performance work system is independent of firm size, the direct effect is strongly related to firm size. This result suggests that investing in HPWS is more profitable for larger firms than for the smaller firms in our sample.

For labour turnover and sickness absence, we found no relationship with the presence of a high performance work system. Instead, we found a relationship between labour turnover and the leadership style: transactional leadership increases the likelihood of having a relatively high level of labour turnover, while transformational leadership reduces this likelihood. This suggests that managers with a transformational leadership style are more able to retain employees.

The lack of any relationship between HPWS and sickness absence may be due to our focus on SMEs. HPWS may reduce sickness absence levels, to the extent that it increases the motivation of employees to attend to work. However, in the case of small firms it is likely that sickness absence is mainly the result of a lack of ability to attend rather than a lack of motivation to attend.

#### *A comparison with previous studies*

In line with Huselid's (1995) findings in his study among larger firms, we find that also for small firms HPWS is positively associated with labour productivity. This differs from the results obtained by Way (2002), who hypothesized but did not find this significantly positive association between HPWS and labour productivity in US small firms. However, Way also measured managers' perceptions of productivity and did find a positive impact of HPWS on such perceptions. Here, the regression analyses show a small but positive impact of HPWS on labour productivity.

An important difference between our study and Way (2002) is the measurement of labour turnover. Way (2002) follows a conventional approach by examining the log of the percentage of employees who left the firm in the last year (Way, 2002, page 773). Using this measure, he finds a significantly negative relationship between HPWS and labour turnover. As we have argued, we believe that this is not a suitable measurement, in particular in the case of small firms (35% of all firms in our sample reported no labour turnover over the past year). Instead, we have defined a binary variable that tells us whether or not the labour turnover of a firm belongs to the top 25% of the relevant size class. We find no significant relationship between HPWS and this binary variable.

Our study does not find empirical support for a mediating effect of labour productivity. A possible explanation is that there is a mediating effect, but that it is too small to be found. After all, the HPWS variable explains only a small part of the variation in labour productivity, which in turn explains only a small part of the variation in profits. The results of Arthur (1994) suggest a different explanation. Arthur (1994) found that HR systems aimed at improving the commitment of employees reduce the scrap rate of the production process of steel mills. This suggests a negative relationship between commitment-oriented HR systems and the costs of production. This result suggests that attention for HPWS does not (only) affect firm profits through its effect on sales per fte, but (also) through its effect on other employee performance indicators. More attention for HPWS may for example lead to improved quality and/or client service, or it may stimulate employees to act more cost oriented.

### *Strengths and limitations*

One of the limitations of Way's (2002) study was that his data set did not include firms with fewer than 20 employees. Here, we further address the lack of multi-industry HPWS research conducted within the small business sector by using a data set that does include smaller firms. We have demonstrated that HPWS is associated with higher labour productivity and innovativeness for the examined population of small and medium-sized firms with a workforce of 5 – 175 people.

A strength of this study is the introduction of innovation as a relevant performance indicator. Nevertheless, we would welcome a more sophisticated measure of innovativeness in future research. A further asset of this study is that it includes information about the profitability of firms. Finally, we believe this is the first study that examines (and finds) the presence of interaction terms.

We have also included information about leadership styles, but our available measure is not really adequate. We were limited to questioning the entrepreneur instead of the employees. Nevertheless, we found a relationship between leadership style and labour turnover, which in turn affects profits.

Perhaps the main limitation of the study is the cross-sectional nature of the data used to test the proposed linkages between HPWS and performance indicators. The cross-sectional data used here implies that the models that we have used can all be seen as temporally backward predictive models (cf. Way, 2002). For example, the HPWS in place at the time of data collection is used to predict the rate of innovativeness over the past period up to the time of the study measuring HPWS (instead of the future period, following the measurement of the HPWS). Thus, the direction of causality cannot be determined. The same applies for the relationship between HPWS, productivity and profitability. Longitudinal designs in which outputs are measured at a later date than HPWS would provide a better test of the different proposed effects of HPWS as well as the causal direction of the linkages.

The HPWS literature proposes that HPWS can have a positive impact on (intermediate indicators of) firm performance. Our study partially supports this. However, this impact is at least in part proposed to run via the system's impact on employee skills, behaviours, motivation, and outputs. Data on this is not available in current studies in this area (including ours). Future studies examining the link between HPWS and firm performance empirically testing the proposed mediating role of such workforce variables would be very useful for further theory development in this area.

### *Conclusion*

Within this study's sample of small Dutch firms, HPWS is associated with higher labour productivity, higher profits and more innovativeness. This suggests that HPWS may enhance the ability of small firms to select, develop, and motivate a workforce that produces superior and innovative employee output. This is not only relevant to science, but also to the millions of small firm owners. Investing in people management may well literally 'pay off'!





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# Correlations

table 11 Correlations between (sub)indices for high performance work systems and firm size (all observations in the sample)

		<i>fte04</i>	<i>HPWS</i>	<i>HPWS_adj</i>	<i>staffing</i>	<i>perform</i>	<i>paylevel</i>	<i>rotation</i>	<i>training</i>	<i>participation</i>
<i>wp04 (size of workforce (people) in 2004)</i>	Correlation	,971**	,099*	,102**	,103**	,190**	-,058	,049	,008	-,039
	Significance level	,000	,024	,003	,003	,000	,129	,145	,839	,243
	Valid observations	894	525	828	849	909	689	901	732	901
<i>fte04 (number of full-time equivalents in 2004)</i>	Correlation	1	,102*	,109**	,110**	,196**	-,061	,029	,021	-,041
	Significance level		,020	,002	,001	,000	,112	,387	,573	,219
	Valid observations	894	517	817	834	894	679	887	721	888
<i>HPWS (indicator for High performance work system)</i>	Correlation		1	1,000**	,289**	,674**	,314**	,202**	,402**	,626**
	Significance level			,000	,000	,000	,000	,000	,000	,000
	Valid observations		525	525	525	525	525	525	525	525
<i>HPWS_adj (adjusted HPWS indicator)</i>	Correlation			1	,344**	,659**	,362**	,229**	,434**	,620**
	Significance level				,000	,000	,000	,000	,000	,000
	Valid observations			828	795	828	678	824	718	822
<i>staffing (extensiveness of staffing)</i>	Correlation				1	,203	-,033	,073*	,125**	,034
	Significance level					,000	,401	,035	,001	,323
	Valid observations				849	849	646	841	688	841
<i>perform (group-based performance pay)</i>	Correlation					1	,035	,045	,133**	,115**
	Significance level						,354	,180	,000	,001
	Valid observations					909	689	901	732	901
<i>paylevel (pay level below, at or above average)</i>	Correlation						1	,047	,002	-,033
	Significance level							,216	,953	,395
	Valid observations						689	685	568	682
<i>rotation (percentage of non-managerial employees involved in job rotation)</i>	Correlation							1	,053	,052
	Significance level								,150	,118
	Valid observations							901	725	894
<i>training (share of employees that followed firm-provided training)</i>	Correlation								1	,104**
	Significance level									,005
	Valid observations								732	725

\*significance level < 0.05; \*\* significance level < 0.01



## Regression results including leadership styles

table 12 Results of logistic regression on sickness absence and innovative output

<i>Variables</i>	<i>High sickness ab- sence (at least 4%) (2004)</i>	<i>Innovations intro- duced in past 3 years</i>
<i>Control variables</i>		
Ln (Firm size)	0.72 **	0.37 **
Collective Labour Agreement present	-0.10	-0.29
Educational level entrepreneur	0.17	0.46 #
Sector dummies	yes	yes
<i>Main and interaction effects</i>		
HPWS (adjusted)	-0.73	3.11 **
Transactional leadership	0.07	0.17
Transformational leadership	-0.14	0.34
HPWS * ln(firm size)	0.11	-0.39 *
HPWS * transactional	0.17	-0.09
HPWS * transformational	-0.03	0.17
<i>Goodness of fit measures</i>		
% predicted correctly	78.7 a)	78.9 b)
R <sup>2</sup> (Nagelkerke)	0.192	0.141
Chi <sup>2</sup> -test for main effects	0.479	12.17 **
Chi <sup>2</sup> -test for interaction effects	1.638	6.75 #
Valid observations	474	483

a) as compared to 76.4 % in the empty model

b) as compared to 77.4 % in the empty model

#  $p < 0.1$  ; \* $p < 0.05$ ; \*\*  $p < 0.01$

table 13 Results of linear regression (OLS) on labour productivity

<i>Variables</i>	<i>Labour productiv- ity (ln (sales per fte))</i>
<i>Control variables</i>	
Ln (firm size)	-0.10 *
innovativeness	0.03
Educational level entrepreneur	0.23 **
Collective Labour Agreement present	0.12
Sector dummies	yes **
<i>Main effects</i>	
HPWS (adjusted)	1.41 **
Transactional leadership	-0.08
Transformational leadership	0.04
<i>Interaction effects</i>	
HPWS * ln(firm size)	-0.04
HPWS * transactional	-0.06
HPWS * transformational	0.07
HPWS * innovativeness	-0.07
Model R2 (adjusted)	0.22
F-test for main and interaction effects	0.03 **
Model F	6.791 **
N	483

#  $p < 0.1$  ; \* $p < 0.05$ ; \*\*  $p < 0.01$



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