

Employees and High-Performance Work Systems: Testing inside the Black Box

Harvie Ramsay, Dora Scholarios and Bill Harley

Abstract

Most work on high-performance work systems has examined only the direct relationship between a set of management practices and performance outcomes. This presumes that any connection operates through the incentive and motivational effects captured as 'high-commitment' or 'high-involvement' employee outcomes. No attempt has been made to examine the alternative, Labour Process conceptualization, which expects performance gains from new management practices to arise instead from work intensification, offloading of task controls, and increased job strain. Using data from WERS98, we tested models based on high-performance work systems and labour process approaches. Both were found wanting, and we consider the possible implications of these failures.

This paper seeks to test the competing claims of theories advocating and criticizing so-called 'high-performance work systems' (HPWS) in order to advance the debates about the nature and outcomes of emerging approaches to labour management. In an attempt to fill gaps in past research, the analysis explores linkages from HPWS practices to employee outcomes and via these to organizational performance. The paper utilizes data from the 1998 Workplace Employee Relations Survey (WERS98) to construct indicators of HPWS practices, of employee outcomes and of organizational performance as a means to explore associations between these phenomena.

Dora Scholarios is at the University of Strathclyde. Bill Harley is at the University of Melbourne.

HARVIE RAMSAY

Editors' note: On 24 April 2000 Harvie Ramsay died suddenly in Glasgow. The editors would like to recognize his contributions as an author, reviewer and referee for the *BJIR* and his immense contribution to the study of employment relations — particularly through his concept of cycles of control.

Authors' note: Those of us who had the pleasure of knowing and working with Harvie will remember him not just for his intellect and energy as a researcher and teacher, but for his generosity, his kindness and his wonderful, irreverent sense of humour.

The paper is divided into four main sections. In the first, an account is provided of alternative theorizations of HPWS as a means to establish a research agenda. The second section describes the features of the WERS98 data set and lays out the method used to operationalize HPWS and test different models in this study. The third presents the results of the multivariate analysis used to test the models, and the concluding section considers the implications of the findings.

1. Introduction: high-performance work systems

For the last decade or so, management scholars, especially in the Anglophone countries, have been declaring the arrival of a new conceptual approach to the ways in which certain employee management practices impact positively on the 'bottom line'. They have argued that effective human resource policies offer organizations their best avenue for establishing robust competitive advantages (e.g. Barney 1995). From this has emerged the notion of a 'high road' approach to management, in which organizations choose to compete primarily on quality, and rely especially on human resource development and employee contributions to succeed in this.

Increasingly prominent in discussions of high-road approaches is the concept of the high-performance work system, in which a range of innovative human resource management (HRM) practices is used in certain combinations or bundles which attain synergistic benefits through an interactive and mutually reinforcing impact (Huselid 1995). There are different emphases in accounts of high-performance work systems, with some stressing 'high-involvement management' (HIM) and others 'high-commitment management' (HCM). More details of the specific HR practices associated with HPWS and its variants are provided later in the paper, but briefly, the strategy entails managements ceding a degree of control to employees and introducing a range of progressive methods which increase employee welfare. These include measures such as involvement programmes, team-based work, enhanced training and development, forms of gain-sharing and high-wage reward systems (Adler and Cole 1995; Appelbaum and Batt 1994; Milkman 1997).

Two key issues emerge from existing studies of HPWS. The first concerns the extent to which management practices work together as systems or bundles. Huselid (1995) is emphatic about the systemic links between practices. Although his factor analysis identified two dimensions among his high-performance practices, one of which included employee skills and what he called 'organizational structures' and the other employee motivation, he concluded from his subsequent analysis (Huselid and Becker 1996) that these could safely be combined into a single measure. Numerous other studies have explored the presence in some companies of an effective 'bundle' of HPWS practices (Arthur 1992; Kalleberg and Moody 1994; MacDuffie

1995; Ichniowski *et al.* 1997; Pil and MacDuffie 1996; Becker and Huselid 1998; Delaney and Huselid 1996; Becker *et al.* 1997).

One difference has been between those who have argued for a contingency approach, in which the specific bundles would vary by sector and business strategy (Arthur 1994; MacDuffie 1995; Youndt *et al.* 1996; Appelbaum *et al.* 2000), and the universalist, one-style-fits-all view, towards which Huselid was drawn by his results. The latter view appears to have gained the ascendancy, though with the modification that a combination of broad types of practice in an overall 'architecture' of policies provides room for different detailed implementation in different settings (Becker and Huselid 1998: 87–91). Wood and de Menezes (1998: 506), meanwhile, argued against the package view, instead treating 'high-commitment management' as a matter of degree.

The second key issue is that there is a consensus among those researchers who have reported a link between HPWS and organizational performance measures (see Huselid and Becker 1996; Cutchner-Gershenfeld 1991; Ichniowski, Shaw and Prensushi 1997; Arthur 1994; Youndt *et al.* 1996; Appelbaum *et al.* 2000; MacDuffie 1995) that the associations reflect a causal link which flows from practices through people to performance.¹ Explanations of how and why this link should work rely on theories of employee motivation in response to the types of practice described by HPWS theory and have become so embedded, especially in US management research, as to be taken largely for granted. In brief, the implicit argument is that HPWS practices may be taken at face value, as employee-centred and empowering. Employees, in turn, find that their needs are met by the opportunities and benefits these practices provide, and respond by taking initiatives without instruction and showing loyalty and enthusiasm for their employer.

These arguments have tended to focus on the efficacy of a range of employee involvement initiatives,² but the HPWS approach takes things further by proposing a far wider portfolio of efficacious innovations. Huselid summarizes the argument for the effect of these succinctly:

An increasing body of work contains the argument that the use of High Performance Work Practices... can improve the knowledge, skills and abilities of a firm's current and potential employees, increase their motivation, reduce shirking, and enhance retention of quality employees while encouraging nonperformers to leave the firm. (Huselid 1995: 635)

There is room for differences of emphasis within the literature on HPWS. One focus is on 'high-commitment management' (HCM) (affective and normative rather than merely continuance commitment, in Allen and Meyer's (1990: 1) terms), reducing turnover, absenteeism and costs through a reduction in the need for control and monitoring. Another stresses 'high-involvement management' (HIM) (see Lawler 1986), concentrating on the enhanced opportunities for employees to take initiatives, arising from their empowerment to take productive decisions. These are seen as intertwined with trustworthy information flows, and are in turn dependent on training

investments to give employees the capability to contribute; the backing of progressive procedures for such things as grievance handling or equal opportunities, for instance; and performance incentives or stakeholding innovations such as employee share ownership to lend a material edge to their contributions.

It is this logic of interdependent effects that makes the HPWS argument distinctive. It entails a causal path in which worker outcomes mediate between HPWS practices and performance. Yet though these connections are crucial to the argument, the linkages from HPWS to employee outcomes and thence to organizational performance remain almost entirely untested.³ Most contributors have taken it as all but demonstrated that the impact on worker experience and response must also have been positive, since this was expected to be the route through which HPWS practices would have their measured performance effect. That the changes are beneficial to employees as well as employers is usually rather vaguely asserted — as in Huselid again: ‘Presumably some of the value created by adopting more effective HRM practices will accrue to employees’ (1995: 667). Subsequently, Becker *et al.* admit that the analysis of performance ‘does not provide direct evidence of how such a system creates that value ... there is very little research that “peels back the onion”...’ (1997: 2).

An alternative view of the nature and outcomes of HPWS is informed by what we term the ‘labour process’ (LP) critique. There are numerous differences of emphasis within the labour process tradition, and indeed what constitutes ‘labour process theory’ remains contested.⁴ None the less, we characterize this alternative approach as LP because its basis is a recognition that a fundamental and perennial problem for the management of labour in capitalism is minimizing the potential gap between labour power and actual labour as a means of maximizing profit (see Marx 1954: 486–96).

Our version of the LP approach shares with Braverman’s (1974) version of LP theory the recognition of a systemic trend in capitalism towards the intensification of work; that is, managers are driven constantly to find ways to make employees work longer and/or harder as a means to maximize labour input. Where we depart from Braverman’s theory (1974) is his argument that Taylorist de-skilling and direct forms of managerial control are the key mechanisms of work intensification. Our theorization apprehends alternative mechanisms. Informed by neo-Fordist theory (Palloix 1976; Aglietta 1979; Prechel 1994), our approach accepts that Taylorism has limits and that there is, in contemporary work organization, some move away from Taylorist strategies. Put simply, direct control and de-skilling can be taken only so far before worker dissatisfaction and employee–management conflict start to outweigh the benefits of the intensification process, and new ways of extracting effort have to be sought (Clegg 1990: 211). The neo-Fordist LP critique conceptualizes HPWS practices as an alternative approach to maximizing the contribution of workers to production, which overcomes the limitation of Taylorist de-skilling and direct control.

Like the mainstream HPWS approach, this view sees the fundamental aim of new management techniques as being to enhance workplace performance, but it eschews the assumption that this will go hand in hand with positive employee outcomes. In effect, the LP approach is concerned with the same set of managerial practices as the HPWS approach. The key differences lie in the anticipated employee outcomes of the practices.

In common with the HPWS account, the LP interpretation posits a positive association between HPWS-style practices and employee discretion. This association is conceptualized as an enhancement of discretion arising from management's need to gain employee compliance and creative capability, in search of which it offers 'responsible autonomy' (Friedman 1977). These changes, however, are likely to be offset by other costs, whose connection may not be directly visible (Parker and Slaughter 1988). To the extent that employees enjoy benefits, these will take the form of minor gains in discretion, granted as a means to gain compliance with managerial aims, which are far outweighed by work intensification, insecurity and stress (see Harley 1995: 24–30).

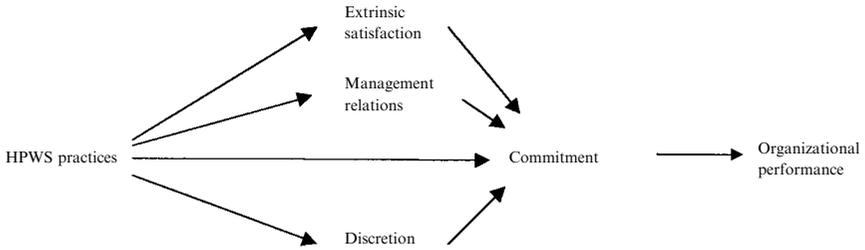
The LP approach thus conceptualizes HPWS practices as leading, directly or indirectly, to work intensification. The predicted outcome of this in experiential terms would be that workers subjected to HPWS practices would suffer higher stress levels than other workers. This stress would be expected to arise directly from work practices, but also as a result of the added responsibility associated with enhanced discretion, insecurity and work intensification. Thus, we would expect to see both direct and mediated effects between HPWS and stress.

To summarize the discussion so far, HPWS and LP approaches conceptualize HPWS practices as likely to contribute to improved organizational performance. Moreover, they hold that HPWS practices have an impact on employees and that it is, in large part at least, through this impact that improvements in organizational performance are realized. It is at this point that the two approaches part company. Conventional accounts of HPWS argue that the practices associated with this approach enhance employees' experience of work and that this feeds into improved organizational performance. The HCM variant stresses the contribution of HPWS practices to employee commitment as the key to performance, while the HIM version of HPWS stresses the role of discretion. The LP critique holds that, while HPWS practices may provide enhancements in discretion, these come to employees at the expense of stress, work intensification and job strain, the latter being a key explanatory factor in improved organizational performance. The HCM, HIM and LP models of HPWS are presented in diagrammatic form in Figure 1.

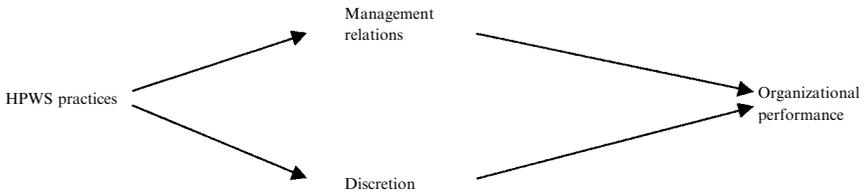
The aim of the remainder of this paper is to test these models using the 1998 Workplace Employee Relations Survey (WERS98) as a means of resolving differences between them. Our main focus is on employee outcomes, both as important factors in themselves and as intermediate variables in associations between HPWS and organizational performance.

FIGURE 1
High-Performance Work System (HPWS) Models

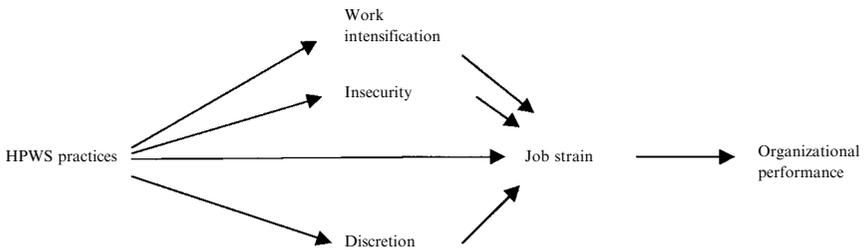
(a) High-commitment management (HCM) model



(b) High-involvement management (HIM) model



(c) Labour process (LP) model



2. Method and analysis

Using WERS98

WERS98 provides data from both management and employees across small and large organizations. The management questionnaire on HR practices can be used as the basis for creating measures of HPWS-style practices associated with different workplaces. The survey of employees sampled from

each establishment can then be matched to the equivalent workplace management questionnaire.

The return rate from management respondents, at over 80 per cent, compares favourably with most US studies which struggle with response rates around or even below 25 per cent (Becker and Huselid 1998: 67). WERS98 also focuses on the workplace level of analysis rather than the company level, thereby avoiding the problem of significant variation between different plants of the same organization associated with company-level studies (Becker and Gerhart 1996; Youndt *et al.* 1996).

One limitation, however, should be noted. While it is possible to relate individuals to workplaces where particular management practices are reported, it is not possible to know whether the actual respondents are always among those experiencing particular practices in their workplaces. This problem actually applies to most of the HPWS literature, which tends to assume that all employees are treated in the same way in each organization. In the present analysis, we used employee-level data to represent attitude measures and workplace-level data to represent the HPWS-style practices and organizational performance outcomes. By including several employee background variables in the multivariate analyses, we were able to control partially for within-workplace variance in attitudes, but not for variance in exposure to the practices.

High-performance Work System Variables

The set of HPWS management practices used as the common departure point for the models presented in Figure 1 was based, as far as possible, given the variables provided by WERS98, on the main contributions to the field. There are differences in the composition of the set of practices comprising the HPWS used by authors (see MacDuffie 1995; Osterman 1994; Youndt *et al.* 1996). Grievance handling or consultation, for example, may be viewed as representing a traditional personnel management/industrial relations approach to partnership, rather than an innovative one. Other methods, such as equal opportunities policies, appraisals, harmonization, some forms of management communication and structured selection systems, could be viewed as bureaucratic and as representing firm-level HRM policies rather than task-level employee-centred practices (MacDuffie 1995). Wood (1999a) examines family-friendly policies and finds them unrelated to his measure of 'high-commitment management', and there is also some controversy concerning the role in the model of individual performance incentives (Becker and Gerhart 1996; Wood 1999b: 394-5). Some see these as part of a HPWS approach, while others feel they may be divisive or diversionary by emphasizing material rewards. A distinction is also hinted at by Huselid's (1995) two dimensions — skills and organizational structures (e.g. grievance procedures, use of selection tests, incentive plans) and employee motivation (e.g. performance measurement, appraisals).

Our approach to developing a measure of HPWS practice was first to identify an inclusive set of 24 HRM practices that HPWS literature (e.g. Appelbaum *et al.* 2000; Huselid 1995; MacDuffie 1995; Wood and Albanese 1995) has linked to increased employee involvement and development. The 24 HPWS practice variables and the WERS98 management questionnaire items used to construct them are described in the Appendix to this paper. Each HPWS variable was a scaled composite of multiple items which were either dichotomous responses indicating the existence of a practice, management reports of the proportion of non-managerial employees covered by the practice, or management attitudes towards the practice's effectiveness.

Acknowledging the debates referred to above, we then identified a possible subset of practices closest to the HPWS idea of enhancing employee involvement and development, and which, as far as could be determined, are also extended to non-managerial employees.⁵ This subset included practices that enhanced involvement in problem-solving and decision-making through work and job design (i.e. upward rather than downward communication, employee consultation, problem-solving groups, team autonomy, involving employees in quality management, job control); practices targeting employee motivation through incentive schemes (profit-related pay, employee share ownership, performance-related pay); and practices aimed at the development of employee skills (e.g. attention to induction procedures, Investor in People accreditation, provision of job security and the existence of an internal labour market).

This selection is dependent to some extent on the way in which we chose to construct the HPWS variables from the WERS98 items. The Appendix indicates that the items for formal teams and formal training, for example, emphasize the existence of formal systems more than the degree of employee involvement; therefore, we were less inclined to include these practices among the HPWS-style practices. It is also possible, though, that some organizational systems, such as formal training, team structures, appraisal systems or management information, are effective support mechanisms for the more innovative work organization, incentive-based and developmental practices (e.g. Osterman 1994). An exploratory factor analysis of the 24 HPWS variables supported the notion of two distinct groups of practices associated with organizational systems. These 'systems' practices loaded on the first two principal components in the factor analysis, leaving a further seven factors.⁶

Drawing from the factor analysis, we retained the conceptual distinction between two different types of 'systems' practice and a third set of practices in the construction of HPWS scores for each workplace.⁷ This allowed an examination of the separate effects of these different subsets of practices in the HCM, HIM and LP models. Three HPWS scores were computed from the variables defined in the first part of the Appendix. The first score — 'Systems' Work Practices 1 (SWP1) — represented the practices that loaded high on the first factor identified in the principal components analysis reported above, and was computed as the sum of the standardized scores for

workplaces on five variables: employee/union representation, consultation committees, EEO/diversity management, family-friendly policies and sophisticated recruitment/selection (Cronbach alpha = 0.65). A second 'systems' score — 'Systems' Work Practices 2 (SWP2) — was computed in the same way using the practices that loaded high on the second factor: grievance procedures, formal teams, harmonization, appraisals, formal training and downward communication (Cronbach alpha = 0.60). Finally, the third score represented the practices expected to more closely resemble the 'high-performance' approach and so is labelled here the High Performance Work Practices (HPWP) score. This was computed using the variables loading on the weaker factors — profit-related pay, employee share ownership, employee consultation, TQM, problem-solving groups, team autonomy, job control, Investor in People accreditation, upward communication, job security, internal labour market and induction procedures.⁸ The Cronbach alpha reliability coefficient for the HPWP score was relatively low (alpha = 0.54); however, this is not surprising given the HPWS literature's lack of coherence in defining what is essentially a complex, multi-component management approach.⁹

Workplace Outcome Variables

The outcome variables used in the test of the HCM, HIM and LP models were workplace performance measures drawn from the WERS98 management questionnaire (see Appendix). This asked management to rate the performance of their workplace in comparison with other workplaces in the industry for financial performance, labour productivity and quality of product service, as well as asking how far labour productivity and labour costs had gone up or down, and the percentage rates of absence and labour turnover. These self-assessments must be regarded with some caution, but, in the absence of actual workplace performance figures, they provide the best available basis for analysis of workplace and behavioural-level outcomes.

Intermediate Variables

Commitment, job discretion and job strain were the key hypothesized employee attitude predictors of workplace performance examined in the HCM, HIM and LP models, respectively. These variables were constructed as composites based on the sum of the standardized scores of items derived from the employee attitude questionnaire (see Appendix for composite descriptions and reliabilities). The commitment composite variable was formed from three items corresponding to the concepts of affective and normative commitment (Allen and Meyer 1990) and the job discretion composite from three items capturing degree of influence in the job. Job strain was measured as a two-item composite drawing on Karasek's (1979) argument that strain arises not just from pressure *per se* (e.g. the perception

of working hard), but from job demands for which the requisite discretion is not provided. One of the items used in the job strain composite, therefore, was the perception of not having enough time to get the job done, the other being how much employees worried about their work outside of their working hours.

A further four variables were included as possible mediators of the relationship between HPWS practices and commitment/job strain following the predictions of the three models: three were employee perceptions of management relations (support and fairness), extrinsic satisfaction (satisfaction with pay) and job security. The fourth was a workplace variable, work intensification, measured as management reports of change in workplace labour productivity (see the Appendix for full descriptions).

Analytical Strategy

Linkages between the HPWS scores, the intermediate variables and workplace performance, as specified in the HCM, HIM and LP models, were examined in three stages using a series of regression analyses. The first stage examined the effects of the three HPWS scores ('Systems' Work Practices 1 (SWP1), 'Systems' Work Practices 2 (SWP2) and 'High Performance' Work Practices (HPWP)) on each of the workplace performance variables — labour productivity, financial performance, product/service quality, absence rate, turnover rate and the reduction in labour costs. These regressions used workplace data from the management survey data set and controlled for workplace size, age, foreign ownership, union density and sector.

The second set of regressions examined the effects of the three HPWS scores on the employee outcomes hypothesized to mediate the relationship between practice and workplace performance in each model. Each of the employee attitude variables depicted in Figure 1 was regressed on the three HPWS scores. These regressions were based on a data set created by matching employee attitude data from the employee survey to corresponding workplace HPWS scores calculated from the management survey. Thus, in addition to attitude scores, each employee observation was assigned the HPWS scores representing that employee's workplace. As well as controlling for workplace characteristics, this analysis controlled for employee's sex, age, hours worked, employment contract, union membership, management/professional occupation and income.

The final stage of the analysis examined the effects through which the HPWS scores are hypothesized to affect workplace performance according to the HCM, HIM and LP models. The first set of regressions in this analysis examined the process through which HPWS practices result in commitment and job strain. The HCM model hypothesizes that practices will influence commitment primarily through enhancing employee control and perceptions (here measured through discretion and perceptions of good management relations) rather than extrinsic reward (satisfaction with pay). The LP model predicts that practices will lead to negative rather than

positive employee outcomes. In this analysis, perceptions of job insecurity and discretion (interpreted by the LP model as a source of added responsibility, hence pressure) were the primary experiences hypothesized to mediate the effects of practices on strain. In addition, management-reported work intensification (measured as change in labour productivity) was also added as a potential explanatory variable for negative experiences. Thus, for the HCM and LP models, the first step in the intermediate analysis conducted regressions using commitment and job strain as dependent variables. The matched employee–workplace data set described above was used again here, so that commitment and job strain were measured at the employee level. Mediation effects were shown if the influence of HPWS practices on commitment or strain was altered when the hypothesized intermediate variables were added to the equations.¹⁰

The second step in the intermediate analysis conducted regressions using workplace performance as the dependent variable and examined the extent to which the effects of HPWS practices could be explained by positive or negative employee experiences. The HCM and HIM models predict that, through cultivating employee commitment and/or job discretion, rather than merely providing extrinsic rewards (pay), HPWS practices will not only affect behavioural outcomes (low absenteeism and turnover) but also translate into positive organizational outcomes (high labour productivity, financial performance, product/service quality). The LP model predicts that any positive effect of HPWS practices on these performance indicators is generated at the cost of higher employee strain, greater insecurity and actual work intensification, and that this will also be reflected in more negative behavioural outcomes (high absenteeism and turnover). In addition, the HPWS practices are expected to lead to a reduction in labour costs, reflecting the ‘low-road’ emphasis in LP interpretations. In each model, the mediation effects were tested by examining the effects of adding each one of the predicted intermediate variables incrementally to the regression model containing the HPWS practices.

3. Results

The High-Commitment Model (HCM) and the High-Involvement Model (HIM)

(a) Effect of HPWS scores on workplace performance

The regressions for workplace performance reported in Table 1 indicate that, of the three HPWS scores, HPWP has the most consistent positive effect on workplace performance. The HPWP score was positively related to management reports of greater comparative labour productivity, financial performance and product service quality, and lead to a decrease in turnover rate. The other behaviour-related outcome that is the focus of HCM and HIM, the absence rate, was unrelated to the HPWS scores. Also, the

'systems' scores were either unrelated to performance or had a negative effect. SWP2, for example, was significantly related to an increase in turnover ($\beta = 0.096$) and reduced quality ($\beta = -0.078$). Thus, only the practices represented by our HPWP score appeared to conform with the expected increases in workplace performance predicted by HPWS theory.

(b) Effect of HPWS scores on positive employee experiences

The first four columns of Table 2 show the regression equations for the employee attitudes that the HCM and HIM expect to result from HPWS practices, i.e. job discretion, management relations, pay satisfaction and commitment. In each equation, the HPWP score had a positive and statistically significant effect, supporting predictions that HPWS practices are related to positive employee experiences. The two 'systems' scores, however, provide contradictory evidence. SWP1, in contrast to the effects of the HPWP score, had a negative, statistically significant relationship with job discretion, management relations and commitment, while SWP2 had little effect except for a positive relationship with management relations.

These regressions show the effect of all three HPWS scores on positive attitudes when entered together in the prediction equation. We cannot conclude from these whether the effect of SWP2 is being cancelled out by SWP1 or HPWP. We therefore repeated the analysis, this time adding each HPWS score incrementally to the equation (i.e., first SWP1, then SWP2, then HPWP) and comparing the explained variance (R^2) at each stage. F -tests for the change in R^2 showed that only in the case of management relations were the 'systems' scores having an independent and, as shown in Table 2, different effect. In other words, for job discretion, pay satisfaction and commitment, the addition of SWP2 in the equation did not significantly increase the variance already explained by SWP1. Both 'Systems' Work Practice scores, therefore, had a generally negative or zero effect on employee experiences.

(c) Intermediate effects

Equations (1)–(4) in Table 3 test for the mediation effects between the HPWS scores and employee commitment as predicted by the HCM. These indicate the effect on the HPWS scores of adding first job discretion, then management relations, then extrinsic satisfaction, incrementally, to the model for commitment. Only the HPWP score had a direct positive effect on commitment in equation (1) and, although the addition of job discretion in equation (2) decreased this effect marginally, discretion could not account entirely for the effect of the HPWP score on commitment. This finding contradicts the HCM model's expectation that the effect of HPWS on commitment functions primarily through increased perceptions of control.

The addition of management relations and satisfaction with pay to equations (3) and (4), respectively, removed the significant relationship of HPWP score to commitment, thus suggesting that the effects of HPWS practices on commitment occur primarily by way of good management

TABLE 1
Effects of HPWS Practices on Workplace Outcomes^a

	<i>Labour productivity</i>	<i>Financial performance</i>	<i>Product/service quality</i>	<i>Absence rate</i>	<i>Turnover rate</i>	<i>Reduction in labour costs</i>	<i>Increased labour production (work intensification)</i>
<i>Sample size and dependent variable means/standard deviations</i>							
<i>N</i>	1358	1429	1484	1339	1548	1392	1386
<i>Mean</i>	3.57	3.66	4.05	4.35	-2.79	2.12	4.09
<i>Standard deviation</i>	0.79	0.84	0.74	7.31	30.59	1.03	0.92
<i>Standardized regression coefficients for full equation (control + HPWS variables)</i>							
<i>HPWS scores^b</i>							
SWP1	-0.065	0.017	-0.044	0.006	-0.029	-0.118***	-0.032
SWP2	0.001	0.034	-0.078*	0.014	0.096**	0.243***	0.018
HPWP	0.154***	0.095**	0.159***	0.037	-0.103**	-0.109**	0.153***
<i>R</i> ²	0.037	0.020	0.069	0.019	0.011	0.050	0.042
<i>Adjusted R</i> ²	0.034	0.017	0.066	0.015	0.008	0.049	0.038

Unweighted data; * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

^a All regressions controlled for workplace characteristics.

^b SWP denotes 'Systems' Work Practices; SWP1 is the sum of standardized scores for employee/union representation, consultation committees, EEO/diversity management, family-friendly policies and sophisticated recruitment/selection; SWP2 is the sum of standardized scores for grievance procedures, formal teams, harmonization, appraisals, formal training and downward communication. HPWP denotes 'high-performance' work practices and is the sum of standardized scores for the remaining HPWS practices listed in the Appendix.

TABLE 2
Effect of HPWS Practices on Employee Outcomes^a

	<i>Job discretion</i>	<i>Management relations</i>	<i>Pay satisfaction</i>	<i>Commitment</i>	<i>Perceived security</i>	<i>Job strain</i>
<i>Sample size and dependent variable means/standard deviations</i>						
<i>N</i>	15,848	15,920	15,788	15,660	15,009	13,242
<i>Mean</i>	8.90	24.91	2.88	10.38	3.45	5.79
<i>Standard deviation</i>	2.52	7.38	1.11	2.66	1.06	1.83
<i>Standardized regression coefficients for full equation (control + HPWS variables)</i>						
<i>HPWS scores^b</i>						
SWP1	-0.030**	-0.049***	-0.012	-0.021*	-0.045***	0.005
SWP2	0.001	0.044***	0.000	0.018	-0.024*	0.001
HPWP	0.026*	0.110***	0.024***	0.074***	0.027*	0.046***
<i>R</i> ²	0.110	0.072	0.098	0.086	0.087	0.121
<i>Adjusted R</i> ²	0.109	0.071	0.097	0.085	0.086	0.122

Unweighted data; * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

^a Workplace HPWS scores were assigned to each employee observation. The sample for each regression, therefore, represented the number of employee observations for which dependent and independent variable data was available. All regressions controlled for workplace and employee characteristics.

^b See Table 1 notes for definition of HPWS scores.

TABLE 3
Intermediate Effects of HPWS Practices on Employee Commitment and Job Strain^a

Predictor variables	Commitment				Job strain			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SWP1 score	-0.021	-0.013	0.010	0.009	0.005	0.004	-0.002	0.002
SWP2 score	0.018	0.019	-0.008	-0.005	0.001	0.001	0.002	-0.002
HPWP score	0.074***	0.066***	0.007	0.008	0.046***	0.047***	0.048***	0.048***
Job discretion		0.294***	0.113***	0.106***		-0.028**	-0.014	-0.014
Management relations			0.585***	0.535***				
Pay satisfaction				0.129***				
Perceived security							-0.067***	-0.067***
Work intensification								0.001
R^2	0.086	0.161	0.450	0.463	0.121	0.123	0.127	0.127
Adjusted R^2	0.085	0.160	0.449	0.462	0.122	0.122	0.126	0.126
ΔR^2		0.076	0.288	0.012		0.001	0.004	0.0001
F for ΔR^2		1412.79***	8191.23***	4371***		10.74**	59.81***	0.031

Unweighted data; ** $p < 0.01$ *** $p < 0.001$

^a See Table 2 notes for description of data set and definitions of predictor variables. Equations (1)–(4) ($N = 15,660$) and (5)–(8) ($N = 13,242$) estimated with same samples as the commitment and job strain regressions in Table 2. All regressions controlled for workplace and employee characteristics.

relations ($\beta = 0.535$) and to a lesser extent satisfaction with pay ($\beta = 0.129$). This is partially consistent then with the HCM model which predicts that perceptions of management support and fairness may be one vehicle through which HPWS practices enhance commitment.

In the analysis for the mediators of the relationship between HPWS practices and workplace performance, we decided to focus only on the HPWP score as an approximation of HPWS, since this measure appeared to have the greatest effect on employee outcomes. The predictions of the HCM and HIM were tested by comparing the results of two sets of equations: first, regressions of the performance indicators on the HPWP score only, and second, regressions of the performance indicators on the HPWP score and the hypothesized intermediate variables. Examination of the decrement in the HPWP score coefficient from the first to the second equation, as well as the *F*-test for the gain in R^2 , indicated the extent to which the relationship between HPWP score and workplace performance was mediated by the HCM/HIM-predicted employee experiences.

Examination of the first step for each equation in Table 4 shows that HPWP was positively related to comparative labour productivity, financial performance and quality, and negatively related to turnover and absenteeism, consistent with HCM and HIM predictions. The direct effect of HPWP on performance was reduced, but still statistically significant, when discretion, commitment, management relations and satisfaction with pay were added to each of the equations. High employee commitment did explain some of the relationship between HPWP score and high labour productivity, financial performance and quality, although the effect, as measured by the decrement in the HPWP score coefficient (0.008, 0.005 and 0.005 for each dependent variable, respectively), was notably small. The extent to which positive employee attitudes also explained the effects of HPWP score on behavioural performance outcomes was either similarly small — as in the 0.005 decrement in the HPWP score coefficient for turnover — or non-existent — as in its lack of significance in the equation for absence rate. Thus, although the tests for addition to incremental variance were significant, the size of the effect on HPWP score suggested that commitment was not a strong mediator of the relationship of HPWS practices with workplace performance. Nor was the HIM expectation that discretion should have the greatest chance of affecting productivity and quality directly supported by these results.

The Labour Process (LP) Model

(a) Effect of HPWS scores on workplace performance

As with the HCM and HIM, the LP model also predicts that HPWS practices will be positively related to workplace performance indicators such as labour productivity, financial performance and product/service quality. Its emphasis, however, is on indicators that imply greater intensification of work processes. In the present analysis, direct support for the LP model was

TABLE 4
Intermediate Effects of HPWP Score on Workplace Performance: High-Commitment Management (HCM) and High-Involvement Management (HIM) Models^a

	<i>Labour productivity</i>	<i>Financial performance</i>	<i>Product/service quality</i>	<i>Absence rate</i>	<i>Turnover rate</i>	<i>Reduction in labour costs</i>
<i>Sample size and dependent variable means/standard deviations</i>						
<i>N</i>	13,412	13,975	14,593	13,245	15,186	13,991
<i>Mean</i>	3.59	3.71	4.00	3.98	-1.12	2.32
<i>Standard deviation</i>	0.78	0.85	0.72	4.14	22.87	1.14
<i>Standardized regression coefficients and equation statistics</i>						
<i>Step 1: HPWP score</i>	0.180***	0.173***	0.078***	-0.052***	-0.065***	0.045***
<i>Adjusted R²</i>	(0.033)	(0.032)	(0.030)	(0.019)	(0.023)	(0.064)
<i>Step 2: HPWP score</i>	0.172***	0.168***	0.073***	-0.055***	-0.060***	0.046***
<i>Job discretion</i>	0.002	-0.017	-0.006	0.004	0.011	0.008
<i>Commitment</i>	0.037**	0.061***	0.062***	0.003	-0.033**	-0.042***
<i>Management relations</i>	0.042***	0.005	0.013	0.022	-0.014	0.019
<i>Satisfaction with pay</i>	0.016	0.017	0.005	-0.023*	-0.021*	-0.008
<i>ΔR²</i>	0.006	0.004	0.005	0.001	0.003	0.001
<i>F for ΔR²</i>	20.79***	15.92***	17.32***	2.18	10.21***	4.31**

Unweighted data; * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

^a See Table 2 notes for description of data set. All regressions controlled for workplace and employee characteristics.

provided by the regression of management reports of increased labour productivity (our measure for work intensification) on HPWS scores (see Table 1). The strong positive coefficient for the HPWP score in this regression ($\beta = 0.153$) suggests that, in workplaces where these practices tend to be used, management does perceive increased labour productivity. However, the greater use of HPWPs does not appear to involve greater reductions in labour costs that would be consistent with the 'low road' LP model predictions. In fact, only SWP2 appeared to have LP-consistent or simply negative effects on workplace performance, with a strong relationship to reduced labour costs ($\beta = 0.240$), an increase in turnover ($\beta = 0.096$) and reduced quality ($\beta = -0.078$).

(b) Effect of HPWS scores on negative employee experiences

The equations regressing employee outcomes on the three HPWS scores (see Table 2) also partially support LP predictions. SWP1 had a generally negative relationship with employee experiences, as is shown by the lower perceived job discretion ($\beta = -0.030$), poorer management relations ($\beta = -0.049$), lower pay satisfaction ($\beta = -0.012$), lower commitment ($\beta = -0.020$), and less job security ($\beta = -0.040$). SWP2, however, showed more mixed behaviour: it was positively related to perceived management relations but negatively related to perceived security. This suggests that SPW2 may contain a mix of practices that are both bureaucratic and more motivational in their effects on employee experiences.

The HPWP score was positively related to job strain ($\beta = 0.046$), providing further support for the LP model. However, while both the 'systems' scores lowered perceptions of job security, the HPWP score appeared to improve it. Further analysis (not shown here) found the HPWP score on its own to have no effect on security ($\beta = -0.004$); but the introduction of the 'systems' scores boosted its effect in a positive direction. This has potentially interesting implications for examining the interactive effects of the different subset scores on employee experience, with the suggestion that the presence of certain firm-level HRM policies and structures may be generally supportive or facilitative of the effects of other HPWS practices (e.g. Osterman 1994).

(c) The intermediate effects

The regressions testing for the effects of intermediate variables between HPWS scores and job strain (equations (5)–(8) in Table 3) supported LP predictions that HPWS practices would lead to job strain directly; however, this effect was not mediated by the negative employee work experiences included in this version of the model. The addition of job discretion to the HPWS scores as predictors in equation (6), and of perceived security in equation (7), did not lessen the effect of HPWP score on job strain, even though both these potential mediators were positively related to the HPWP score (see Table 2) and negatively related to job strain. In other words, the

adverse effects of the HPWS practices in terms of strain were not reduced by any other potential positive outcomes.

Also evident from Table 3 is the finding that the effect of adding job discretion was to reduce strain ($\beta = -0.028$), contrary to neo-Fordist predictions. The effect of job discretion on strain, however, disappeared with the introduction of perceptions of insecurity in equation (7), and, in turn, the effect of insecurity remained constant when work intensification was added in equation (8). Thus, while the results supported the LP model's prediction that HPWS practices will have a direct effect on job strain, they did not support the expectation that this effect would be derived from the greater discretion afforded by the practices, or from the greater insecurity resulting from either the practices or work intensification.

The final set of regressions (reported in Table 5) tested for the mediators between HPWS practices (again using only the HPWP score) and workplace performance predicted by the LP model. This was achieved in three steps: first, by running the regression equations for workplace performance with HPWP score only; second, by adding the employee variables to the equation with HPWP score; and third, by adding the management-reported work intensification variable. The addition of discretion, job strain and perceived security into the equations (step 2 in Table 5) led to zero or very small reductions in the coefficient for HPWP score, suggesting that, even though these variables added significantly to the explained variance for all the performance indicators, they did not mediate the relationship between HPWP score and the dependent variables. Greater employee security, in particular, was positively related to labour productivity, financial performance and quality, and negatively related to turnover rate, but this cannot be used to explain the effects of the HPWP score on performance.

Given that the HPWP score was found to influence perceptions of security positively (see Table 2), the positive relationships found between security and the performance indicators in Table 5 are only suggestive of a 'high road', rather than a labour process 'low road', interpretation. In support of LP predictions, though, the HPWP score was positively related to reductions in labour costs and to higher levels of job insecurity, although job security accounted for only a 0.001 decline in the coefficient for HPWP. With regard to the effects of job strain, only in the case of labour productivity and absence rate were the LP model's predicted relationships with performance confirmed ($\beta = -0.023$ and $\beta = 0.028$, respectively). Again, however, job strain could not be provided as an explanation for the effects of HPWP on performance.

The addition of our measure of work intensification at step 3 accounted for large decrements in the coefficients for HPWP score at steps 1 and 2. This suggested that the HPWP score practices were indeed affecting performance through work intensification. As suggested above, though, the LP prediction that this effect resulted from negative employee experiences was not supported. Interestingly, the addition of the work intensification measure did result in a reduction of the coefficients for job security from

TABLE 5
Intermediate Effects of HPWP Score on Workplace Performance: Labour Process Model (LPM)^a

	<i>Labour productivity</i>	<i>Financial performance</i>	<i>Product/service quality</i>	<i>Absence rate</i>	<i>Turnover rate</i>	<i>Reduction in labour costs</i>
<i>N</i>	11,563	11,906	12,503	11,241	12,886	13,141
Mean	3.58	3.73	4.00	3.86	-1.01	2.32
Standard deviation	0.77	0.84	0.73	3.67	20.61	1.14
Step 1: HPWP score	0.155***	0.158***	0.071***	-0.073***	-0.039***	0.039***
Adjusted <i>R</i> ²	(0.026)	(0.026)	(0.033)	(0.022)	(0.026)	(0.062)
Step 2: HPWP score	0.157***	0.159***	0.071***	-0.074***	-0.040***	0.038***
Job discretion	0.016	-0.012	0.012	-0.005	0.015	0.016
Job strain	-0.023*	0.006	-0.006	0.028**	0.006	0.000
Job security	0.077***	0.092***	0.037***	0.020*	-0.075***	-0.079***
Δ <i>R</i> ²	0.007	0.007	0.002	0.001	0.005	0.006
<i>F</i> for Δ <i>R</i> ²	27.55***	30.48***	6.93***	3.67*	22.13***	25.87***
Step 3: HPWP score	0.108***	0.129***	0.048***	-0.073***	-0.027**	0.043***
Job discretion	0.018	-0.012	0.012	-0.006	0.015	0.016
Job strain	-0.023*	0.005	-0.006	0.028**	0.006	0.000
Job security	0.065***	0.085***	0.033***	0.022*	-0.073***	-0.078***
Work intensification	0.287***	0.163***	0.118***	-0.023*	-0.068***	-0.028**
New technology innovation	0.001	-0.050***	-0.029**	-0.076***	0.009	0.005*
Δ <i>R</i> ²	0.078	0.026	0.013	0.006	0.004	0.001
<i>F</i> for Δ <i>R</i> ²	503.95***	165.64***	87.68***	36.69***	28.43***	5.02*

Unweighted data; * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

^a See Table 2 notes for description of data set. All regressions controlled for workplace and employee characteristics.

step 2 — most obviously for labour productivity, financial performance and quality — thus perhaps interfering with some of the positive effects on the performance of increased employee security. Once more, however, this analysis could not confirm any direct links between workplace performance, HPWP score and the degradation of employee experience.

4. Conclusions

The analysis presented above provides little support for HPWS or LP theory, with all three of the models tested being called into question. Our results confirm the relationship between HPWS-style practices and a number of measures of workplace performance. However, the widely held assumption that positive performance outcomes from HPWS flow via positive employee outcomes has been shown to be highly questionable. This most significant finding calls into question the unitarist assumption, which underlies much mainstream management theory, that everyone benefits from managerial innovation. Our results suggest that the HPWS orthodoxy has been accepted far too uncritically by many scholars. Moreover, the findings reported here caution against theorizations of work organization that give primacy to employee orientations to work as an explanatory variable for organizational performance and which are so common in mainstream managerial literature.

The LP model, however, emerges from our analysis looking no more robust than either of the HPWS models. While we do not step back from our criticism of the orthodox assumption that management and labour are both winners in the new world of work, nor do our results suggest that we should accept the simple counter-argument that gains to management always come at the expense for labour of degradation of work. On the basis of the analysis presented here, this assumption is no more tenable than that of orthodox theories of HPWS.

How can we explain the fact that none of the three models provides an adequate account of the outcomes of HPWS? First, limitations inherent in the WERS98 data might be responsible. It is possible that the indicators of employee outcomes that we were able to generate using the WERS98 data were not adequate to capture the factors that operate to generate positive organizational performance. Moreover, even if the variables covered the appropriate range of factors, they may have been unable to capture, in a sufficiently detailed, subtle and nuanced way, employee responses to HPWS.

Second, the statistical models of the relationships between HPWS practices, employee response and organizational outcome used in the analysis are perhaps too simplistic to capture the complex reality of the implementation and operation of HPWS. It may also be the case that any technique can be applied by organizations in different ways, more varied than merely 'high' or 'low'-road, but seeming to vindicate either in different selected cases. Over a large sample, these different ways of enacting methods

might well cancel each other out, with the result that there is no discernible trend at the aggregate level.

We are reluctant to accept that the lack of support for the models can be explained simply by problems with the data and statistical models. The WERS98 represents the largest, most reliable and most current source of data available on employee relations in Britain, and the items on employee outcomes are for the most part well-established measures which have been tested previously. Indeed, many of the measures that we have utilized are similar or identical to those used in other studies of HPWS (e.g. Appelbaum *et al.* 2000). Moreover, the statistical models employed are entirely appropriate to the data and to the research problems under investigation.

Perhaps, then, the results can be explained by limitations inherent in the theorizations of HPWS that underlie the analysis. It is quite plausible that outcomes flowing from managerial innovation are much less determinate than our models apprehend. Many managements may simply be incompetent (rather than either brilliantly constructive or conspiratorially exploitative) at implementing and maintaining innovative approaches, with the result that the putative outcomes of HPWS practices fail to eventuate. More charitably, it may be that there are major limitations to the strategic management of labour which severely constrain the potential for innovative approaches to be implemented successfully (see Hyman 1987). If either view is correct, then we should not be surprised to see reality failing to be captured by the models tested here.

Finally, the indeterminacy of labour, with its capacity to resist, passively or actively, most managerial practices is a theme emphasized in recent LP theory (Smith and Thompson 1998). If we accept a role for labour in shaping outcomes, then we must expect an unevenness of outcome disruptive for hypotheses based on simplistic managerial or labour process accounts.

Appendix: Description of Study Variables

High-Performance Work System (HPWS) variables

Downward communication Defined as one-way information flow from management to employees and measured as a summed score of the existence of nine practices, each scored 1: information given to employee or representatives about internal investment plans, about the financial position of establishment or organization, about staffing plans, a system of briefings for any section(s) of workforce, daily/weekly briefings, briefings for entire work-force, regular meetings with entire work-force present, cascading information from management and regular newsletters to all employees.

Upward communication Defined as communication involving employees directly and measured as a summed score of the existence of four practices, each scored 1: a formal survey of employees' views in last five years, the availability of written survey results to all employees, suggestion schemes,

and whether or not 25 per cent or more of meetings is given to employee views/questions.

Performance-related pay Measured as summed score of existence of two variables, each scored 1: existence of individual or group schemes, and whether half or more of non-managerial employees receive PRP.

Profit-sharing schemes Measured as summed score of two variables, each scored 1: existence of profit sharing scheme, and whether half or more of non-managerial employees participate in the scheme.

Employee share ownership Measured as summed score of two variables, each scored 1: existence of ESOS scheme, and whether half or more of non-managerial employees participate in the scheme.

Problem-solving groups Defined as the extent of participation through group structures and measured as sum of three variables, each scored 1: existence of permanent groups, existence of groups that solve specific problems or discuss aspects of performance/quality, and whether half or more of non-managerial employees are members of such groups.

Consultative committees The degree and type of consultation through committee or a similar structure. Measured as summed score of nine variables, each scored 1: existence of committees of managers and employees concerned with consultation, whether all employees are covered by committees, discussion of 'soft' HRM issues, discussion of 'hard' HRM issues, discussion of plans and government regulations, discussion of production issues, discussion of financial issues, whether members of committees are elected/invited/volunteered, and whether the committees are rated by management as being 'very influential' on management decisions affecting the work-force.

Representation/union involvement Based on questions related to either trade union or other employee representation, this variable was measured as a summed score of two variables, each scored 1: whether there was consultation or negotiation on all of nine issues (pay and conditions, recruitment and selection, training, payment systems, handling of grievances, staffing or manpower planning, equal opportunities, health and safety, and performance appraisals), and whether there was consultation or negotiation with a trade union on change.

Employee consultation Measured as summed score of two variables, each scored 1: whether employees were consulted or negotiated with on change, and whether targets (relating to budget, cost, profit, productivity, etc.) were set in consultation with employees or their representatives.

Job control Defined as management perception of degree of influence afforded largest occupational group (LOG) and measured as the summed score of three variables, each of which was rated on a four-point scale (1, 'None'; 2, 'A little'; 3, 'Some'; 4, 'A lot'): the extent of variety in LOGs work, the extent of discretion in how LOGs do their work, and the extent to which LOGs have control over pace of work.

Formal team structures The proportion of LOGs working in formally designated teams, measured on a seven-point scale (1, 'none (0%)'; 2, 'just a few (1%–19%)'; 3, 'some (20%–39%)'; 4, 'around half (40%–59%)'; 5, 'most (60%–79%)'; 6, 'almost all (80%–99%)'; 7, 'all (100%)').

Team autonomy Measured as summed score of four variables, each scored 1: whether team members work together, whether teams appoint their own leaders, whether team members jointly decide on their work, and whether teams have responsibility for specific products/services.

Formal training systems Measured as summed score of four variables, each scored 1: whether half or more employees are given off-the-job training, whether employees have received more than one day's training in the last 12 months, whether there has been training in non-technical skills (e.g. problem-solving, communication, customer service), and whether half or more employees are trained to do a job other than own.

Investors in People accreditation Workplaces accredited were scored 1, workplaces that had applied for accreditation were scored 1, and those who had not applied were scored 0.

Total Quality Management index Based on the main components associated with TQM, this measure was constructed as a summed score of the existence of eight practices within the workplace, each scored 1: uses JIT, uses customer surveys to monitor quality, records faults and complaints, uses individual employees to monitor quality, keeps records of product/service quality, sets targets for product/service quality, provides training for problem-solving, has attained either of the quality standards BS5750 or ISO9000.

Internal labour market Measured as summed score of the existence of two practices, each scored 1: a preference for internal candidates when filling vacancies, and that half or more vacancies are filled internally.

Sophisticated recruitment and selection Measured as the summed score of the presence of 10 practices (each scored 1) associated with 'best practice' recommendations for recruitment and selection: specified qualities sought when recruiting (motivation, experience, skills, qualifications), special procedures used for recruiting particular groups (e.g. women, ethnic minorities), personality/attitude tests used for any group of employees, personality/attitude tests used for management/professionals, personality/attitude tests used for non-manual occupations, personality/attitude tests used for operatives/manual and non-skilled, performance/competency tests used for any group of employees, performance/competency tests used for management/professionals, performance/competency tests used for non-manual occupations, performance/competency tests used for operatives/manual and non-skilled.

Induction Measured as the summed score of three practices, each scored 1: existence of a formal induction programme, induction programme is longer than one day, induction is used to make people aware of job responsibilities.

Performance appraisal Measured as the summed score of five practices, each scored 1: formal appraisal exists for at least some occupations, appraisal is linked to pay, appraisal is conducted at least once a year, appraisals are used for a non-financial purpose (e.g. feedback, behaviour change), half or more of non-managerial occupations have performance formally appraised.

Job security Measured as summed score of three variables, each scored 1: existence of a policy of guaranteed job security or non-compulsory redundancies, existence of such a policy for non-managerial employees, no reductions in work-force in 12 months excluding natural wastage/redeployment.

Harmonization Measured as summed score of two practices, each scored 1: all employees in LOG have standard employment contracts, managers and employees have same entitlements.

EEO/diversity management Measured as the summed score of five practices, each scored 1: formal EEO policy exists in workplace, policy targets at least one type of discrimination, policy addresses equality for at least eight different groups, workplace measures effects of policy, three or more EEO practices are in existence.

Family-friendly management Measured as summed score of six practices, each scored 1: the workplace has at least one FF practice, workplace has three or more FF practices, 10 per cent or more of non-managerial employees have used practices in last 12 months, workplace shows some flexibility in arrangements for days off for sickness, workplace treats days off for sickness as special paid leave, men are entitled to parental leave.

Grievance procedures Measured as summed score of two practices, each scored 1: non-managerial employees are covered by formal grievance procedures, all non-managerial employees are covered.

Employee Control Variables

Female employee (1)

Employee age six size bands: '1', <20; '2', 20–24; '3', 25–29; '4', 30–39; '5', 40–49; '6', 60 or over

Employee's job is permanent (1)

Hours worked per week (continuous scale)

Employee is a member of a trade union or staff association (1)

Employee belongs to management/professional occupational group (1)

Employee's reported weekly income 12 size bands from '1', less than £50, to '12', £681 or more

Workplace Control Variables

Establishment size Number of employees

Number of years establishment has been operating

Union density % total employees

Foreign ownership Coded 1 if establishment is predominantly (51 per cent or more) foreign-owned

Sector three dummy variables created for public, production and service sectors

Workplace Outcome Variables

Comparative labour productivity Management assessment of workplace's labour productivity relative to other workplaces in industry. The five-point scale was coded '1', a lot below average; '2', below average; '3', average for industry; '4', above average; '5', a lot better than average.

Comparative financial performance Management assessment of workplace's performance relative to the industry. The five-point scale was coded '1', a lot below average; '2', below average; '3', average for industry; '4', above average; '5', a lot better than average.

Quality of product/service Management assessment of workplace's quality of products or services relative to the industry. The five-point scale was coded '1', a lot below average; '2', below average; '3', average for industry; '4', above average; '5', a lot better than average.

Absence rate Percentage absent in workplace over previous 12 months.

Turnover rate Percentage rate of turnover of full-time and part-time employees in one year.

Change in labour costs Measured as management rating of change in costs relative to all other costs in previous five years. The five-point response scale was '1', gone up a lot; '2', gone up a little; '3', stayed the same; '4', gone down a little; '5', gone down a lot.

Intermediate Variables

Job discretion composite ($\alpha = 0.78$) Consists of three questions — degree of influence in range of tasks, pace of work, and how work is done — coded on a four-point response scale ('1', none; '2', little; '3', some; '4', a lot). Summed composite scale range 1–12.

Management relations composite ($\alpha = 0.93$) Consists of six questions, rating: overall employee–management relations, management effectiveness on informing employees of change, allowing comment on change, responding to suggestions, dealing with work problems, and treating employees fairly. Employees were asked for their rating on five-point scale ('1', very poor, to '5', very good). Summed composite scale range 1–40.

Commitment composite ($\alpha = 0.83$) Consists of three items — 'share many of organization's values', 'feel loyalty towards organization', 'proud to tell people who you work for' — measured on five-point scale of agreement ('1', strongly disagree, to '5', strongly agree). Summed composite scale range 1–15.

Job strain composite ($\alpha = 0.61$) Consists of two items — ‘never enough time to get job done’ and ‘worry about work outside working hours’ — rated on five-point scale of agreement (‘1’, strongly disagree, to ‘5’, strongly agree). Summed composite scale range 1–10.

Extrinsic satisfaction Measured as satisfaction with pay rated on a five-point scale from ‘1’, very dissatisfied, to ‘5’, very satisfied.

Job security Measured as agreement that job is felt to be secure in this workplace: ‘1’, strongly disagree, to ‘5’, strongly agree.

Work intensification at employee’s workplace Management report of change in labour productivity in last five years measured on a five-point response scale: ‘1’, gone down a lot; ‘2’, gone down a little; ‘3’, stayed the same; ‘4’, gone up a little; ‘5’, gone up a lot.

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Notes

1. Reverse causation, e.g. by performance making ‘headroom’ for certain kinds of people management practice, is either dismissed or rejected due to time-series data (e.g. Huselid 1995).
2. See Harley (1999) for more detailed discussion of involvement practices and their putative outcomes for employees and organizations.

3. Two exceptions should be noted. Studies by Appelbaum and others (see Appelbaum *et al.* 2000) have sought to measure worker responses, and indeed to include potential negative outcomes in a pathbreaking study in three types of industry. Patterson *et al.* (1997) examine the relationship of employee satisfaction and commitment and company productivity and profitability, as well as that between human resource management practices and these performance measures. They show positive correlations in each case — but do not examine the full model by exploring links from practices to employee responses.
4. See Ramsay (1985) for a clarification of competing labour process views, and Smith and Thompson (1998) for an account of recent developments. A challenge to conventional labour process theory has been provided by recent Foucauldian elaborations which explore the ways in which managements seek to harness work-group self-surveillance to enhance their control behind the appearance of a measure of group autonomy (Sewell 1998); however, addressing the Foucauldian approach is beyond the scope of this paper.
5. See Wood (1999b: 401–2) on the importance of the high-commitment concept being extended to non-managerial employees.
6. Nine factors with eigenvalues more than or approximately equal to one and explaining 58 per cent of the common variance were extracted through varimax rotation. The first factor, accounting for 17.5 per cent of variance, could be interpreted as firm-level personnel systems and structures, and included employee/union representation, consultative committees, EEO/diversity management, family-friendly policies and sophisticated recruitment/selection. The second factor, accounting for 8 per cent of variance, also included the variables we had expected to find associated with HR systems — grievance procedures, downward communication, existence of formal teams, formal training and appraisal systems. The second factor could be interpreted as organizational systems that provide support for involvement in decision-making and development of skills in line with HPWS. The first factor composite score was more likely to be higher in public-sector workplaces ($r=0.20$, $p<0.001$) than the second factor composite score ($r=0.09$, $p<0.001$), which also supports the idea that the first factor represents more traditional, possibly bureaucratic, systems than the second. We interpreted the remaining factors as consisting of practices closer to the desired conceptualization of a HPWS.
7. We also performed a series of cluster analyses on the full set of 24 practices, consistent with MacDuffie's (1995) recommendation for empirical validation of bundles, but no identifiable patterns were found. The cluster analysis method estimated initial cluster centroids from a hierarchical procedure and then refined the final solution using a non-hierarchical procedure that is less susceptible to outliers (Hair *et al.* 1992: 278–9). Alternative solutions using the within-groups linkage and Ward's method were found to be comparable.
8. Given performance-related pay's loading on the weakest ninth factor in the factor analysis reported above, along with the conceptual ambiguity surrounding its inclusion in HPWS (e.g. Becker and Gerhart 1996), this variable was dropped from the analysis.
9. Also, homogeneity in multi-dimensional scales, particularly for complex constructs, is best achieved when each component is measured by one subscale (Spector 1992). Our approach to constructing the composite variables representing HPWS from the available WERS98 data clearly was not consistent with this criterion.

10. In all analyses testing the LP model where this measure of work intensification was introduced, we also controlled for new technology innovation, which might have been the one factor other than labour to raise productivity, perhaps with less problematical consequences for employees.

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