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Human resource systems and employee performance in Ireland and the Netherlands: a test of the complementarity hypothesis

Justine Horgan and Peter Mühlau

Abstract A central claim of strategic HRM is the notion that the way a firm manages its workforce affects its corporate performance. In particular, ‘high performance human resource management’, a systematic approach toward HR management consisting of internally consistent HR dimensions that develop the skill and motivation of the workforce, is considered to contribute to the ‘bottom-line’ of companies. The benefits are attributed generally to ‘complementarities’ among the constituent dimensions. In the theoretical part of this paper we distinguish between three different processes resulting in such complementarities: reinforcement, flanking and compensation. These different processes are exemplified for five areas of high performance human resource management, incentives systems, training, sharing arrangements, guidance and selective recruitment. In the empirical part of this paper we examine whether the effect at the employee level can be traced to the complementary relationships among the five high performance HR dimensions. The core hypothesis to be tested in this study is that the complementarity effect of the high performance HR management system enhances employee performance over and above the sum of the effects of the five practices. This complementarity hypothesis is tested using a methodology for the test of systems effects suggested by Ichniowski *et al.* (1997). The data come from a matched establishment survey in two European countries, Ireland and the Netherlands. These datasets comprise data from nearly 400 establishments. Key findings are that the complementarity hypothesis is fully supported by the Irish data but rejected by the Dutch data.

Keywords Complementarities; high performance HRM systems; Ireland; the Netherlands.

Introduction

There is considerable support among those involved in strategic HRM for the notion that how a firm manages its workforce affects its performance. This idea is strongly reflected in the high performance human resource management (HPPHR) discussion where the effect of HR is assumed to impact positively at the employee level (Appelbaum *et al.*, 2000; Batt, 2002; Schuler and Jackson, 1987). The employee level in turn is considered

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to be an important mediator of the relationship between the system and corporate performance or between the system and company production level outcomes (e.g., Horgan, 2003; Huselid, 1995; MacDuffie, 1995). In terms of explaining this, there is widespread consensus for the idea that the main benefits come from using a coherent bundle or set of HR dimensions (Huselid, 1995; Ichniowski *et al.*, 1997).

But what constitutes this coherence among the practices? Delery (1998) discusses the different types of relationships that are possible among HR practices and evaluates these in terms of their contribution to HR outcomes. First practices may present an additive relationship with one another when producing the desired HR outcome. These practices have independent, non-overlapping effects on the outcome. Second practices may have interactive effects in that their usefulness depends on the level of the other practices in the system. Some of these may be substitutes for one another, leading to identical outcomes. If two practices are substitutes, then the presence of one practice reduces the marginal contribution of the other. Another type of interactive effect referred to by Delery (1998) is the synergistic relationship among practices. Synergy among practices implies that using these practices together results in a substantially different effect than the sum of their individual contributions. There are two possible forms of synergistic relationships. One involves practices working against one another and is described by Becker *et al.* (1997) as 'deadly combinations'. Alternatively two practices may work in tandem or with one another, enhancing each other's effectiveness and in this case the outcome effect of the combination would be substantially greater than the sum of the individual effects (Delery, 1998: 5; Milgrom and Roberts, 1995). In short, positive synergy implies that the performance benefits of HR practices are strongly dependent on the presence of other complementary practices. But are we in a position to estimate the potential for positive synergy among practices – can we evaluate a human resource system in terms of the complementary relationships among the practices? This requires insight into the processes that underlie the positive interactions among the constituents of the HR system.

In this paper we suggest three different mechanisms of how the combination of practices can boost performance. The first of these points to the condition that practices with a similar aim *reinforce* one another. The second mechanism concerns the process of *flanking* whereby productivity gains arise from one practice creating conditions that enhance the effectiveness of the other. The third mechanism underpinning complementarity is *compensation* where the unintended, undesirable side effects of HR practices are blocked or mitigated by another practice.

A second objective of this study is to contribute empirically to the study of complementarities among human resource dimensions. Evidence for these synergies are surprisingly scarce. While a number of studies examine complementarities between forms of work organization and human resource strategies (Becker and Huselid, 1998; Delaney and Huselid, 1996; MacDuffie, 1995), this study focuses on complementarities among a set of five dimensions of human resource management. Further, research on human resource systems or bundles has focused primarily on financial performance and productivity as dependent variables, which is perhaps a reflection of the interest in the effect that high performance work systems have for the company's bottom line (Becker and Huselid, 1998; Ichniowski *et al.*, 1997; MacDuffie, 1995). Yet a core assumption of this literature is that the direction of causality of human resource management runs through employee performance and subsequently on to corporate performance. The most immediate effects of human resource management – i.e. the effects on employee performance are, however, rarely studied. In this paper we examine the effects of high performance human resource management on perceived employee

performance. Finally, research has been largely confined to the US and the UK. In order to study whether effects of high performance human resource management are robust for contextual differences, we test the hypotheses for two different national samples taken from Ireland and the Netherlands. In this study, we determine whether there is evidence to suggest that a system of human resource management applying the five dimensions – training, selection, sharing, incentives and guidance (we will also refer to this system as ‘high performance HR management’) – extensively improves employee performance more than other human resource systems in Ireland and the Netherlands. In particular, we will examine whether complementarities between the constituted dimensions account for the superiority of the high performance human resource system.

High performance human resource activities, complementarity and employee performance: theory and hypotheses

A core hypothesis applied in this study is based on the popular view that the focus of a HR system should be to make improvements to employees’ training, skills and knowledge, to stimulate their motivation and provide opportunities for discretionary effort (Appelbaum *et al.*, 2000; Becker *et al.*, 1997; Delery, 1998; MacDuffie, 1995) as well as to establish work norms that support trust and cooperation in the firm. In this study we focus on five core areas of human resource management, which are incentive systems, sharing arrangements, guidance, training and selectivity practices¹. Each of these dimensions of high performance HR management has a principal effect or outcome – for example training programmes ensure that employees have the knowledge and skills that are needed by the firm. The effectiveness of the firm’s HR training programme depends not only on the quality of the training programme itself but also on the extent to which other areas of human resource management complement the training programme. In the following we overview three different types of complementarity relationships before going on to demonstrate how each of these positive interaction effects can be evoked by using the five areas of high performance HR simultaneously.

- 1 *Reinforcement*: HR activities that work in the same direction are not necessarily substitutes but can also reinforce one another. This is the case when one human resource practice is not powerful enough to achieve a critical outcome level and, therefore, needs the support of another practice to exceed this threshold. Such reinforcement is particularly important where the working of the dimension of HR depends on the quality of communication or signalling. Here, signals emitted by one practice may be ambiguous or noisy and hence ineffective; consequently consistent signalling across an array of practices is needed to achieve the modification in employee attitude and behaviour (Baron and Kreps, 1999; Mühlau and Lindenberg, 2003).
- 2 *Flanking*: The effectiveness of HR practices is most often contingent on supportive conditions. Training, for example, is more effective for employees who are motivated to learn and have better cognitive skills – these give a comparative advantage in acquiring and applying new skills. Human resource practices can thus support the working of others by creating favourable conditions. Compensation systems that tie the wage to skill levels, for example, provide learning incentives that improve the employee’s motivation to participate actively in the training programme, are likely to contribute to the effectiveness of training; selection procedures that lead to the recruitment of employees who are willing and able to be trained is another example. We refer to a complementary relationship as *flanking* if one human

resource activity aids the working of another by changing the ‘inputs’ and therefore facilitates achieving its goals more effectively.

- 3 *Compensation*: The third complementarity relationship pertains to the fact that many of the areas of high performance HR management have unintended negative side effects or consequences which, if unchecked, undermine the potential for high performance. Negative side effects are typically associated with how employees process information, form expectations and react to behavioural control. The classical example of the latter is where employees’ intrinsic work motivation is ‘crowded out’ by an over reliance on extrinsic reward system (Frey, 1997). If human resource activities ‘block’ such negative side effects or mitigate their consequences, we refer to *compensation*. In this case, compensating for this effect might come from practices that keep the employee’s intrinsic interest salient. Guidance practices that instil a sense of meaning and purpose and sharing arrangements that succeed in mobilizing a feeling of commitment and obligation can be important in this respect.

‘Positive synergies’ or complementarities among HR practices can thus be achieved by different mechanisms. While reinforcement is based on the consistent working of different practices in the same direction where one practice adds a crucial contribution to the other, both flanking and compensation achieve complementarity by the concerted working of practices with different effects. In the case of flanking, one practice creates conditions that improve the effectiveness of the other. In the case of compensation, one practice blocks or mitigates the negative side effects of the other. These three types of complementarity are essential to the high performance effect in that the outcome of each focal HR dimension is strengthened to the extent that its effect is considerably greater than what might be realized from the simple addition of their individual contributions.

Five dimensions of high performance HR management: a basis for complementarity

In this section we first describe and explain the aspects of employee performance improvements that are particular to each of the five dimensions of high performance HR management. In a second step, we describe the potential to strengthen each of these dimensions by invoking the interdependencies that exist among the five dimensions of high performance HR. We discuss each of the individual areas of high performance HR management, pointing out the reinforcing, flanking and compensating relationships with other HR dimensions.

Table 1 summarizes the discussion of the five areas of HR. We begin by discussing the first and second columns that outline the principal outcome of each of the five areas of human resource management considered in this study. As mentioned above, each of the five dimensions of human resource management improves employee performance in different ways: Well-designed *incentive systems* provide the employee with goals that appeal to her or his self-interest and can be very effective in motivating employees to put forth extra work effort. Given that employees are not expected to cooperate fully when not participating in the economic outcomes of the high performance organization (Levine and Tyson, 1990), incentive systems, by ensuring that the goals and objectives of employee and employer are well aligned, are expected to be a very important area of human resource management. *Training* refers to the company’s planned and systematic efforts to modify or develop the knowledge, skills and attitudes of their employees through learning experiences. As an activity, it spans many boundaries, including the distinction between education and training, on-the-job and off-the-job training, as well as formal and informal training through work experience. *Sharing arrangements* have

Table 1 *Theoretical framework: A basis for complementarity among the HR dimensions*

<i>HR dimension</i>	<i>Main outcome/effect</i>	<i>HR effect contingent on...</i>	<i>Negative effects</i>
<i>Incentive systems</i>	1 Goal setting 2 Motivating 3 Interest alignment	1 Skills and knowledge 2 Motivation 3 Trust and confidence	1 Crowding out intrinsic motivation 2 Frustration
<i>Sharing</i>	1 Opportunities for displaying generosity, trust establishment	1 Effective communication and understanding between company and employees 2 Motivation	1 Taken-for-granted potential 2 Shirking, exploitation 3 Credibility of sharing
<i>Training</i>	1 Skills and work performance enhancing	1 Ability 2 Effort and motivation	1 Employee poaching
<i>Guidance</i>	1 Information sharing 2 Employee socialization into firm norms/culture	1 Training and work performance ability 2 Trust and confidence	1 Patronizing, 'over-supervised' feeling
<i>Selectivity</i>	1 Screening employees at port-of-entry	1 Type/quality of applicants	

the function of providing employees with a share in the fruits of the organization. Sharing arrangements can take various forms such as profit sharing and ownership plans, super-competitive wages, generous fringe benefits, employment security and opportunities for advancement. These practices affect the employee's motivation and trust in management in two ways: first, when the employer commits credibly to sharing, the employee's fears of exploitation are allayed and a trust relationship is more likely to develop; second, sharing is experienced by employees as an act of generosity that may initiate a gift-exchange where the employee reciprocates with increased effort and commitment (Mühlau, 2000). *Guidance activities* have an information sharing effect in that employees are made aware of what is expected of them in terms of task or role obligations. Additionally, they are also better informed about general norms concerning work effort and work culture. The effect of guidance is that it forges for the employee a link between the work behaviours valued by the company and the rewards that are available for their efforts. The feedback received during performance evaluations also provides the company with the opportunity to promote the employee's general sense of belongingness, job satisfaction and self-esteem at work. Other important guidance activities, including context instruction activities, mentoring, team building, and group work, provide employees with substantial, yet more informal sources of information about the expectations and standards of employer and colleagues alike. Orientation programmes such as introduction days provide more formal and structured opportunities for the company to integrate and acclimatize new employees into company life and culture. Other guidance relative activities such as career guidance, assessment centres and personal development activities, represent opportunities for the employer to support employee morale through general goal setting, widening horizons of achievement, and promoting greater openness for considering further training possibilities, work experiences, career trajectories, or similar developments. *Selectivity* decisions allow the selection of employees with adequate skills, sufficient potential and motivation – all of which are essential for developing and sustaining a high performing work force. An array of selectivity activities allows the company to filter out undesirables while selecting high calibre employees who are appropriately trained and highly motivated.

Each of the five areas discussed above offer the firm the possibility to manage the core of its human resource needs – from employee–job matching, developing skills and knowledge profiles as well as a high capacity to learn, strong work motivation, advancement ambition, effective socialization, integration and willingness to stay. However investing in any one of these areas alone is unlikely to be sufficient to ensure the firm appropriates the full benefits. For example, investing in on-the-job training will not be beneficial if the low level of employees' school education hinders their learning ability. The 'crowding out' of intrinsic motivation can undermine the performance enhancing effects of incentive systems. Column 3, Table 1 mentions the main 'internal' contingencies that affect the working of the HR dimensions. Column 4, Table 1 contains the main negative side effects that can impede the system's effectiveness. In the following section, we discuss how each of the five dimensions of high performance HR management are dependent on being complemented by the reinforcing, flanking and compensating effects of the other four HR dimensions.

Relationships among high performance HR dimensions

The success of each of the high performance HR dimensions depends on the complementary practices put in place by the firm. Table 2 contains details of the relationships among the five HR dimensions. Column 3 outlines how the dimensions

Table 2 *Complementarity among high performance HR dimensions*

<i>HR dimension</i>	<i>HR function</i>	<i>Complementarity effect</i>		
		<i>Reinforcement</i>	<i>Flanking</i>	<i>Compensation</i>
Incentives	Interest alignment between employer and employee	Sharing	Training, Guidance, Selectivity, Sharing	Sharing, Guidance
Sharing	Establish trust and cooperation	Training, Guidance	Incentives, Guidance, Selectivity	Incentives, Guidance
Guidance	Orientation and integration	Incentives, Training	Sharing, Training, Incentives	Incentives
Training	Development of skills and knowledge	Guidance	Incentives, Guidance, Selectivity	Sharing, Guidance
Selectivity	Maximize person –organization fit		Training, Incentives, Sharing	

reinforce one another and this will be discussed first. This is followed by a discussion of columns 4 and 5 where the flanking and compensation relationships for each of the five high performance HR dimensions are presented.

Reinforcement Although the HR dimensions are characterized by one primary objective, they may also contribute to goals in other domains. For example, employer-sponsored training is not only a device to provide employees with the skills needed to perform their job. It is also a 'gift' by which the employer shows his support and goodwill to the employee as well as a communication device to inform employees of the company's values and expectations (Akerlof, 1982). Activities in one HR dimension that have a side effect in other dimensions potentially reinforce these effects. Sharing arrangements, although primarily understood as aiming to build trust and to establish a cooperative atmosphere, also provide incentives to stay and can be used as a basis for systems that make these provisions particularly contingent on performance and thus reinforce the effects of incentives schemes. For example, advancement opportunities can be utilized to provide training incentives or to establish a prize structure for 'promotion tournaments' (Lazear and Rosen, 1981). Similarly, high wages can be tied to performance-contingent contract renewal and used as a disciplinary device (Shapiro and Stiglitz, 1984). Training as a 'gift' is likely to strengthen the trust-building effect of sharing such as high wages or fringe benefits; similarly the provision of guidance may be experienced by employees as employer support and thereby reinforce the trust-building effect from sharing. The effect of guidance on the self-efficacy and integration of employees is in turn enhanced by training and incentives systems as they both communicate information about the expectations and values of the company. This not only clarifies for the employee their role in the firm but also makes the culture of the firm more accessible by imparting the specific norms and values that prevail. Guidance reinforces selection efforts by moulding the personality of the employee, aiding selection efforts to maximize the fit between person and organization. The extent that the side effects of HR activities reinforce the working of particular domains of HR management depends to a large degree on whether the primary activities are sufficient to achieve the desired outcome level. For example, if the sharing arrangements of a company are effective in establishing and maintaining a high level of trust and cooperation additional training provision may be redundant as 'relational signals' (Mühlau and Lindenberg, 2003). If, however, sharing arrangements on their own are not able to convince employees of the generosity and good intentions of management, for example due to a long history of management-worker conflict or because employees attribute the sharing arrangements to strong unions rather than benevolent management, sponsoring training may be crucial to achieve a 'reframing' of the employment relationship from adversarial to cooperative.

Flanking The effectiveness of all HR domains depends on how well the ground is prepared by the presence of other HR practices. Flanking an *incentives* system is desirable for several reasons. In the first instance, incentives do not appeal to all types of people. The more an employee is determined to achieve success, and the less deterred they are by hard work, the more likely they are to rise to the challenge of an incentive system. Flanking incentives with selection techniques ensures that the employees recruited display a high work ethic and performance motivation. Second, incentives have little or no effect on work effort if employees are not convinced of their ability to achieve the performance specified by the reward system. Flanking with training ensures that employees have the skills and expertise needed to conduct their work – only then are they actually competent to conduct the tasks specified by the incentive system. Third, guidance builds employees' self-esteem and confidence and thus increases the likelihood

that employees are motivated by incentives. Fourth, the effectiveness of incentives systems also depends on employees' understanding the system used to evaluate and measure their work performance. The more specific the guidance and training received by employees, the more informed they will be of the work tasks and obligations required by the firm's evaluation procedures.

The potential of *sharing* depends on three things: first the extent to which the employee understands the role played by mutual reciprocity in the employment exchange; second, on the company convincing its employees that its intentions are credible; and third, on the company protecting itself from the opportunistic activities of its employees. Flanking with selection ensures the recruitment of people who are able to understand and who aspire to norms of mutual cooperation and fair treatment in work. The essence of using sharing arrangements is to establish mutual trust and confidence – flanking with guidance clarifies the importance attributed to these issues in the organization. Flanking with guidance sees to it that employees are informed of the importance of group effort and commitment to the firm as well as being aware of the extent to which it disapproves of shirking. Flanking with incentives also helps to make clear the firm's values. The use of incentive systems establishes in the employee's mind the salience of a high effort culture in the firm.

While *guidance* practices help to provide employees with direction regarding how best to target their efforts and to plan their future careers, the effectiveness of this advice depends on several factors. First, the effect of guidance is only as good as the skills and motivation of the employees recruited and developed by the company. To this end, the flanking effects from training are crucial to developing employee performance competency and contribute directly to developing the portfolio of skills and experience necessary to meet plans made during career guidance procedures. A flanking effect from incentives targets employee motivation for self-development: the use of incentives signals to employees that there is a reward to be gained from building on the advice and assistance received during guidance. Selecting employees who fit well into the company culture adds additional support to the integration and socialization functions of guidance. Finally, flanking guidance with sharing ensures that high levels of trust and goodwill facilitate processes of integration and socialization into the organization.

Ensuring that the company has the human capital it requires involves investing heavily in the skills and *training* of the workforce. The efficiency of the training investment depends on several issues: first, it depends on the cognitive skills and the motivation of the employees to acquire new capabilities. Flanking training with selectivity practices ensures that 'trainable' employees are hired. Through the use of stringent selection procedures the company can take steps to ensure that the profile of employees is such that they are willing to share with the firm the costs and benefits of training as well as to respond well to and learn quickly from the training opportunities provided. To this end, the selection of employees favourably evaluated for their training potential helps to ensure that the company's return on training investment is maximized. Training incentives flanked by performance incentives rewards the acquisition and the application of skills – the prospect of a wage increase from improved training means that training flanked by incentives is a strong motivation to enhance one's training profile. Another training motivation can be found in the flanking effect from guidance. Career development plans demonstrate to employees the value of extra skills in achieving advancement plans.

The effectiveness of *selection* depends very strongly on the type of candidates who apply to the firm for a job. A high performance work culture will require several attributes: One important issue is the applicant's ability to learn and conduct the work

tasks assigned to him/her; apart from ability, the applicant's general work motivation and willingness will also be under scrutiny in recruitment. Ensuring the highest applicant pool quality will depend on flanking effects from sharing, incentives and training. First, flanking with incentives and training demonstrates to (potential) applicants what they can expect if recruited by the firm. Such prior knowledge gleaned from incentive systems and training programmes should attract only those who are motivated to work towards incentives and who are keen to develop their training profiles. Finally, flanking with sharing arrangements is also expected to increase the size of the applicant pool as this activity signals the firm's generosity relative to other firms in the industry.

Compensation Negative side effects of human resource activities can be detrimental for high performance systems. Strong *incentives*, for example, are notorious for misalignment problems – the most prominent of which are employee attention and efforts being wholly focused on specified tasks, unhealthy rivalry, undesirable conformity, colluding against the employer and problems with legitimacy (Baron and Krepes, 1999). These problems result in a weakening of the incentive effect suggesting the need to be compensated. Legitimacy problems can arise where employees' expectations are disappointed – for example should employees not secure a coveted reward (such as a promotion). These types of events can trigger doubts about the credibility of an incentive system and, if not tackled, may even escalate to doubts about the employer's trustworthiness and fairness. Compensating incentives by using guidance practices is, therefore, highly appropriate: they have the specific objective of avoiding such ambiguity through establishing clear communication of the company's rationale. Further, guidance provides the employee with helpful feedback, preventing disappointment arising from misunderstandings and any consequent demoralization. Sharing arrangements can also compensate through tackling legitimacy problems as they build general trust and confidence in the relational integrity of the employer (Mühlau, 2000). Moreover, the cooperative orientation induced by sharing arrangements prevents employees searching for loopholes in the incentive systems in order 'to beat the system' (Mühlau, 2000). Guidance practices compensate for the tendency for strong incentives to 'crowd out' intrinsic motivation (Lindenberg, 2001): A principal objective of guidance practices is to promote the employee's long-term interest in his or her work, in their personal development and in their wider role in the organization. In this way the firm invests in providing the employee with rewards associated with developing meaningful work and the experience of self-efficacy, control and competence in their career.

Sharing arrangements also have their drawbacks or negative repercussions, which need to be compensated for. For example, sharing arrangements if unchecked can create problems of dependency, becoming associated with a sense of entitlement and/or a sense of loss should sharing benefits be threatened or even removed. Compensation for these negative effects can come from many sides. The institutionalization of high work effort norms not only prevents the notorious problems associated with a 'public service mentality' but also helps to mobilize group pressure and informal sanctioning which are important safeguards against opportunistic exploitation and the threat of waning intrinsic motivation. By signalling a strong appreciation for hard work, compensating sharing with incentive systems prevents the establishment of lenient work effort norms and imparts a high sense of personal achievement, efficacy and control when employees' performance goals and rewards are accomplished. Incentives communicate that a high work effort is expected of employees. Guidance also provides an appropriate compensation effect: The employee's sense of control can be undermined by fears of promises being reneged upon by the employer. The clarifying and explanatory functions of guidance practices help to communicate the firm's *true* intentions and minimize any

perceptions of a breach in the psychological contract (Robinson and Rousseau, 1994). Finally, compensating with selection practices filters out potential 'free riders' that come with a low work effort mentality and plays an important role in avoiding the problem of opportunistic exploitation.

The principal compensation issue associated with guidance is the risk that employees become spoon-fed and that they fail to develop a strong sense of control over work choices and plans. In short, strong guidance can dampen the sense of self-achievement and entrepreneurial attitude needed to accomplish career plans and overcome obstacles. The compensation effect from incentives systems can reinstate the link between performance and goal. It focuses the employee's sense of orientation towards defining and working towards goals and on reaching these goals, being rewarded for his/her efforts. In this way, incentives compensate for the tendency for employees to develop a sense of 'learned helplessness' that can arise from being overly guided and assisted.

The most important compensation issue arising with *training* relates to retention. Training specific to the employer may be of little value outside the particular company, but general expertise and experience will undoubtedly improve the labour market position of workers. Consequently sponsoring training involves a considerable loss should the employee decide not to stay with the company. From the perspective of the firm, the provision of training has the negative effect that the employee is rendered more valuable to other firms and thus increases the risk of an unwanted turnover of highly skilled employees (i.e., poaching). Sharing, guidance and incentive systems can provide compensation effects. Sharing arrangements through paying high wages has the effect of increasing the employees' attachment. Guidance has a similar binding effect but in this case by creating a career development plan – a long-term perspective with the firm is created for employees. Guidance can also strengthen employee attachment as these practices work on integrating employees into the social milieu of the company. Finally, the potential to control one's income through rewards from the incentives systems means that the attraction of alternative employment may be compensated for or even diffused altogether. In this sense sharing, guidance and incentives together, build on the creation of a long-term mutual project involving the employee, his/her colleagues and the firm.

To summarize: in this section, five dimensions of human resource practices, training, incentives, sharing, guidance and selectivity, that form the basis of a coherent system of high performance HR management, were introduced. These practices ensure that employees acquire the skill and knowledge, are motivated to perform and cooperate and develop trust and confidence in management. Moreover, we discussed how the practices work together in order to achieve complementarity. Three types of relationships among the five HR dimensions were distinguished – reinforcement, flanking and compensation and we discussed how these relationships form the synergistic effects associated with the potential of a high performance HR system.

In the empirical part of this paper we examine whether the effect at the employee level can be traced to the complementary relationships among the five high performance HR dimensions. The core hypothesis to be tested in this study is that:

Hypothesis 1: the complementarity effect of the high performance HR management system enhances employee performance over and above the sum of the effects of the five practices (Complementarity hypothesis).

The empirical test of this hypothesis will be presented in two steps. First, the data will be examined for evidence to corroborate that the system is indeed the most effective approach to HR management. In a second step, the results of data analyses conducted

to demonstrate that the system is more than just the sum of its parts or put another way, that the system is a more powerful lever of employee performance than the single constituent practices, will be presented.

Data and method

Data and data collection

The data used to test the hypotheses were obtained from a matched establishment survey conducted in Ireland and the Netherlands. The target population of this survey were establishments of private companies with 50 or more employees. All industries with the exception of agriculture were targeted. In the Netherlands, where registration with the Chamber of Commerce is mandatory for all commercial enterprises (with few exceptions such as street vendors), we used a random sample of the companies registered with the Chamber of Commerce (*Kamer van Koophandel*). In Ireland, we combined listings from the Irish Development Agency (IDA) and Kompass Ireland. For both countries, multiple establishments of the same organization were deleted. The data were collected between July 2000 and January 2001. A detailed questionnaire covering a range of human resource practices, context information and performance estimates was sent to senior management/human resource officers of establishments. A total of 81 usable questionnaires were returned from Ireland, yielding a response rate of 9 per cent. In the Netherlands, 311 usable questionnaires were returned, yielding a response rate of 6.3 per cent. This is somewhat below the average of some other postal surveys, but within the 6 to 16 per cent range being typical for international mail surveys (Harzing, 1997). Moreover, there are no indications of response bias. The size and industry distributions of the respondents do not differ significantly from the distributions of the target population with the exception of small establishments and service organizations being somewhat under-represented in the Dutch sample (see Horgan, 2003). Separate analyses on the under-represented strata showed no differences in effects; hence, it appears unlikely that the uneven responses affect the size of coefficients. *Ex ante*, the small size of the Irish sample raised concerns regarding the power of statistical tests. We therefore employed a threshold of a 10 per cent significance level (2-tailed test). For the Netherlands, where the number of cases is much larger ($n = 311$), the sample size is of the order where substantial effects should yield conventional levels of significance.

Measurement of the human resource activities

The use of incentive systems, sharing arrangements, guidance practices, training and selection were operationalized by a series of items and scales (see Table 2 for an overview). When items belonging to the same HR dimension differed in their theoretical range, the items have been standardized (z-transformed) before being aggregated to the indices. The different practices within a HR dimension are frequently substitutes. This renders correlation-based consistency measures meaningless; consequently, we do not report Cronbach's alpha in the table. Nevertheless, we regard these indices as rough indicators for the management intensity or the amount of effort an organization puts into a particular domain of human resource management. These indices of management intensity have been standardized (z-transformed) before being submitted to the clustering procedures (see below) as the range of the indices is mainly a function of the number of items summed up and these arbitrary variance differences would have the effect of variable weights in clustering procedures. With the exception of the index for 'sharing arrangements', the indices were standardized for the pooled data so that country differences regarding HR domains are reflected in the clustering solutions. The index for

'sharing arrangements', which largely refers to the relative position of a company within an economy, has been standardized for each country separately. Irish companies made more extensive use of training measures and had a stronger focus on selection than Dutch companies while the countries did not differ with regard to their incentives structuring and guidance efforts. Further, there were no inequalities with regard to the variance of these indices (see Horgan, 2003: 96–9).

In order to identify a typology of HR systems that is valid for both countries we submitted the pooled data to a clustering procedure. The standardized indices pertaining to the five HR dimensions were submitted to a two-stage cluster analysis that combined hierarchical clustering with *k*-means clustering for the pooled data. Hierarchical clustering was used to profile the cluster centres and to identify any obvious outliers. In order to optimize the clusters, the cluster centres identified by the hierarchical method were then used as the initial seed points in a *k*-means clustering procedure. This combination helps to avoid the weakness of *k*-means clustering where the iterative algorithm becomes 'stuck' in a local minimum. Ward's method was chosen as the hierarchical clustering algorithm. This method is said to be the most likely in discovering underlying cluster structures and follows a similar logic to that of *k*-means clustering (see, e.g. Bacher, 1996; Hair *et al.*, 1998). We followed Bacher (2001) and applied variance analytical statistics to determine the number of clusters for non-hierarchical clustering procedures. These statistics recommended a six-cluster solution as optimal. The stability and robustness of this cluster solution were demonstrated by a comparison of the results of the pooled data with country-specific solutions (see Horgan, 2003: 100–6).

The cluster analyses demonstrated that the companies in Ireland and the Netherlands use six different types of human resource management Table 3 (see Table 4). Only one type involves high levels in all five HR dimensions. This version can be seen as full adopters of the High Performance HR management system. A second group of companies focuses on a selective set of the HR dimensions. Here three types can be distinguished: one type is strongly involved in the training of their workers but makes only moderate use of the other dimensions (selective adopter, training centred). A second type might be referred to as a selective adopter, reward centred. This is characterized by high management intensities in the dimensions of incentives structuring and sharing – both related to rewarding employees – as well in the selectivity dimension that screens and filters the pool of applicants. A third type is characterized by high levels of sharing (selective adopter, sharing centred). Finally, there is a group that exhibits no intensive management activities at all: one type, which may be called weak HRM, combines medium levels of incentives structuring and selection with low levels in the other dimensions. The other type in this group has low values in all of the five dimensions and is referred to as non-adopters of high performance human resource management.

Employee performance

Key informants were asked to compare the performance and cooperation of the company's employees to that of other similar companies. Moreover, these informants were asked to rate the problems they had in various areas of employee discipline. Two of these dependent variables, employee work performance and employee cooperation have been measured using Likert scaling. The variable 'employee discipline', as an index of five items that covers different aspects of employee discipline, could be treated as approximately continuous. This variable is, however, skewed to the right and consequently the residuals of a linear regression would also be skewed to the right. It was, therefore, decided to transform this into quintiles and use it as an ordinal variable.

Table 3 *Measurement of HR dimensions*

<i>HR dimension</i>	<i>Items</i>	<i>Type</i>
<i>Training</i>	Internal training programmes used	Yes/No
Index of z-scores (4 items)	Share of workers receiving: <ul style="list-style-type: none"> – on-the-job in-house training; – off-the-job in house training; – funding further education 	Percentage
<i>Incentives</i>	Importance of merit/job performance for <ul style="list-style-type: none"> – promotion – compensation 	(1–5 ordinal)
Index of z-scores (9 items)	Use of performance-related pay	Yes/No
	Use of performance appraisals	Yes/No
	Bonuses for <ul style="list-style-type: none"> – individual performance – team performance 	Yes/No
	Importance of <ul style="list-style-type: none"> – skills for compensation – Variety of skills for promotion – Specific skills for promotion 	All 1–5 ordinal
<i>Selectivity</i>	Importance for recruitment: <ul style="list-style-type: none"> – education credentials – technical skills – work experience – willingness to learn new skills – ability to work with others – ambition 	All 1–5 ordinal
Scale of 13 items	Importance for promotion: <ul style="list-style-type: none"> – leadership quality – conscientiousness – hard working – innovativeness – autonomy – teamwork – commitment 	
<i>Guidance</i>	Use of career development practices	9 practices
Index of z-scores (2 scores)	Clarity of recruitment and promotion standards	Differentiation score
<i>Sharing arrangements</i>	Wage level	Lower-higher
Index of z-scores (3 scores)	Promotion rate	Ratio
	Fringe benefits	11 practices
<i>Employee performance</i>	1. Job performance	1–5 ordinal
Index of z-scores (3 scores)	2. Employee cooperation	
	3. Problems with <ul style="list-style-type: none"> – theft – drug and alcohol – absenteeism – negligence 	0–3 ordinal

Note

See Horgan (2003) for further details.

Table 4 HRM systems (based on cluster analysis)

HR dimensions	High performance HR	Selective adopter training centred	Selective adopter reward centred	Selective adopter sharing centred	Weak HRM	Non-adopters
<i>Incentives</i>	High	Medium	High	Medium	Medium	Low
<i>Sharing arrangements</i>	High	Medium	High	High	Low	Low
<i>Guidance</i>	High	Medium	Medium	Medium	Low	Low
<i>Training</i>	High	High	Medium	Medium	Low	Low
<i>Selectivity</i>	High	Medium	High	Low	Medium	Low
<i>Number of establishments</i>	39 (10%)	58 (15%)	80 (21%)	65 (17%)	111 (28%)	39 (10%)
<i>No. of est. Ireland</i>	11 (14%)	18 (22%)	16 (20%)	11 (14%)	18 (22%)	7 (9%)
<i>No. of est. Netherlands</i>	28 (9%)	40 (13%)	64 (21%)	54 (17%)	93 (30%)	32 (10%)

Notes

High = 0.5 or more standard deviations larger than the average company; Medium = between -0.5 and +0.5 standard deviations of the mean value; Low = .05 or more standard deviations smaller than the average company.

The three variables were regressed using an ordinal regression procedure (logit link) (Greene, 2000). The ordinal nature of the dependent variables (with k categories) is reflected in $k-1$ parameters for thresholds (μ) that estimate the chance of exceeding the k th level of the ordinal variable. These regressions of performance outcomes are controlled for sector and other company attributes in order to minimize the potential impact of company heterogeneity.

Method

In general, three approaches to detect synergy or complementarity effects between HR practices are found in the literature. The most direct testing of the idea of full complementarity would be to use a full-set of interaction terms and with these to examine two-way and higher-order effects. Two problems are associated with this approach. First, with more than a few practices, a large set of interaction effects must be estimated (for example, 26 in the case of five practices). The information provided by these effects is difficult to interpret since it would be insufficient to examine the five-way interaction without also considering the others. Second, the variables created in order to estimate the interaction effects are highly correlated with the single HR dimensions and also with each other. This multi-collinearity introduces further problems yielding robust interpretations. In order to circumvent these problems Cappelli and Neumark (2001) suggest the use of a smaller set of interaction terms. The problem with this, however, is the lack of theoretical motivation for the selection of combinations. This results in a lack of clarity as to why certain combinations are selected over others. More importantly, however, higher-order interaction effects are not treated at all as the authors consider only complementarities between single practices. Because a core assumption of this study is that a systemic effect arises from a company's use of all five dimensions, higher-order interactions cannot be omitted. Consequently, an approach suggested by Ichniowski *et al.* (1997) was considered most appropriate for this study. This approach models the interaction effects among HR dimensions implicitly by using dummy variables representing distinct configurations of practices or HR systems. This approach appears to be particularly appropriate if there are fewer real types of HR configurations than there are theoretically possible combinations.

Results

In constructing the set of dummies for the human resource management systems identified by the cluster analysis we use the high performance HR management system as a reference category. The estimates for the dummies thus indicate the differences between high performance HR management and each of the other systems where a negative estimate means that the high performance HR management system exhibits superior performance.²

Table 5 shows the results of ordinal regressions of different aspects of employee performance for the Irish data. Referring first to the variable 'employee job performance', the results indicate that the High performance HR system is the best performing system. The direction of the coefficients shows, when compared to the high performance HR system the other five yield poorer job performance outcomes. With the exception of the *sharing centred selective adopters* all of these outcome differences are significant.

Turning to the variable 'employee cooperation', all of the HR system estimates are again in the expected direction: they all yield lower employee cooperation outcomes than the high performance HR management system. However only one of the five contrasts is significant, that with the *sharing-centred selective adopter*. Finally, the last column of the

Table 5 Ordinal regression of employee performance on HR systems: Ireland

Independent variables Regression model	Employee work performance		Employee cooperation		Employee discipline	
	β	S.E.	β	S.E.	β	S.E.
Union	-.054	.623	-.129	.604	-.412	.577
Log size	.182	.192	-.363*	.192	-.249	.181
Log age	-.182	.257	.036	.249	-.631***	2.33
Service industry	.346**	.167	-.213	.165	.075	.147
Process industry	-.270	.719	-.383	.697	.735	.663
Food industry	1.637**	.764	.036	.715	.565	.632
<i>HR systems</i>						
Non-adopter	-.2704***	1.040	-.1408	.972	-.1667*	.933
Weak HRM	-.2707***	.886	-.745	.795	-.1468*	.765
Selective adopter sharing-centred	-.1.204	.930	-.1.784*	.924	-.2.406***	.898
Selective adopter reward-centred	-.1.527**	.822	-.371	.773	-.1.934**	.781
Selective adopter training-centred	-.1.799**	.862	-.1.087	.810	-.186	.786
<i>Reference category: high performance HR management</i>						
μ_1	-6.006	1.494			-6.402	1.227
μ_2	-4.535	1.220	-7.505	1.572	-4.838	1.160
μ_3	-1.426	1.098	-3.365	1.119	-3.634	1.110
μ_4	-1.383	1.090	-1.344	1.055	-2.122	1.053
χ^2 [df]	25.9 [11]		15.3 [11]		38.7 [11]	
	$p = .007$		$p = .167$		$p = .000$	
MacFadden Pseudo R^2	.141		.087		.149	

Notes

* $p < .1$; ** $p < .05$; *** $p < .01$; **** $p < .001$; ***** $p < .0001$; Unstandardized coefficients are reported.

table presents the results of the regression of employee discipline. Here again, all coefficients indicate that, of all six HR types, the high performance HR management system commands the highest level of employee discipline. All contrasts prove to be significant with the exception of the one with *training centred selective adopter*.

When the three employee performance indicators are aggregated to form an overall measure of employee performance the results confirm the finding that the high performance HR management system is superior to all other systems in mobilizing employee performance. In the case of the aggregate all contrasts are significant, at least at the 10 per cent significance level (see Table 5, model 2).

Table 6 reports the same analysis as Table 5 for the Dutch sample. The regression results for job performance produce a mixed picture. First, apart from the *sharing-centred selective adopter*, the coefficients of the other four HR systems suggest a poorer performance outcome than that of the reference category. However the high performance HR management system is only significantly better than the *training-centred selective adopter*. While the *sharing-centred selective adopter* in the Irish situation was found to be among the poorer systems, in the Dutch case it appears that this system yields even more favourable employee job performance than the reference category. This finding however is not significant. Turning to employee cooperation, the *weak HRM* system is associated with the highest level of perceived cooperation with the high performance HR management system following. Again none of the contrasts is significant. Finally the estimates yielded by the regression of employee discipline suggest that the high performance HR management system once again exhibits the most favourable impact upon employee discipline. It should be noted however that, as in the previous regressions, the results are not significant. It is striking that, for all three regressions, the coefficients for the HR system dummies are considerably smaller than those produced by the Irish data and, more generally, that performance outcomes vary more among the HR systems in Ireland than they do in the Netherlands. Not surprising the point estimates for the regression of the aggregated performance measure (see Table 8, Model 2), indicate that although the high performance HR management system may perform best, the difference between it and the other systems is very small and far below conventional significance levels.

Evidence of a system level effect?

The results of Table 5 and 6 examined how the HR systems were related to employee performance. But these results alone do not demonstrate complementarity among the practices. For this study a central theoretical expectation regarding complementarity effects is that, to the extent that they exist, it is the interaction effects among the HR dimensions that should be the crucial determinants of performance. This should be evidenced by a superior performance of the high performance human resource system even when controlled for the effects of the constituting practices. This empirical expectation is the subject of the regression analyses that follow. This section examines whether there is evidence in the Irish and Dutch data for a 'system' effect of the system, and whether this is indeed more effective than that of the single practices.

Table 7 provides the results of a regression analysis conducted using the Irish data set. Having combined employee work performance, cooperation and discipline to comprise one index of employee performance that approximates a continuous, normally distributed variable, the coefficients were thus estimated using OLS regression. Three regression models were estimated: Model 1 estimates the effects on employee performance of the single HR dimensions; Model 2 estimates the differences between the HR systems; and Model 3 contains both the single dimensions and the system dummies.

Table 6 Ordinal regression of employee performance on HR systems: Netherlands

Independent variables Regression model	Employee work performance		Employee cooperation		Employee discipline	
	β	S.E.	β	S.E.	β	S.E.
Union	-1.655***	.508	-.539	.490	-.315	.427
Log size	-.032	.139	-.278*	.143	-.229*	.125
Log age	-.142	.139	-.205	.139	-.048	.120
Service industry	-.171	.140	.097	.136	-.163	.121
Process industry	-.460	.401	-.159	.403	.205	.352
Food industry	-.012	.371	.388	.374	-.075	.326
Sector unknown	-.566	.436	-.356	.438	-.726*	.386
<i>HR systems</i>						
Non-adopter	-.289	.519	-.790	.541	-.553	.476
Weak HRM	-.117	.439	.123	.444	-.485	.403
Selective adopter sharing-centred	.499	.460	-.323	.479	-.654	.422
Selective adopter reward-centred	-.929*	.531	-.382	.523	-.300	.457
Selective adopter training-centred	-.113	.446	-.703	.453	-.228	.410
<i>Reference category:</i> <i>high performance HR management</i>						
μ_1					-3.669	.873
μ_2	-.5.220	1.024	-5.798	1.042	-2.211	.856
μ_3	-1.194	.943	-2.009	.963	-1.545	.852
μ_4	-.605	.944	-.252	.964	-.580	.849
χ^2 [df]	25.1 [12]		26.1 [12]		16.1 [12]	
R^2	$p = .014$		$p = .011$		$p = .188$	
	.042 ¹		.044 ¹		.017	

Notes

* $p < .1$; ** $p < .05$; *** $p < .01$; **** $p < .001$; Unstandardized coefficients are reported.

¹ MacFadden Pseudo

Table 7 Aggregate of employee performance regressed on HR: Ireland

Independent variables	Model 1		Model 2		Model 3	
	β	S.E.	β	S.E.	β	S.E.
Constant	1.168	.953	3.672**	1.109	3.233*	1.456
Union	-.519	.705	-.299	.656	-.492	.721
Log size	-.081	.207	-.159	.201	-.045	.204
Log age	-.288	.249	-.327	.250	-.280	.252
Service industry	.037	.162	.103	.160	.052	.161
Process industry	.205	.724	.373	.749	.467	.733
Food Industry	.284	.696	.481	.705	-.240	.734
Single HR practices						
Incentives	.217	.325			.223	.376
Sharing	.505*	.292			.666*	.378
Training	.108	.294			-.035	.357
Guidance	.024	.276			-.623*	.372
Selectivity	.455*	.272			.481	.328
HR systems						
Non-adopter						
Weak HRM						
Selective adopter sharing-centred						
Selective adopter reward-centred						
Selective adopter training-centred						
Reference category: high performance HR management						
<i>F-values [df] OUT</i>	2.300 [11,69]		2.419 [11,69]		2.288 [16,64]	
ΔF (Model 1-> 3)[df]	$p = .068$		$p = .013$		$p = .010$	
ΔF (Model 2-> 3)					1.923 [5,64]	
					$p = .103$	
					1.722 [5, 64]	
					$p = .142$	
R^2		.268		.278		.364

Notes:

* $p < .1$; ** $p < .05$; *** $p < .01$; **** $p < .001$; Unstandardized coefficients are reported.

All three models contained the vector of variables with the purpose of controlling for firm heterogeneity.

As the results of model 2 show, the high performance HR management system is associated with higher employee performance than any other human resource system identified by the cluster analysis (see previous section).

Demonstrating a complementarity effect requires that the magnitude of the performance effect of the high performance HR management system be greater than the sum of the marginal effects produced by the adoption of the single HR practices comprising the system. Model 3 includes the single HR dimensions as well as the HR systems. As in the other two models, the control variables are included. In accordance with the complementarity hypothesis, when the single HR dimensions are added to the regression, substantial differences in performance still exist between the high performance HR management system and the other systems. These differences are significant with respect to the three selective adopter types.

The effects of the single HR dimensions explain about half of the performance difference between the *non-adopters* and the high performance HR management systems, approximately 20 per cent between the *weak HRM* system and approximately 10 per cent between the *sharing-centred selective adopter* and the high performance HR management system. The performance differentials between the other *selective* adopter types and the high performance HR management system, however, are even greater once the effects of the single HR dimensions are controlled for. The single dimensions thus explain only partially the disadvantage of *non-adopters*, *weak HRM* and *sharing-centred selective adopters*. The differences between two types of *selective adopters* (*training- and reward-centred*) and the high performance HR management systems cannot be explained at all by the corresponding management intensities in the single HR dimensions.

The results indicate that performance gains are associated with the high performance HR management system that are over and above the sum of the effects of the single HR dimensions. Finally, the coefficients on the individual variables for many of the HR dimensions are insignificant in Model 3. Only two are significant – guidance and sharing. While the effect of sharing is also positive in this specification, the effect of guidance becomes negative suggesting that in Ireland guidance practices, when applied alone, undermine employee performance. This may indicate that Irish employees perceive guidance practices as controlling and patronizing when not complemented by the other HR activities, in particular, incentives.

Table 8 presents the same regression models estimated using the data from the Netherlands. The same three regressions models were estimated and the vector of control variables was again included in each model. The model fit of all three specifications, as evaluated by the explained variance, is poorer for the Dutch when compared with the Irish sample. This suggests that HR dimensions as well as the various HR approaches or systems have far less explanatory power with regard to employee performance in the Netherlands.

The results of Model 1 indicate that there is a relationship between some of the single HR practices and employee performance in the Netherlands. Investment in the guidance and sharing practices apparently yields a significant positive effect on employee performance. With regard to the HR 'system' effects (Model 2), it appears that, although the sign of the coefficients are in the predicted direction, the differences between the HR approaches are not significant. Finally, when the single HR dimensions are added to the regression procedure, the guidance and sharing effects are found to be robust, still yielding a significant positive effect on employee performance. The HR system dummies in this specification become positive and, with exception of the *sharing-centred selective*

Table 8 Aggregate of employee performance regressed on HR: Netherlands

Independent variables	Model 1		Model 2		Model 3	
	β	S.E.	β	S.E.	β	S.E.
Constant	2.250	.9441	.715	1.085	.811	1.129
Union	-.837	.537	-.870	.549	-1.016*	.544
Log size	.328**	.159	-.214	.159	-.314*	.159
Log age	-.058	.152	-.014	.153	-.064*	.152
Service industry	-.304**	.153	-.290*	.155	-.289	.153
Process industry	.014	.442	.013	.451	.073	.443
Food industry	-.109	.407	-.068	.417	-.069	.410
Sector unknown	.470	.407	-.841*	.478	-.909*	.470
Single HR practices						
Incentives	-.072	.158			.055	.189
Sharing	.206	.147			.433**	.199
Training	.032	.146			.242	.208
Guidance	.341**	.159			.587***	.194
Selectivity	.159	.157			.175	.183
HR systems						
Non-adopter			-.467	.606	2.252**	1.004
Weak HRM			-.331	.515	2.080**	.809
Selective adopter sharing-centred			-.240	.542	1.199	.727
Selective adopter reward-centred			-.104	.526	1.176*	.691
Selective adopter training-centred			-.086	.580	1.159*	.683
<i>Reference category: high performance HR management</i>						
<i>F-values [df]OUT</i>		2.038 [12,298]		1.151 [12,298]		1.869 [17,293]
		<i>p</i> = .021		<i>p</i> = .318		<i>p</i> = .020
ΔF (Model 1- > 3)[df]						1.430 [5,293]
						<i>p</i> = .213
ΔF (Model 2- > 3)						3.478 [5,293]
						<i>p</i> = .005
R^2		.076		.044		.098

Notes

p* < .1; *p* < .05; ****p* < .01; *****p* < .001; Unstandardized coefficients are reported.

adopter dummy, they also become significant. These estimates suggest negative synergies or at least strong substitution among the HR dimensions in the Netherlands rather than the positive complementarity predicted. Being used in concert appears to diminish the effect of each of the practices on employee performance.

Summary and discussion

The idea of complementarity, and related ideas such as ‘internal fit’ or ‘horizontal integration’ have attracted strong interest in the discussion of ‘high performance work systems’. While complementary relationships among HR practices have been distinguished from other forms of how practices can be related (Delery, 1998), that very different mechanisms can account for positive synergies has been overlooked. In this paper, we suggest to distinguish between three different processes underlying complementarity – *reinforcement*, *flanking* and *compensation*. When practices work consistently in the same direction (as their main target or as a side-effect of a practice with a different primary objective) and a practice alone lacks the power to achieve a critical performance level, we refer to it as *reinforcement*. Practices can also flank each other: *Flanking* consists in the strengthening of effect of the focal practice by putting in place practices that create favourable conditions for the working of the focal practice. Finally, that HR practices can also have negative side-effects that are detrimental to performance has been largely ignored. When such negative side-effects are blocked or mitigated by other practices we call the relationship *compensation*. In this paper, we apply these different mechanisms to a high performance management system characterized by consistent and substantial effort in five different HR dimensions – incentives structuring, training, selection, guidance and sharing arrangements.

This theoretical framework permits a better understanding of complementarity among human resource practices than previous attempts to explicate the basis of complementarity. These attempts have been confined to a discussion of one type of relationship, mainly what we referred to as flanking. An encompassing understanding of complementarity effects of human resource management practices requires however that all three different relationships among the practices – reinforcement, flanking and compensations – be considered and systematically revealed for the full set of practices applied in a human resource management system.

Empirically this paper has two objectives. First, it intends to establish that the high performance HR management system is the most effective form of HR management in enhancing employee performance. Second, it seeks to demonstrate that this superior effectiveness is in part derived from a complementarity between the five HR dimensions. The hypothesis that the high performance HR management system would improve performance more than the other HR systems was tested by regressions on three indicators of employee performance – employee job performance, employee cooperation and employee discipline – on the HR types or systems. The Irish data provided strong support for this hypothesis. For all three indicators, the high performance HR management system exhibited the best performance and, in most cases, this system did significantly better than any other HR approach. The results for the Dutch sample, however, were far less clear. Although the high performance HR system, on average, did better than the other HR approaches, the differences between the HR systems were small and not significant.

In order to test the second hypothesis, an overall indicator of employee performance was regressed on the various HR approaches while controlling for the effects of the single dimensions. The crucial test was whether the high performance HR management system would still be associated with higher employee performance when the effects of the

single dimensions are included. This hypothesis also found strong support from the Irish data. The differences between the high performance HR management system and the selective approaches became even larger once controlled for the single HR dimensions. The complementarity hypothesis was thus confirmed in the Irish case but rejected by the Dutch data. When controlled for the single dimensions the high performance HR system performed even more poorly than the other HR approaches.

Two interrelated findings from this empirical study are puzzling: first the high performance HR management in the Netherlands has hardly any effect on employee performance – why does it work so much less well than in Ireland? Second, is there an explanation for the negative ‘*system effect*’ in the Netherlands? It may be that the different societal context accounts for the much weaker relationship between high performance HR management and employee performance. The educational and labour market institutions and values system in Ireland may facilitate the working of high performance HR management while the Dutch societal context may mitigate its effects on employee performance. For example, a higher spread of cognitive skills in Ireland when compared with the Netherlands (see OECD and Statistics Canada, 2000; Mühlau and Horgan, 2001) may account for higher returns to selection and training efforts and a stronger evaluation of extrinsic rewards in Ireland and thus may result in higher returns to incentive structuring and sharing (see, e.g., Horgan, 2003: 39–74). While this reasoning of a better ‘external fit’ in Ireland may be suited to explain the weaker impact of high performance HR management in the Netherlands and differences in the effect strength of the single HR dimensions, this is however unable to account for the negative ‘systems effect’. Could these findings be a methodological artefact? The finding of negligible performance differences in the Dutch case may raise doubts about whether the clustering procedure uncovered the HRM types that ‘make a difference’ in the Dutch context. However since the Dutch data set had a much stronger influence on the cluster solution by virtue of its larger size, one should expect problems of a potentially artificial cluster solution to be more relevant for the Irish rather than the Dutch data. Moreover the HRM types were corroborated by country-specific analyses. The poor explanatory power of the models for the Dutch data could be related to a much smaller inter-firm variance of ‘objective’ employee performance resulting in very ‘noisy’ measurement of subjectively perceived employee performance. This argument presupposes that there are few ‘objective’ performance differences in the Dutch case but this is an outcome and not an explanation for the weak effects of HRM systems. This argument can also not explain the negative ‘system effects’. Finally, the difference between the countries could come from the unobserved attributes of the companies adopting the high performance HR management system. The causal ordering underlying associations between HRM systems and performance in the cross-section has frequently raised the question whether these associations are spurious, caused by an underlying attribute – for example, the quality of management – particularly as these associations are not always fully reflected in panel data (see Guest *et al.*, 2003). If incompetent managers of ailing companies, in a desperate attempt to improve their awful performance record were the ones who adopt the high performance HR management system in the Netherlands, then this would result in a much weaker estimate of the relationship between the system and employee performance. Such a scenario could also make sense of the ‘negative systems’ effect. Negative interaction effects among human resource practices can be associated with two different constellations among the practices (cf., Delery, 1998). When practices are substitutes, the marginal returns of one practice are diminished if the other practice is in place. The effect of substitutive practices is hence sub-additive. The more serious case is described as ‘negative synergies’: one practice undermines what the other practice

achieves resulting in the extreme case in a mutual neutralization of effects. While overlapping and hence substitutive effects are not at all unlikely, in particular as we measured the intensity of management in a particular HR dimension and not single practices, the size of the 'negative systems effects' appear to be too large to be the outcome of effect substitution. At the end of the day, the 'negative systems effect' almost neutralizes the sum of the contributions of the single HR dimensions. It is, therefore, more likely that the failure of high performance HR management to capitalize on the investments in the HR dimensions has to be attributed either to a contingent association of the particular HRM system with other attributes that are negatively associated with employee performance, i.e., adoption by ailing companies, or that these HRM systems are implemented in a way that the specific practices in the different dimensions are so poorly matched that they form 'deadly combinations'. Such a specification and implementation strategy naturally does not speak for a particularly gifted management team. While this explanation may be able to explain the weakness of the relationship between high performance HR management and performance and of the negative 'systems effect' in the Netherlands, it is purely speculative and perhaps not very plausible. We are thus somewhat at odds with this finding.

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Notes

- 1 These five areas were chosen after a review of the literature indicated that these belong to the core HR activities common to a variety of firm types. Practices relating to industrial relations and work organization were not included reflecting a distinction made between high performance human resource management on the one hand and high performance work organization and high commitment practices on the other.
- 2 This method of contrasting the high performance HR management with each of the other systems provides a much stronger and direct test of the hypotheses than the alternative strategy of contrasting high performance HR management with the average of the other systems (by creating one dummy variable for the high performance HR management system).

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