

THE RELATIONSHIP BETWEEN HR PRACTICES AND FIRM PERFORMANCE: EXAMINING CAUSAL ORDER

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Significant research attention has been devoted to examining the relationship between HR practices and firm performance, and research support has assumed HR as the causal variable. Using data from 45 business units (with 62 data points), this study examines how measures of HR practices correlate with past, concurrent, and future operational performance measures. The results indicate that correlations with performance measures at all 3 times are both high and invariant, and that controlling for past or concurrent performance virtually eliminates the correlation of HR practices with future performance. Implications are discussed.

The desire of human resource (HR) practitioners to demonstrate the value of what they do for the rest of the organization has a long history. Drucker (1954) referred to “personnel” managers as constantly worrying about “their inability to prove that they are making a contribution to the enterprise,” (p. 275). This has been echoed more recently by Tom Stewart, who described HR leaders as being “*unable to describe their contribution to value added except in trendy, unquantifiable and wannabe terms...*” (Stewart, 1996, p. 105).

In response to these longstanding and repeated criticisms that HR does not add value to organizations, the past 10 years has seen a burgeoning of

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research attempting to demonstrate that progressive HR practices result in higher organizational performance. Huselid's (1995) groundbreaking study demonstrated that a set of HR practices he referred to as high performance work systems (HPWS) were related to turnover, accounting profits, and firm market value.

Since then, a number of studies have shown similar positive relationships between HR practices and various measures of firm performance. For instance, MacDuffie (1995) found that "bundles" of HR practices were related to productivity and quality in his sample of worldwide auto assembly plants. Delery and Doty (1996) found significant relationships between HR practices and accounting profits among a sample of banks. Youndt, Snell, Dean, and Lepak (1996) found that among their sample of manufacturing firms, certain combinations of HR practices were related to operational performance indicators. More recently, Guthrie (2001) surveyed corporations in New Zealand and found that their HR practices were related to turnover and profitability. This vein of research has been summarized by Huselid and Becker who stated "Based on four national surveys and observations on more than 2,000 firms, our judgment is that the *effect* of a one standard deviation *change* in the HR system is 10–20% of a firm's market value" (Huselid & Becker, 2000, p. 851, emphasis added).

Certainly, the existing research suggests a positive relationship between HR and performance. However, contrary to Huselid and Becker's (2000) claim, this body of work tends to lack sufficient methodological rigor to demonstrate that the relationship is actually causal in the sense that HR practices, when instituted, lead to higher performance. Little, if any, research has utilized rigorous designs to test the hypothesis that employing progressive HRM systems actually results in higher organizational performance in a causal sense.

The purpose of this study is to provide a more rigorous examination of the causal order in the HR practice–organizational performance relationship. It uses a unique sample of autonomous business units within the same company and explores the relationships between HR practices and past, concurrent, and future measures of operational and financial performance.

A Causal Examination of the HR–Performance Relationship

For researchers to better explore the relationship between HR practices and profitability, they first must consider the conditions necessary for making valid causal inferences. These conditions have been thoroughly examined within the philosophy of science literature, yet little of that discussion has been integrated into the literature on the relationship between HR practices and firm performance. We address this below.

Conditions for Inferring Cause

Cook and Campbell (1979) provide an in-depth analysis of how philosophers of science have approached the issue of demonstrating a causal relationship. Based on the work of John Stuart Mill, they propose three criteria for inferring cause: covariation between the presumed cause and effect, the temporal precedence of the cause, and the ability to control or rule out alternative explanations for a possible cause-and-effect connection.

With regard to covariation, they suggest that demonstrating cause requires that the effect be present when the cause is present and be absent when the cause is absent. Temporal precedence requires that, at the level of molar relationships, the proposed cause must exist in time prior to the proposed outcome. Finally, although not always possible, they suggest a need to control for all other variables that might cause the focal outcome. Although such conditions do not necessarily “prove” cause, they provide a basis for drawing more valid causal inferences.

Importantly, Cook and Campbell (1979) note that the ability to infer causal connections is instrumental for human decision making. They suggested that the most interesting causal relationships are those where decision makers exert some control over the putative cause. In such situations, they can manipulate the putative cause in order to influence the proposed outcome. This fits quite nicely with the basic assumption and goal of the research on the HR–performance relationship. This stream of research seeks to demonstrate a relationship between HR practices and performance in an effort to provide decision makers with the causal inferences necessary to justify developing and implementing these practices in order to increase performance. Consequently, this vein of research, to fulfill its ultimate goal, must provide research that maximizes the validity of the proposed causal inferences.

Research on the HR–Performance Causal Relationship

Acquiring data that enables researchers to validly infer cause is difficult in any arena but even more so in research on the HR–performance relationship. Such research requires studying organizations that are subject to a tremendous variety of variables that influence performance. The research almost universally relies on survey or interview methodologies to assess the HR practices that exist at a given time. It is important to note that research built predominantly around survey methodologies can never match the ability to demonstrate both temporal precedence and control of alternative explanations that exist in laboratory experiments. So, we do not suggest that any survey design can ultimately “prove” cause in

either direction. However, we do believe that existing research, although consistently demonstrating covariation, has paid inadequate attention to temporal precedence and/or alternative explanations.

In order to examine the extent to which this literature has addressed causality issues, we conducted a literature review identifying 68¹ empirical studies examining the relationship between multiple HR practices and performance. These studies were gathered via literature search as well as examining studies for cross referencing. We included only studies that reported empirical relationships between a system of HR practices (we excluded studies examining a single practice) and organization-level performance measures. We classified each study in terms of the type of design (discussed below), whether or not a significant relationship was supported, and whether or not the study empirically tested for reverse causality. It is important to note that some studies reported data from multiple designs, so there are actually more designs (70) than studies (66). Table 1 displays these results (the full reference information for the studies is available in the appendix). The first thing notable about this table is that all of the published studies have reported at least one significant relationship between HR practices and performance.

The second notable observation from this table is the vast reliance on one kind of design. By far the most prevalent design within the literature examining the HR–performance relationship is what we call “post-predictive” because it measures HR practices after the performance period, resulting in actually predicting *past* performance. Many of these designs entail a single data collection effort where the same respondent provides information for both assessments of their current HR practices and their firms’ performance. For instance, Delaney and Huselid (1996) used data on both HR practices and performance collected via phone interviews. Interestingly, such designs ask respondents for their firm’s *current* HR practices but measure their *past* performance (i.e., performance up until the point of the response) presenting a logical inconsistency for arguing that HR practices *cause* performance. Other studies using this design gather HR practices via survey during 1 year but use the previous year’s performance metrics (e.g., Black and Lynch, [2001] use HR practice data gathered in 1994 to predict performance during the 1987–1993 time period). Regardless, in both cases the performance occurs *prior* to the assessment of HR practices.

A second type of design is referred to as “retrospective” because it asks respondents to recall HR practices that existed prior to the

¹Of the 68 studies, two were impossible to classify because they did not provide sufficient detail regarding the timing of the measures. Consequently, Table 1 only includes 66 studies, the designs of which could be coded.

TABLE 1
Studies Examining The HR-Performance Relationship

Author(s)	Study type	Reverse causality tested (yes/no)
Addison and Belfield (2001)	Post-predictive	No
Agarwala (2003)	Contemporaneous	No
Ahmad and Schroeder (2003)	Post-predictive	No
Appleyard and Brown (2001)	Post-predictive	No
Arthur (1994)	Post-predictive	No
Bae et al. (2003)	Post-predictive	No
Bae and Lawler (2000)	Post-predictive	No
Batt (2002)	Post-predictive	No
Batt et al. (2002)	Post-predictive	No
Bennett et al. (1998)	Post-predictive	No
Björkman and Xiucheng (2002)	Post-predictive	No
Black and Lynch (2001)	Post-predictive and Retrospective	No
Caligiuri and Stroh (1995)	Post-predictive	No
Cappelli and Neumark (2001)	Post-predictive	No
Chandler and McEvoy (2000)	Post-predictive	No
Chandler et al. (2000)	Post-predictive	No
Collins and Clark (2003)	Predictive	No
Cooke (1994)	Post-predictive	No
Delaney and Huselid (1996)	Post-predictive	No
Delery and Doty (1996)	Contemporaneous	No
Fey and Bjorkman (2001)	Post-predictive	No
Fey et al. (2000)	Post-predictive	No
Fulmer et al. (2003)	Post-predictive Contemporaneous and Predictive	Yes
Gelade and Ivery (2003)	Contemporaneous	No
Gomez-Mejia (1988)	Predictive	No
Guest et al. (2003)	Predictive	Yes
Guthrie et al. (2002)	Retrospective	No
Guthrie (2001)	Retrospective	No
Harel et al. (2003)	Post-predictive	No
Harel and Tzafrir (1999)	Post-predictive	No
Harris and Ogbonna (2001)	Post-predictive	No
Harter et al. (2002)	Post-predictive	No
Hoque (1999)	Post-predictive	No
Huang (2000)	Post-predictive	No
Huselid (1995)	Predictive	No
Huselid and Becker (1997)	Retrospective	Yes
Huselid et al. (1997)	Predictive	No
Ichniowski and Shaw (1999)	Retrospective	No
Ichniowski et al. (1997)	Retrospective	No
Jayaram et al. (1999)	Post-predictive	No
Jangwoo Lee and Miller (1999)	Post-predictive	No

TABLE 1 (continued)

Author(s)	Study type	Reverse causality tested (yes/no)
Li (2003)	Post-predictive	No
Khatri (2000)	Post-predictive	No
Lahteenmäki et al. (1998)	Post-predictive	No
Lam and White (1998)	Post-predictive	No
Lincoln and Kalleberg (1996)	Post-predictive	No
Liouville and Bayad (1998)	Post-predictive	No
MacDuffie (1995)	Post-predictive	No
Martell and Carroll (1995)	Post-predictive	No
Ngo et al. (1998)	Post-predictive	No
Park et al. (2003)	Post-predictive	No
Paul and Anantharaman (2003)	Post-predictive	No
Ramsay et al. (2000)	Post-predictive	No
Richard and Johnson (2001)	Post-predictive	No
Rodríguez and Ventura (2003)	Post-predictive	No
Rogg et al. (2001)	Post-predictive	No
Shaw et al. (1998)	Post-predictive	No
Snell and Youndt (1995)	Predictive	No
Stroh and Caligiuri (1998)	Post-predictive	No
Vandenberg and Richardson (1999)	Predictive and Post-predictive	No
Varma et al. (1999)	Post-predictive	No
Way (2002)	Post-predictive	No
Welbourne and Andrews (1996)	Predictive	No
West et al. (2002)	Post-predictive	No
Wright et al. (1999)	Post-predictive	No
Youndt et al. (1996)	Predictive	No

Note. All of the above studies reported at least one significant relationship between HR practices and performance.

performance period. For instance, Ichniowski, Shaw, and Prensushi (1997) used monthly performance data from steel-finishing lines over a 5-year period. However, they measured HR practices by asking respondents after the 5-year production period to recall what the HR systems were in place at monthly intervals during the 5-year time frame. Similarly, Guthrie (2001) used performance data from 1996/97 but asked respondents during that time to report the practices that existed during 1995/96. Despite the popularity of retrospective reports, there are a number of problems associated with informant fallibility that can strongly influence these reports. The primary problem is that key informants may not be able to accurately recall sets of HR practices used in years past. As a number of organizational researchers have suggested, inaccurate recall in retrospective reporting can result from inappropriate rationalizations,

oversimplifications, faulty post hoc attributions, and simple lapses of memory (Golden, 1992; Huber & Power, 1985). Given the potential problems noted by others (Gerhart, Wright, McMahan, & Snell, 2000; Wright et al., 2001) with regard to unreliability of single rater reports of HR practices compounded with the memory requirements to report practices that existed from 1 to 5 years in the past, such retrospective designs preclude drawing confident causal conclusions (Martell & Guzzo, 1991)

Third, other studies have gathered contemporaneous HR practice and performance data, and we refer to these studies as being “contemporaneous.” For instance, Delery and Doty (1996) gathered HR practice data during 1992 and used the year-end performance data. Because the year-end data includes performance from months prior to and concurrent with the HR practice measure, it is difficult to draw firm causal conclusions using this methodology.

Finally, only a few studies have explored if practices assessed at one point in time were related to subsequent firm performance. Such designs are the only true “predictive” designs. Huselid (1995) gathered both contemporaneous and subsequent year performance data and reported only the subsequent year data in his study in order to provide more conservative effect size estimates. Youndt et al. (1996) related HR practices to plant performance assessed 2 years later. Youndt and Snell (1995) also related their assessments of HR practices to performance assessed 3 years later.

As can be seen in Table 1, the vast preponderance (50 of the 70 designs) of studies have used a “post-predictive” design. This is not surprising given the relative ease of data collection, but it does make one wonder how such studies can legitimately suggest that HR practices “cause” performance. Six of the studies have used a retrospective design, and an additional four used a contemporaneous design. The strongest design for actually arguing a causal relationship, the predictive, has been used in only 10 studies.

Finally, as can be seen in Table 1, very few studies to date have attempted to test whether firm performance predicts future HR practices or vice versa. A study conducted by the consulting firm Watson Wyatt (2002) (not included in the table because it was not refereed) used data on 51 corporations with HR practice and financial performance scores for 1999 and 2001. They found that the 1999 HR practices correlated .41 with 2001 financial performance, but 1999 financial performance correlated only .19 with 2001 HR practices, thereby concluding that this demonstrated that HR practices were “leading indicators” of future financial performance.

In one of the most extensive efforts to examine causal order, Huselid and Becker (1996) compared cross-sectional and panel estimates to determine the direction in which the causal arrow pointed. They found that longitudinal estimates were substantially smaller than cross-sectional

estimates and, when using the most appropriate statistical analyses, non-significant. However, they found that after making the necessary statistical corrections for measurement error, the data seemed to indicate that previous HR practices predicted future corporate financial performance. In addition, as Gerhart (2004) notes, using fixed effects estimates can result in lower effect sizes than cross-sectional estimates because of measurement error problems. Although Huselid and Becker corrected for unreliability in their fixed effects estimates, they did not correct for unreliability in the cross-sectional estimates. Upon doing so, Gerhart found that the cross-sectional coefficient (.24) was nearly twice as large as the comparable fixed effects coefficient of .125, suggesting that there may be an omitted variables problem.

More recently, Guest, Michie, Conway, and Sheehan (2003) related HR practices to both past and subsequent objective productivity and profitability data as well as current subjective productivity and financial performance estimates among a sample of 366 companies in the UK. They found that HR practices were related to higher profitability but not productivity using the objective performance measures, but that after controlling for past performance, the significant relationship with profitability disappeared. They concluded that their results confirm an association between HRM and performance, but failed to demonstrate that HR causes higher performance.

So, in summary, the literature on the HR performance relationship has (a) universally reported significant relationships between HR and performance, (b) almost exclusively used designs that do not logically allow one to draw causal conclusions, and (c) very seldom actually tested for a reverse causal order.

Research on the Attitude–Performance Causal Relationship

The notion of causality is not limited to the HR–performance relationship. Recent research on the relationship between affective variables such as employee engagement, job satisfaction, or organizational commitment and performance at the business unit level of analysis provides interesting insights and additional evidence that the directionality of cause may be suspect.

For instance, Ryan, Schmidt, and Johnson (1996) examined the relationship between unit employee satisfaction and a number of organizational performance measures with branches of a financial service organization. Although they found that employee satisfaction was related to employee turnover, customer satisfaction, and a 60-day delinquency rate within each of successive years, they unexpectedly found that

customer satisfaction in Year 1 predicted employee satisfaction in Year 2, but not vice versa.

More recently, Koys (2001) examined the relationship between the HR outcomes of employee satisfaction, employee turnover, and citizenship behavior and organizational outcomes of profits and customer satisfaction among 28 branches of a restaurant chain. He found that the HR outcomes in 1 year more strongly predicted the organizational outcomes in the following year than the organizational outcomes in 1 year predicted the HR outcomes in the following year.

In a significant meta-analysis of the attitude–performance relationship, Harter, Schmidt, and Hayes (2002) examined the relationship between employee satisfaction–engagement and business unit outcomes such as customer satisfaction, productivity, profit, employee turnover and accidents. Their results showed a consistent set of strong relationships with all these outcomes. They concluded that changes in management practices that increase employee satisfaction may increase business unit outcomes. Although they did not specifically test for the causal direction, they noted that some of the studies used predictive designs and acknowledged that future research should continue to focus on causality and directionality issues.

In a more pessimistic study, Schneider, Hanges, Smith, and Salvaggio (2003) used job satisfaction data from a consortium of companies gathered over a set of 8 years. They gathered financial performance information (ROA and EPS) over the same period of time in order to assess the causal direction. Using multiple time lags (1-year, 2-year, etc.) they found significant and stable relationships for three of the seven scales. However, their results indicated that Overall Job Satisfaction and Satisfaction with Security were more strongly predicted by past performance (using both ROA and EPS) than vice versa, and that the third scale, Satisfaction with Pay, exhibited a reciprocal relationship with the performance measures.

Finally, Fulmer, Gerhart, and Scott (2003) examined whether the “100 Best Companies to Work For” are actually better performers. These authors based their analysis on the idea that having a superior employee relations climate would result in higher motivation and productivity, and reduced turnover that would translate into financial performance. In an extremely creative study, they examined differences between a set of the 1998 100 Best and (a) a matched set of peer companies from each member’s industry, and (b) a Value Weighted Index of firms from the NYSE/AMEX/NASDAQ stock listings over a 6-year time frame including 3 years prior to the announcement of their status on the list and the 3 years following. We should note that our categorization would actually suggest that although the authors were correct in defining these years prior to and following the announcement (the list came out on January 12, 1998)

the actual employee satisfaction data was gathered during the prior year (1997), making results with regard to that year really a “concurrent” study. Nonetheless, this study provides some evidence of the potential for a reverse causal direction. Although they did find that the 100 Best companies outperformed their comparison groups on most of the dependent variables in 1997 and 1998, on at least one variable (annual return to shareholders, 1996, Table 3) they also outperformed their competitors. In addition, although problematic because it included the 1997 year, which was actually concurrent with the data collection, the 100 Best companies outperformed their comparison groups on the cumulative returns from 1995 to 1997. Thus, although it is clear, as the authors note, that investing in these 100 Best companies would provide a higher return than investing in the comparison companies, this might have been true even before they were noted for their strong employee relations climate.

These studies indicate that significant uncertainty exists as to the extent to which attitudes at the unit level impact unit performance, unit performance impact attitudes, or the relationship exhibits dual causality. This suggests the need for further research because, as Harter et al. (2002) suggest, “The most convincing causal evidence comes not from one study but from a body of research and a multitude of types of evidence. . .” (p. 276).

Summary

As can be seen by this detailed analysis of the designs, some of the seminal studies in the HR-performance literature fail to provide predictive designs that allow drawing more confident causal inferences. In addition, the studies that specifically set out to address the causal nature of the relationship have provided, at best, somewhat mixed results. Finally, studies examining the causal order in the employee attitude (those expected to be strongly impacted by HR practices) and organizational outcomes have also produced mixed results. This may not be problematic if no valid alternative explanations for the relationship have been proposed. However, a number of alternative causal models have been proposed.

Alternative Causal Models for the HR-Performance Relationship

Universally assumed in the HR-performance literature is a causal model wherein HR practices, when implemented effectively, result in higher organizational performance. However, Wright and Gardner (2003) offered three alternative explanations for the observed covariation between HR practices and firm performance.

First, “reverse causation” would suggest that, rather than HR practices causing performance, performance causes HR practices. This model suggests that high-performing organizations by their nature possess slack resources. Firms that are profitable may share these profits with employees in a number of ways. They may provide higher pay and benefits, may invest in offering more training and development opportunities, may develop more extensive selection systems, and may allow employees to participate in teams, quality circles, and other forms of empowerment activities. In fact, a number of the HR practice items more logically demonstrate a reverse causation effect. Items such as the percentage of total pay that is variable, the differences in percent merit increases between high and low performers, and the number of hours of training received are heavily influenced by the past and current financial performance of a firm. Firms facing financial difficulties reduce their variable pay (profit sharing and stock options have little or no value; Hewitt Associates, 2001; Kennedy, 2003), merit increases (and thus the difference between high and low performers; Kennedy, 2003), and training budgets (reduce the number of hours they train employees; Exclusive RSS Survey, 2003; McIntyre, 1992).

Consequently, studies that do not attempt to assess temporal precedence (through using a predictive design that uses a performance measure collected following the HR practice measure) may not provide the data necessary for making valid causal inferences. Even studies that are predictive in design may still not allow complete confidence in drawing causal conclusions. As Huselid and Becker (1996) showed, if financial performance also predicts HR practices, then both predictive designs, or designs that examine cross-lagged correlations (such as the Watson Wyatt study), may show relationships between past HR practices and future firm performance, without truly proving that it is the HR practices leading to performance, rather than vice versa.

Second, a “spurious” relationship might exist if there were an actual true covariation between the measures of HR practices and performance, yet, there was no direct causal relationship between the two variables. In this case, it may be that a third variable is causing both variables resulting in their respective covariation. For instance, it could be that effective leaders cause organizational performance, and they also treat employees well through progressive HR practices. A number of texts have argued for the positive effects of leadership on organizational performance (Conger & Kanungo, 1988; Day & Lord, 1988; Kouzes & Posner, 1995). These texts argue that leadership contributes toward defining strategic direction, integrating various job activities, coordinating communication between organizational subunits, monitoring activities, and controlling deviations from standard. These activities are likely to directly effect performance as well as define organizational HR practices.

Organizational culture may be another third variable that causes both the implementation of “high performance” HR practices and organizational performance. Organizational culture is a system of shared values (what is important) and beliefs (how things work) that shape a company’s people, organizational structures, and control system to produce behavioral norms (the way we do things around here; Schein, 1985). An organization’s culture is likely to be related to both its management practices as well as organizational performance. A number of texts have in fact argued for positive effects of organizational culture on organizational performance (Barney, 1986; Collins & Porras, 1994; Kotter & Heskett, 1992; Siehl & Martin, 1990). Although some researchers have argued that HR practices shape organizational culture as part of the HR practice–firm performance causal chain (Kopelman, Brief, & Guzzo, 1990; Ostroff & Bowen, 2000), it is just as possible that culture actually influences which types of HR practices are put in place in an organization as well as how they are implemented.

One of the very first published HR–performance articles supports the notion of a third spurious variable driving HR practices and firm performance (Krackhardt, McKenaa, Porter, & Steers, 1981). Using 50 branches of a single commercial bank, the researchers trained managers in half the branches to improve communications with tellers, set up cross-training, and reward top performers; managers in the matched sample received no such training. The main findings suggested that the experimental group had lower turnover than the control group. Post hoc analyses revealed that some of the managers in the experimental branches implemented the management practices and some did not. Managers in historically high-performing branches were more likely to implement the practices than those in historically low-performing branches. Although clearly not a true test of the spurious variable hypothesis, these findings suggest an unmeasured attribute of the bank branches concurrently drove performance, use of HR practices, and employee turnover (Krackhardt et al., 1981). Studies that do not control for a full set of variables that might cause performance may lack the data necessary for making valid causal inferences.

Finally, “implicit performance theories” might suggest that there may be no true relationship between HR practices and performance, but one may be observed empirically due to respondents’ implicit performance theories. This explanation suggests that the information processing requirements for respondents to know and report all HR practices across all jobs across all units, across the globe are too great, and consequently, they respond to the HR practice measure based on their knowledge of the firm’s performance (i.e., “we’re a high performing firm so we must do all these HR things”). In fact, a study by Gardner and Wright (2002) presented

executives and graduate students with fictitious descriptions of high- and low-performing companies and found evidence that their reports of HR practices can be influenced by knowledge of the company's past performance. Thus, studies gathering concurrent HR practice and performance (or retrospective HR) data, particularly if both measures come from the same respondent, may have HR practice measures that are contaminated by respondents' implicit performance theories.

This discussion is not to suggest that any one study can adequately address all of the conditions necessary for drawing causal conclusions. It does, however, point to the fact that the current research base does not provide the data necessary for drawing causal conclusions implicitly or explicitly driving current research and practice.

This study will attempt to address at least some of these issues with regard to drawing valid causal conclusions regarding the relationship between HR practices and firm performance. First, it uses a number of variables that comprise a logical chain through which we expect that HR practices will impact profitability, including human resource (affective organizational commitment), operational (productivity, quality, shrinkage, and workers compensation), and financial (expenses and profits) performance measures. Second, the performance data are collected over time, allowing us to explore the relative relationships between our focal variables (HR and affective organizational commitment) and the performance variables assessed prior to, concurrent with, and following the assessment of these focal variables. Finally, although it does not control for all potential alternative causes of the performance variables, the unique sample of autonomous business units within the same company control for a number of extraneous variables (industry, product lines, revenues, number of employees, etc.) that are often difficult to control in other studies.

The design of our study is illustrated in Figure 1. As can be seen, we test for the relationships between both HR practice and aggregated affective commitment and multiple performance measures at four different times: past, concurrent, early post, and late post. The performance measures span both operational (productivity, quality, shrinkage, and workers compensation) and financial (expenses and profits) performance measures.

At the outset we should note that the purpose of this article is not to argue that HR practices *do not* have any impact on firm performance. Rather, it is to argue that (a) past research does not provide an adequate basis for inferring cause, and (b) past research may have resulted in inflated estimates of any causal impact that does exist. We hope that the empirical examination of the causal direction will spur future researchers to conduct more rigorous empirical investigations that can result in more valid causal inferences.

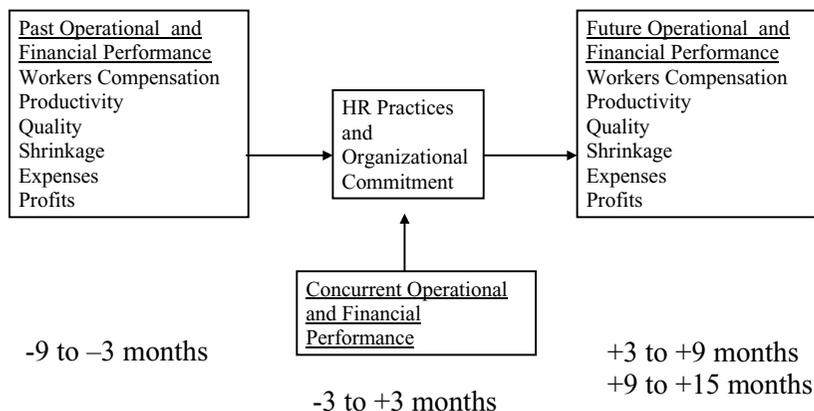


Figure 1: The Study Design.

Method

Overview

This study consisted of examining the relationships between both HR practices and collective affective commitment and various operational and financial measures of performance. Survey data collected from multiple employees per business unit were used to measure HR practices and affective commitment and their covariation with archival measures of previous, concurrent, and subsequent organizational performance measures collected at 6-month intervals.

Sample

The sample consisted of 45 self-contained business units (the equivalent of a plant) of a large food service corporation with operations in the United States and Canada. The data were collected from U.S. employees over two fiscal years (1998–2000), and because a subset ($n = 17$) of the business units participated in the survey in both years, there are a total of 62 data points.² Each of the business units has six basic job categories:

²For each of these 17 cases we treated them as independent observations using the corresponding past, simultaneous, early post and late post measures. Consequently, the late post measures for these cases in Year 1 also served as the past measures in Year 2. Because the 17 business units created the situation where the observations were not all independent, we reran the analyses with only the 45 independent observations. The results did not differ significantly from those presented here, so in the interest of higher power, we used the full data set.

sales, warehousing, merchandising, delivery drivers, administrative staff, and supervisors/managers. Business unit HR directors were instructed to randomly select and survey 20% or more of the employees in each job group from each of the three shifts. Employees completed surveys on company time under the direction of the HR director. Surveys were collected in one large sealable envelope per meeting, which was then sent to the researchers. The response rate for employees in this meeting was 99.4% for a total employee sample size of 13,005.

Consistent with past research on the HR-performance relationship (Arthur, 1994; Batt, 2002; Delery & Doty, 1996; Shaw, Delery, Jenkins, & Gupta, 1998), we used the survey responses from employees in core jobs, defined as nonsupervisory, nonmanagerial workers at the business unit who are directly involved in providing the service at the location (Osterman, 1994, p. 175). Extensive field work at multiple business units along with conversations with business unit presidents allowed us to conclude that the core jobs were MA (merchandising associates, i.e., salespersons), warehouse employees, and delivery drivers. The MAs work with customers to determine their product needs and place their orders, warehouse employees acquire the necessary products from the warehouse, and the delivery drivers deliver these products to the customers.

Thus, each data point in this study was derived from an average of 39.02 MAs, 38.66 warehouse employees, and 35.00 drivers for a total of 112.68 employees per business unit and a total of 6,986 employees across the 62 business units. The employee sample included 21.6% of all employees across all 62 business units. In order to eliminate the possibility of common method variance (or percept-percept correlations that are biased by collecting two measures from the same source using the same method at the same time), we used the reports of HR practices from half the respondents from each organization and the reports of affective organizational commitment from the other half of the respondents.

This corporation's management philosophy emphasizing structural ways to create an entrepreneurial environment presents a unique opportunity to study the relationship between HR and performance in a controlled field setting. First, the corporation tries to keep every business between \$350 million and \$700 million in revenues with a corresponding employee count of between 250 and 600 employees. If a business unit grows beyond the \$700 million mark, it is then divided into two business units. This creates a sample where size (both in terms of revenues and employees) is strongly controlled. In addition, the basic products and information technology are largely uniform across all of the business units. Although regional differences may result in different volumes and mixes of products, the products available for sale are uniform. Similarly, although localized

changes might be made to the information technology, the basic operational systems are largely uniform. Thus, again the sample largely controls for performance differences due to products and technology.

However, although size, technology, and products provide little opportunity for variance, considerable variance exists with regard to HR strategies. Guided by the corporate principle of “earned autonomy,” business units are largely free to manage their employees however they see fit. A minimal level of uniformity in HR practices exists with regard to legally mandated benefits, but the majority of HR practices (e.g., specific selection processes and practices, pay systems, performance management systems, training and development strategies and practices) are left to the business units to design, develop, and implement. Corporate control over the business units comes from monitoring the operational and financial results that we report here. This is analogous to the “financial” controls as opposed to “strategic” controls discussed in the corporate strategy literature (see Rowe & Wright, 1997). Thus, this sample provides a unique opportunity to study the HR–performance relationship where many sources of extraneous variance are controlled through design (thus negating the need for statistical controls), but the major focus of variance is with regard to the phenomenon of interest: HR practices.

Measures

HR practices. Employee respondents in each work unit were asked whether or not nine specific HR practices existed for their job category (“Yes,” “No,” and “I don’t know”). “Yes” responses were coded as 1; “No” responses were coded as zeros. “I don’t know” responses were classified as “No” and coded as zeros. See Table 2 for the complete listing of the HR practice items used in this study. The choice of the items was based on a compromise between what the researchers wanted to examine and what the company was willing to allow to be asked. We were allowed to add some actual HR practice items to the survey in return for providing a reduced fee (the company was originally only interested in assessing the climate), but the company representatives refused to allow us to ask some questions that they deemed too sensitive in terms of potentially priming employees to wonder why they did not have these practices (e.g., gain-sharing, profit sharing, etc.). In the end, we had items that represented the major areas of HR practices (selection, pay for performance, training, and participation).

One training item was originally written in a different response format than the rest of the HR practice items. This item was “On average, how many hours of formal training do employees in this job receive each year?”

TABLE 2
Human Resource Management Practice Questions^a

Selection

1. Applicants undergo structured interviews (job related questions, same questions asked of all applicants, rating scales) before being hired.
2. Qualified employees have the opportunity to be promoted to positions of greater pay and/or responsibility within the company.
3. Applicants for this job take formal tests (paper and pencil or work sample) before being hired.

Training

4. On average how many hours of formal training do employees in this job receive each year?^b

Pay for Performance and Performance Evaluation

5. Employees in this job regularly (at least once a year) receive a formal evaluation of their performance.
6. Pay raises for employees in this job are based on job performance.
7. Employees in this job have the opportunity to earn individual bonuses (or commissions) for productivity, performance, or other individual performance outcomes.

Participation

8. Employees in this job are involved in formal participation processes such as quality improvement groups, problem-solving groups, roundtable discussions, or suggestion systems.
 9. Employees in this job have a reasonable and fair complaint process.
-

^aWith the exception of those marked, the response option for these questions was “Yes, No, I don’t know.”

^bResponse option was “Hours—”

This item was recoded to comply with the yes/no dichotomous response format of the other practice items. If the number of training hours entered is equal to or greater than 15, that response was be coded as 1 = *yes*. Hours below 15 were coded as 0 = *no*.³

It should be noted that collecting HR practice data from multiple employees from each business unit is consistent with recommendations by Gerhart et al. (2000) and Wright et al. (2001). Collecting HR data from employees results in the measurement of HR practices in use and not policies in books. Second, due to information processing demands, HR

³Fifteen hours was used as a cut off based on a study of employer provided training conducted by the Bureau of Labor Statistics (Frazis, Gittleman, Harrigan, & Joyce, 1998). Both employers and employees of establishments of this size in the wholesale trade industry report employee receive 16 to 24 hours of training each year. Fifteen hours is well below industry averages.

executives are generally unable to accurately describe the HR practices used to manage employees at multiple locations in multiple job groups. Individual employees are best able to describe their actual employment relationships. Finally, collecting data from multiple sources allows the estimation of the interrater reliability for both the individual practices and the index. As reported below, use of this methodology results in highly reliable measures.

Consistent with previous research, we used an additive index of these HR practices (e.g., MacDuffie, 1995; Youndt et al., 1996). Because there was no reason to believe that these practices should be conceptualized as a unidimensional construct (see Delery, 1998), interrater reliability was deemed to be the most appropriate reliability assessment. Intraclass correlations were computed for this scale at the organizational level. For each individual, a ratio was calculated of the number practices they stated were present divided by nine. The business unit index of HR practices was created by taking the mean of this ratio for the half of the employees providing information about this measure. Hofmann (2002) notes that when constructs are objective ones that are being assessed by multiple respondents (such as with HR practices), one is only interested in obtaining a reliable estimate of the aggregate phenomena. These HR practice measures illustrated that using a single respondent (ICC(1), which assesses the reliability of a single respondent measure) would result in extremely low reliability, but that by using multiple respondents (ICC(2) which assesses the reliability of using aggregated multiple respondents), the reliability of the measures is more than adequate (average item ICC(1) = .06, average item ICC(2) = .77; scale ICC(1) = .13, scale ICC(2) = .89).

Affective organizational commitment. Five items from two different organizational commitment scales (Meyer & Allen, 1997; Porter, Steers, Mowday, & Boulin, 1974) were used to construct the collective affective commitment measure. Sample items include "I feel a strong sense of belonging to this organization," "I am willing to work harder than I have to in order to help this company succeed," and "I am proud to be working for this company." Items were averaged to create one index per person and were then aggregated to the business level using half the sample of employees providing information about commitment. Again, aggregating over respondents resulted in good reliability ($\alpha = .86$, ICC(1) = .07, ICC(2) = .81). The ANOVAs used to calculate the ICCs were significant at the .001 level suggesting a level of agreement about affective commitment at the business unit to aggregate individual scores into a mean commitment score.

Performance. Six measures of performance were obtained from archival company records. These measures represent the major performance measures tracked by the corporate headquarters as indicators of

a businesses success.⁴ “Workers Compensation” was the workers compensation expenses incurred during the 6 months divided by sales; the lower the number the better. “Quality” was measured as number of pieces per error where each piece represents a carton of product. “Shrinkage” was measured as inventory loss including loss due to spoilage, warehouse outs, inventory adjustments, cycle count adjustments, warehouse damage, delivery shorts, delivery damage, samples shrinkage, and sales return damage as a percentage of sales. “Productivity” was assessed as payroll expenses for all employees divided by the number of pieces; the lower the number the better (i.e., it measures “payroll per piece”). “Operating Expenses” consisted of all relevant business operating expenses including warehouse, occupancy, delivery, selling, data processing, and G&A expenses as a percentage of sales. Finally “Profitability” was assessed as the operating pre tax profit of the business unit as a percentage of sales where operating pre tax profit was calculated as Sales – (Cost of Goods Sold + Operating Expenses + Cash Discounts).

Each measure was for a 6-month period and included 9 months to 3 months prior to the survey administration (past), 3 months prior and 3 months after the survey administration (concurrent), 3 to 9 months after survey administration (early post) and 9 to 15 months after the survey administration (late post). It is also important to point out that although the standard deviations for operating expenses, shrinkage, and worker’s comp are extremely small, their means are also quite small. These performance measures have a similar dispersion, relative to the mean as the HR index, collective commitment, and the other performance measures.

Results

The means (at the request of the company all variables were centered to disguise the raw data), *SDs*, and intercorrelations are presented in Table 3.

Although somewhat redundant, Tables 4 (HR practices) and 5 (collective affective commitment) provide these same relationships in a way that enables the reader to better understand the causal connections. Columns 1 through 4 display the correlations between the focal variable and each of the past, concurrent, early post, and late post performance variables. Columns 5 through 8 show the partial correlations with each of the six future performance measures (early and late) controlling for the same

⁴One of the reviewers correctly noted that a number of problems exist with using ratio measures in regression. The preferred method for controlling for the denominator is by entering it in to the regression equation rather than computing it as a denominator. However, the corporation only provided us with data in its already computed ratio form.

TABLE 3
Descriptive Statistics and Correlations of All Variables^{a,b}

	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19 ^c	20	21	22	23 ^c	24	25	
1. HR practice index	.11																										
2. Commitment	.27	.57																									
3. Profitability (past)	.93	.23	.26																								
4. Profitability (concurrent)	.83	.32	.34	.75																							
5. Profitability (early post)	.92	.33	.29	.78	.95																						
6. Profitability (late post)	.88	.33	.31	.67	.93	.93																					
7. Operating expenses (past)	.02	-.21	-.26	-.49	-.51	-.42																					
8. Operating expenses (concurrent)	.01	-.20	-.25	-.49	-.51	-.49	-.45	.94																			
9. Operating expenses (early post)	.01	-.25	-.27	-.49	-.52	-.53	-.48	.94	.97																		
10. Operating expenses (late post)	.01	-.16	-.18	-.42	-.48	-.47	-.47	.87	.95	.95																	
11. Shrinkage (past)	.0001	-.38	-.34	-.49	-.48	-.42	-.41	.32	.36	.32	.30																
12. Shrinkage (concurrent)	.0001	-.35	-.30	-.39	-.39	-.35	-.35	.29	.30	.27	.24	.86															
13. Shrinkage (early post)	.0001	-.30	-.26	-.41	-.44	-.41	-.37	.32	.32	.31	.26	.81	.93														
14. Shrinkage (late post)	.0001	-.29	-.22	-.26	-.39	-.35	-.34	.23	.22	.21	.18	.59	.72	.82													
15. Productivity (past)	.28	-.08	-.25	-.36	-.34	-.35	-.26	.82	.76	.77	.73	.20	.17	.19	.10												
16. Productivity (concurrent)	.27	-.03	-.20	-.38	-.35	-.34	-.29	.77	.80	.79	.80	.22	.16	.16	.06	.93											
17. Productivity (early post)	.28	-.07	-.23	-.34	-.33	-.33	-.29	.77	.81	.82	.83	.19	.16	.17	.08	.92	.97										
18. Productivity (late post)	.29	-.06	-.18	-.36	-.36	-.35	-.33	.72	.78	.78	.84	.25	.19	.19	.08	.85	.94	.96									
19. Quality (past) ^c	198.5	.50	.46	.49	.49	.48	.48	-.21	-.16	-.22	-.17	-.56	-.48	-.45	-.36	-.20	-.16	-.18	-.20								
20. Quality (concurrent)	238.7	.46	.40	.39	.47	.46	.46	-.08	-.06	-.09	-.04	-.59	-.56	-.52	-.43	-.01	.02	.01	-.03	.89							
21. Quality (early post)	234.2	.48	.38	.44	.50	.51	.50	.14	-.11	-.16	-.12	-.57	-.54	-.53	-.45	-.02	.00	-.02	-.05	.85	.92						
22. Quality (late post)	291.0	.49	.37	.47	.53	.53	.52	-.27	-.30	-.32	-.30	-.46	-.40	-.42	-.40	-.11	-.13	-.18	-.21	.64	.69	.79					
23. Workers comp. (past) ^c	.001	-.15	-.56	-.35	-.31	-.31	-.27	.34	.27	.30	.23	.27	.25	.21	.29	.44	.39	.40	.39	-.31	-.37	-.36	-.37				
24. Workers comp. (concurrent)	.001	-.46	-.43	-.28	-.27	-.23	-.25	.31	.31	.33	.22	.36	.23	.25	.28	.21	.18	.22	.18	-.22	-.28	-.29	-.35	.74			
25. Workers comp. (early post)	.001	-.43	-.50	-.38	-.36	-.34	-.35	.41	.37	.41	.31	.28	.18	.20	.26	.33	.31	.35	.31	-.34	-.36	-.38	-.44	.79	.86		
26. Workers comp. (late post)	.001	-.26	-.43	-.33	-.30	-.34	-.30	.40	.32	.35	.28	.16	.10	.12	.20	.44	.38	.41	.36	-.17	-.20	-.16	-.26	.59	.51	.70	

^aTo maintain the confidentiality of business unit information all variables were centered and have a mean of zero.

^bExcept as described below $n = 62$; Coefficients $> |.20|$ are significant at $p < .10$; $> |.24|$ at $p < .05$; $> |.30|$ at $p < .01$.

^cSample size for these coefficients was 47. Coefficients $> |.25|$ are significant at $p < .10$; $> |.28|$ at $p < .05$; $> |.35|$ at $p < .01$.

TABLE 4
Correlation Between HR Practice Index and Performance Measures^a

	1	2	3	4	5	6	7	8
	Past	Concurrent	Early post	Late post	Early post controlling for past performance	Late post controlling for past performance	Early post controlling for concurrent performance	Late post controlling for concurrent performance
1. Profitability	.23 [†]	.32**	.33**	.33**	.25*	.24	.07	.07
2. Operating Expenses	-.21 [†]	-.20	-.25*	-.16	-.15	.04	-.21	.10
3. Shrinkage	-.38**	-.35**	-.30*	-.29*	.01	-.10	.08	-.06
4. Productivity	-.08	-.03	-.07	-.06	.00	.02	-.21	-.09
5. Quality	.50** ^b	.46**	.48**	.49**	.02 ^b	.22 ^b	.16	.26*
6. Workers Comp.	-.15 ^b	-.46**	-.43**	-.26*	-.21 ^b	-.09 ^b	-.08	-.04

^aExcept as noted, $n = 62$.

^bFor these analyses, $n = 45$.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

TABLE 5
Correlation Between Organizational Commitment and Performance Measures^a

	1	2	3	4	5	6	7	8
	Past	Concurrent	Early post	Late post	Early post controlling for past performance	Late post controlling for past performance	Early post controlling for concurrent performance	Late post controlling for concurrent performance
1. Profitability	.26*	.34**	.29*	.31**	.15	.19	-.10	-.03
2. Operating Expenses	-.26*	-.25*	-.27*	-.18	-.09	.09	-.16	.17
3. Shrinkage	-.34**	-.30*	-.26*	-.22†	.04	-.03	.08	-.002
4. Productivity	-.25*	-.20	-.23†	-.18	-.002	.08	-.14	.05
5. Quality	.46**b	.40**	.38**	.37**	.03 ^b	.11 ^b	.03	.15
6. Workers Comp.	-.56**b	-.43**	-.50**	-.43**	-.27 ^b	-.19 ^b	-.28*	-.28*

^aExcept as noted, $n = 62$.

^bFor these analyses, $n = 45$.

measure's past (Columns 5 and 6) and concurrent (Columns 7 and 8) performance, respectively (e.g., the partial correlation between HR and future quality performance controlling for past quality performance).

In order to examine the basic relationships depicted in Figure 1, we first report the bivariate correlations using the concurrent measure of collective commitment and the early post performance measures. As can be seen in Table 3, HR practices correlated highly with concurrent collective affective commitment ($r = .57; p < .01$). Table 4 (column 3) shows that the HR index was also appropriately correlated with all but one of the early post operational performance measures including shrinkage ($r = -.30, p < .05$), quality ($r = .48, p < .01$), and workers compensation ($r = -.43, p < .01$). HR practices were unrelated to our measure of early post productivity ($r = -.07, ns$). The HR practice index also correlated significantly with early post expenses ($r = -.25; p < .05$) and profits ($r = .33; p < .01$). Similarly, as can be seen in Table 5 (Column 3), affective commitment correlated strongly with the operational performance measures' productivity ($r = -.23, p < .10$), shrinkage ($r = -.26, p < .05$), quality ($r = .38, p < .01$), and workers compensation ($r = -.50, p < .01$) as well as expenses ($r = -.27; p < .05$) and profits ($r = .29; p < .05$). The results were similar using the late post measures (Column 4 of both Tables 4 and 5), indicating support for the basic idea that both HR practices and affective organizational commitment are positively related to measures of organizational performance.

Although these results show that past HR practices predict future performance, they may be biased (and even misleading) if the causal arrow points in the opposite direction (e.g., performance is relatively stable and it causes HR practices). Thus, the next set of analyses examines the comparative relationships using past, concurrent, and post (early and late) measures. Starting with Table 4, comparing Columns 1 and 2 with Columns 3 and 4 shows that the correlations between HR practices and the performance measures vary little over time. The same comparisons in Table 5 display similar results in that the correlations between commitment and the performance measures vary little over time. On a positive note, this suggests that the relationships observed in the concurrent studies may adequately reflect what would be observed in predictive studies. On the negative side, however, these results provide just as much support for the proposition that performance causes commitment and HR practices as it does the reverse.

Finally, not surprisingly given the stable correlations discussed previously, controlling for past or concurrent performance tends to reduce the relationships drastically, usually to the level of nonsignificance. Looking at Table 4 (Columns 3 and 4), 9 of the 12 bivariate correlations between HR and the two post-performance measures were significant. However, when controlling for the past performance on each of the focal variables

(Columns 5 and 6), only one correlation remains significant, and controlling for concurrent performance results in only one significant correlation. Turning to Table 5 (Columns 3 and 4), 8 of the 12 bivariate correlations between collective affective commitment and the two post-performance measures were significant at the .05 level. However, after controlling for past performance (Columns 5 and 6), none of the correlations remained significant, and only two correlations remained significant when controlling for concurrent performance (Columns 7 and 8). These results suggest that the proposition that HR practices cause higher organizational performance should be, at best, tentative, and great caution should be exercised in interpreting past HR-performance research that suggests this relationship.

Discussion

Research on the relationship between HR practices and performance has provided a firm foundation from which the next generation of research can be built. Although models of the process through which HR practices impact performance have progressed, they have not been tested empirically. In addition, research has not attended to the methodological rigor necessary to suggest causality. Consequently, the existing research base does not provide as firm a foundation for drawing valid causal inferences. This study suggests that such causal inferences should be drawn with extreme caution.

The basic causal model positing that HR practices impact collective commitment, operational performance, expenses, and profits was supported in a predictive sense. HR practices correlated strongly, positively, and most often significantly with operational and financial measures observed later (both early and late). Taken alone, these results would provide more support for the notion that implementing progressive HR practices will result in improved operating and financial performance (Becker & Huselid, 1998; Dyer & Reeves, 1995).

However, when comparing these relationships with those between HR practices and past or concurrent performance, caution flags arise. The relative consistency across all these time periods suggests that the causal order could just as easily be reversed. These results essentially mirror those of Guest et al. (2003) who found that in some cases, the correlations with past performance exceeded those with future performance. Certainly they point to the fact that even predictive studies that simply explore the relationship with future performance may be misleading.

Finally, the drastic reduction in observed relationships that occurs when controlling for past or concurrent performance provides further impetus for exercising extreme caution in inferring a direct causal impact of HR

on performance. Among the significant correlations (i.e., those that would lead to the conclusion that HR causes performance) from Table 3 (HR–performance) and Table 4 (OC–performance), considerable reductions occur. Specifically, when using the early post measure, the average significant correlation is .36, which is reduced by 23 and 24 correlation points when controlling for past and simultaneous performance, respectively. Using the late post, the average significant correlation of .34 is reduced by 18 and 23 points, respectively. In Table 4, when using the early post-performance measures, the average significant correlation of .34 is reduced by 22 and 21 points when controlling for past and simultaneous performance, respectively. Using the late post-performance measures, the average significant correlation of .37 is reduced by 21 and 22 points, respectively. Again, this coincides with Guest et al.'s (2003) research demonstrating the drastic reduction to nonsignificance of the effects of HR on performance once past performance has been controlled. Again, these results spark cautious interpretation among even predictive studies.

By no means do these results suggest that HR practices *do not* have a positive impact on performance. Neither do they provide any more support for concluding that performance causes HR practices than they do for concluding that HR practices cause performance. They do, however, raise interesting questions regarding the true causal relationship between HR practices and performance. This leads us to speculate on some potential explanations for findings such as ours and Guest et al.'s (2003).

One possibility is that the data observed here, relatively consistent positive relationships over time, may indicate a nonrecursive model. Such a model suggests dual causation; business units that perform well, invest more in HR practices, and this investment pays off in increased performance. If this is the case, then it does not negate the value in implementing progressive HR practices, but it does suggest that the observed payoff may be far less than the estimates provided in past research (e.g., Huselid, 1995; Huselid & Becker, 1996, 2000).

A second explanation for these results may be that the relationship is spurious, with both HR and performance variables being caused by some third variable. For instance, it may be that, as previously discussed, the business units with effective leaders (presidents) both treat people well (through the HR practices) and drive higher business performance. For example, in addition to assessing HR practices, Huselid and Becker (1997) captured a measure of “other management effectiveness” (i.e., a one-item measure “Excluding the HR function, how would you rate the other functional areas within your firm [e.g. finance, marketing, production, etc.] relative to those same functions in your direct competitors?”) This measure correlated .30 with performance and .25 with the HR systems measure. Partialling out this crude measure from the HR–performance

relationship reduces the observed correlation from .25 to .18, indicating at least some evidence for the possibility of a spurious relationship. Or, for instance, recently many corporations have sought to build “high performance” cultures (Wright, Snell, & Jacobsen, 2004). Such a culture seeks to both engage employees emotionally to the firm and to encourage them to maximize their performance. Because such cultures are sought to be built in part by aligning the HR systems, one cannot easily tease out whether both HR practices and performance emanate from the culture or the culture and performance emanate from the HR practices.

Third, one could hypothesize that the observed relationships result from the temporal stability of both sets of variables. For instance, HR practices tend to be intractable and very difficult to change (Gerhart & Milkovich, 1990; Snell & Dean, 1994). Thus, when measuring HR practices at one point in time, one is likely capturing the practices that have existed for a number of years. If, in fact, these practices do result in higher performance, then the measure at one point in time would still be strongly related to both past and future performance. In this case, our “past” performance measure may actually be a “post”-performance measure because though our measure was taken after the performance measure, the practices were implemented prior to the performance measure. In addition, the performance measures are quite stable over time. The correlations across the four time periods ranged from .67 to .95 for profitability, .87 to .97 for expenses, .59 to .93 for shrinkage, .85 to .96 for productivity, .64 to .92 for quality, and .51 to .86 for workers compensation. Consequently, past research using post-predictive or concurrent designs may display similar results to predictive designs.

However, interestingly, the results do not seem to differ whether using the HR practices measure (assumed to be extremely stable) or the commitment measure (assumed to be a bit more variable over time). Our results indicated that the correlations between commitment and the various performance measures are almost invariant over time and that they became nonsignificant when controlling for past or concurrent performance. This differs somewhat from the results of Koys (2001) who found that employee satisfaction in Year 1 was more strongly related to profits in Year 2 than the reverse. However, he did find that when controlling for other HR outcomes in one equation, and for those outcomes and past performance in another equation, employee satisfaction did not predict profits. Again, if HR practices strongly influence commitment, and the practices have existed for considerable time, there should also be some stable variance in commitment. However, we note simply that our results seem to show suspicion in drawing causal order conclusions whether using a stable HR predictor measure (practices) or a more variable predictor (commitment), and also seem to be consistent using both operational (shrinkage, productivity,

quality, workers compensation costs) and financial (expenses, profit) measures of performance.

An additional finding stemmed from a question raised by one of the reviewers regarding differences in variance in HR practices at different performance levels. In an exploratory analysis, we divided the firms into quartiles on each of the 24 performance measures (6 measures at 4 different times) and examined the standard deviations for each of the quartiles. Surprisingly, we found that greater variance existed in HR practices at the bottom quartiles than at the top quartiles. This seems to indicate two things. First, high-performing companies seem to almost universally use a high level of HR practices (a high mean and low *SD*). However, having a high level of HR practices does not ensure high performance. The low-performing companies, although having a low mean, also had a high *SD*, indicating that some of them must have been engaging in a significant number of the HR practices we assessed. This leads to the second implication, that perhaps something is moderating the relationship between HR practices and performance. In other words, it seems that low HR practices are associated with low performance, but high HR may only be associated with high performance under certain conditions. Again, this may lead to the potential missing variable discussed above. Perhaps effective leaders or high performance cultures that are supported by HR practices tend to exhibit high performance, but simply transplanting a set of HR practices into a low performance culture or under an ineffective leader may not have the intended effect.

These results also suggest some interesting implications for future research. Future research should focus on study designs that are better able to demonstrate the causal order to show that HR practices, when implemented correctly, can positively generate higher firm performance. At a minimum, this calls for focusing on gathering data at multiple points in time as was done in both this study and the Huselid and Becker (1996) study. Our current sample of business units with data at both points ($n = 17$) is too small for providing any stable results. However, we continue to conduct the climate survey, the number of participating business units continues to grow, and the company continues to provide the performance data. Thus, we are hopeful that future waves of data collection will provide an ability to examine how units that actually change their HR practices experience corresponding performance changes.

Another approach to teasing out the causal direction in the HR–firm performance relationship may be the use of quasi-experimental designs. Cook and Campbell (1979) discuss how quasi-experimentation can provide data that enable researchers to more confidently draw causal conclusions. For instance, the company we studied uses the climate data in part to persuade business leaders to implement better HR practices. One could

identify companies that have gone through drastic changes in their HR practices and match them with companies who did not change their practices. These two samples could then be compared with regard to their subsequent performance. Although such designs do not prove causation, they can enable researchers to better understand the causal nature of the relationship between HR practices and firm performance.

Limitations

A few limitations must be considered in interpreting these results. First, the time frame used for the study (i.e., 3–9 months prior to and 9–15 months following the measure of HR) may have been too short to fully capture causal effects. Although this is one of only a few studies that have actually examined how measures of HR practices relate to past performance, the time lag between the previous performance measure and the measure of HR was not great (3–9 months). Certainly, it is possible that the practices reported were likely in place during the timeframe comprising this past performance measure. In addition, the effects of HR practices may take longer and/or aggregate over longer time periods (i.e., longer than 9–15 months) after their implementation. However, this illustrates the potential vacuousness of cross-sectional or even lagged studies that examine the *impact* of HR practices on performance. The cross-sectional relationship may exist, but there is no way of knowing the causal direction. Thus, although the short lag does not *prove* reverse causation, it certainly demonstrates that empirically, this is just as likely as the oft-hypothesized causal order. This argues for future research that both uses longer time periods of study and assesses performance variables after actual changes in HR practices.

Second, because the study was conducted within one organization, one could question the generalizability of the results. We note that generalizability is not the goal of all research. Some research, such as this, is aimed primarily at testing theoretical predictions rather than trying to develop generalizable empirical results. What our study demonstrates is that in a cross-sectional study finding a relationship between HR practices and performance, the results could also support a reverse causation or reciprocal causation explanation. Again, the goal is not to conclude that reverse causation explains all past research, nor to argue that HR practices *do not* impact performance, but simply to provide results that spur researchers to be more creative in the design of research in this area. Better future research designs will provide more conclusive evidence of the true causal order.

Third, we must recognize the potential for an unmeasured variables problem. Although the single corporation/multiple business unit design

allows real controls over a number of variables, because these business units are geographically distinct, it may be that local labor markets and economic conditions might vary considerably across the companies. Interestingly, however, if one explores how that might play out, the most likely effect would be to support the reverse causation effect. For instance, if it is the local markets that greatly impact profitability (e.g., markets with higher socioeconomic conditions result in those companies having naturally higher profits), then any unmeasured variable effect (i.e., the relationship between HR and performance is due to this variable) would require that these companies use their excess profits to build HR systems. One would be hard pressed to hypothesize that companies investing in HR practices produces greater geographical socioeconomic conditions.

Fourth, we must recognize the limited number of HR practices that went into our HR practice measure. We assessed practices representing the major functional areas (staffing, training, appraisal, pay for performance, and participation) but only had nine practices assessed as opposed to other studies that have assessed a broader set of practices.

Finally, we must note that we did not attempt to test any complex mediational model (i.e., the impact of HR on performance is through commitment). We have tested this model with a subset of the data presented here (Wright, Gardner, & Moynihan, 2003) and found support for the mediation. However, the purpose of this study was to examine methodological, as opposed to theoretical issues in this vein of research. Because questions of causality have been raised regarding both the HR practices–performance and job attitudes–performance relationships, focusing specifically on these relationships allowed a more focused test of the research questions.

Conclusion

Past research has provided extensive data on the positive relationship between HR practices and organizational performance in an effort to demonstrate a positive impact of HR practices. This study has attempted to both explicate the issues with regard to drawing causal conclusions within this vein of research and to provide empirical data to explore some of these issues. The study demonstrates that HR practices are strongly related to future performance but that they are also strongly related to past performance, suggesting caution among both academics and practitioners in making any causal inferences. Although one could accurately interpret our results as showing HR practices to be part of a “high-performance” organization, they certainly do not provide proof that these practices cause that high performance. Consequently, our study points to the need to design and conduct studies that are better able to examine the extent to which implementing progressive HR practices will result in improved operating

and financial performance. Such research will provide for decision makers a more convincing business case for the need to properly manage human resources.

REFERENCES

- Arthur JB. (1994). Effects of human resource systems on manufacturing performance and turnover. *Academy of Management Journal*, 37(3), 670–687.
- Barney JB. (1986). Organizational culture: Can it be a source of sustained competitive advantage? *Academy of Management Review*, 11, 656–665.
- Batt R. (2002). Managing customer services: Human resource practices, quit rates, and sales growth. *Academy of Management Journal*, 45, 587–597.
- Becker BE, Huselid MA. (1998). High performance work systems and firm performance: A synthesis of research and managerial implications. In Ferris GR (Ed.), *Research in personnel and human resource management* (Vol. 16, pp. 53–101). Greenwich, CT: JAI Press.
- Black SE, Lynch LM. (2001). How to compete: The impact of workplace practices and information technology on productivity. *Review of Economics & Statistics*, 83, 434–445.
- Collins JC, Porras JI. (1994). *Built to last: Successful visionary companies*. New York: HarperBusiness.
- Conger JA, Kanungo RN. (Eds.) (1988). *Charismatic leadership: The elusive factor in organizational effectiveness*. San Francisco: Jossey-Bass.
- Cook D, Campbell D. (1979). *Quasi-experimentation*. New York: Holt Rinehart.
- Day DV, Lord RG. (1988). Executive leadership and organizational performance: Suggestions for a new theory and methodology. *Journal of Management*, 14, 453–464.
- Delaney JT, Huselid MA. (1996). The impact of human resource management practices on perceptions of organizational performance. *Academy of Management Journal*, 39, 949–969.
- Delery JE. (1998). Issues of fit in strategic human resource management: Implications for research. *Human Resource Management Review*, 8, 289–310.
- Delery JE, Doty DH. (1996). Modes of theorizing in strategic human resource management: Tests of universalistic, contingency and configurational performance predictions. *Academy of Management Journal*, 39, 802–835.
- Dyer L, Reeves T. (1995). HR strategies and firm performance: What do we know and where do we need to go. *International Journal of Human Resource Management*, 6, 656–670.
- Drucker P. (1954). *The practice of management*. New York: Harper & Row.
- Exclusive RSS survey reveals top 15 ways to cut compensation costs. (2003). *Report on Salary Surveys*, 3(12), 1–7.
- Frazis H, Gittleman M, Harrigan M, Joyce M. (1998). Results from the 1995 survey of employer-provided training. *Monthly Labor Review*, 121(6), 3–13.
- Fulmer B, Gerhart B, Scott K. (2003). Are the 100 best better? An empirical investigation of the relationship between being a “great place to work” and firm performance. *PERSONNEL PSYCHOLOGY*, 56, 965–993.
- Gardner TM, Wright PM. (2002). The HR–firm performance relationship: Is it only in the mind of the beholder? Center for Advanced Human Resource Studies Working paper, Cornell University, Ithaca, NY.
- Gerhart B. (2004). Research on human resources and effectiveness: Selected methodological challenges. Paper presented at the conference “HRM: What’s Next?,” Erasmus University, Rotterdam, The Netherlands.

- Gerhart B, Milkovich G. (1990). Organizational differences in managerial compensation and financial performance. *Academy of Management Journal*, 33, 663–691.
- Gerhart B, Wright PM, McMahan GC, Snell SA. (2000). Measurement error in research on human resources and firm performance: How much error is there and how does it influence effect size estimates? *PERSONNEL PSYCHOLOGY*, 53, 803–834.
- Golden BR. (1992). The past is the past—or is it? The use of retrospective accounts as indicators of past strategy. *Academy of Management Journal*, 35, 848–860.
- Guest D, Michie J, Conway N, Sheehan M. (2003). A study of human resource management and corporate performance in the UK. *British Journal of Industrial Relations*, 41, 291–314.
- Guthrie J. (2001). High involvement work practices, turnover, and productivity: Evidence from New Zealand. *Academy of Management Journal*, 44, 180–192.
- Harter J, Schmidt F, Hayes T. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. *Journal of Applied Psychology*, 87, 268–279.
- Hewitt Associates. (2001). *Survey of economic impact due to current events*. Hewitt Associates, Lincolnshire, IL.
- Hofmann DA. (2002). Issues in multilevel research: Theory development, measurement, and analysis. In Rogelberg SG (Ed.), *Handbook of research methods in industrial and organizational psychology* (pp. 247–274). Malden, MA: Blackwell.
- Huber GP, Power DJ. (1985). Retrospective reports of strategic level managers: Guidelines for increasing their accuracy. *Strategic Management Journal*, 6, 171–180.
- Huselid MA. (1995). The impact of human resource management practices on turnover, productivity, corporate financial performance. *Academy of Management Journal*, 38, 635–672.
- Huselid MA, Becker BE. (1996). Methodological issues in cross-sectional and panel estimates of the human resource-firm performance link. *Industrial Relations*, 35, 400–422.
- Huselid MA, Becker BE. (1997). The impact of higher performance work systems, implementation effectiveness and alignment with strategy on shareholder wealth. Working paper available at: http://www.rci.rutgers.edu/~huselid/Papers/1997_Shareholder_Wealth.pdf.
- Huselid MA, Becker BE. (2000). Comment on measurement error in research on human resources and firm performance: How much error is there and how does it influence effect size estimates? *PERSONNEL PSYCHOLOGY*, 53, 835–854.
- Ichniowski C, Shaw K, Prennushi G. (1997). The effects of human resource management practices on productivity. *American Economic Review*, 87, 291–313.
- Kennedy PW. (2003). Redefining compensation in challenging times. *Employee Benefits Journal*, 28(3), 63–69.
- Kopelman RE, Brief AP, Guzzo RA. (1990). The role of climate and culture in productivity. In Schneider B (Ed.), *Organizational climate and culture* (pp. 383–412). San Francisco: Jossey-Bass.
- Kotter JP, Heskett KL. (1992) *Corporate culture and performance*. New York: The Free Press.
- Kouzes JM, Posner BZ. (1995). *The leadership challenge: How to get extraordinary things done in organizations*. San Francisco: Jossey-Bass.
- Koys D. (2001). The effects of employee satisfaction, organizational citizenship behavior, and turnover on organizational effectiveness: A unit-level, longitudinal study. *PERSONNEL PSYCHOLOGY*, 54, 1101–1114.
- Krackhardt D, McKenna J, Porter LW, Steers RM. (1981). Supervisory behavior and employee turnover: A field experiment. *Academy of Management Journal*, 24, 249–259.

- MacDuffie JP. (1995). Human resource bundles and manufacturing performance: Organizational logic and flexible production systems in the world auto industry. *Industrial and Labor Relations Review*, 48, 197–221.
- Martell RF, Guzzo RA. (1991). The dynamics of implicit theories of group performance: When and how do they operate? *Organizational Behavior and Human Decision Processes*, 50, 51–74.
- McIntyre D. (1992). Training budgets weather the recession. *Canadian Business Review*, 19(2), 33–35.
- Meyer JP, Allen NJ. (1997). *Commitment in the workplace: Theory, research, and application*. Thousand Oaks, CA: Sage.
- Osterman P. (1994). How common is workplace transformation and who adopts it? *Industrial and Labor Relations Review*, 47(2), 173–188.
- Ostroff C, Bowen DE. (2000). Moving HR to a higher level: HR practices and organizational effectiveness. In Klein KJ, Kozlowski SWJ (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 211–266). San Francisco: Jossey-Bass.
- Porter LW, Steers RM, Mowday RT, Boulin PV. (1974). Organizational commitment, job satisfaction, and turnover among psychiatric technicians. *Journal of Applied Psychology*, 59, 603–609.
- Rowe WG, Wright PM. (1997). Related and unrelated diversification and their effect on human resource management controls. *Strategic Management Journal*, 18, 329–338.
- Ryan AM, Schmidt MJ, Johnson R. (1996). Attitudes and effectiveness: Examining relations at an organizational level. *PERSONNEL PSYCHOLOGY*, 49, 853–882.
- Schein E. (1985). *Organizational culture and leadership*. San Francisco: Jossey-Bass.
- Schneider B, Hanges P, Smith B, Salvaggio A. (2003). Which comes first: Employee attitudes or organizational financial and market performance. *Journal of Applied Psychology*, 88, 836–851.
- Siehl C, Martin J. (1990). Organizational culture: A key to financial performance? In Schneider B (Ed.), *Organizational climate and culture* (pp. 241–281). San Francisco: Jossey-Brass.
- Shaw JD, Delery JE, Jenkins GD, Gupta N. (1998). An organization-level analysis of voluntary and involuntary turnover. *Academy of Management Journal*, 41, 511–525.
- Snell S, Dean J. (1994). Integrated manufacturing and human resource management: The moderating effects of jobs and organizational inertia. *Academy of Management Journal*, 37, 1109–1140.
- Stewart T. (1996). Taking on the last bureaucracy. *Fortune*, 133(1), 105, 106, 108.
- Watson Wyatt Worldwide. (2002). *Human Capital Index[®]: Human capital as a lead indicator of shareholder value*, Washington DC.
- Wright PM, Gardner TM. (2003). Theoretical and empirical challenges in studying the HR practice–firm performance relationship. In Holman D, Wall TD, Clegg C, Sparrow P, Howard A (Eds.), *The new workplace: People technology, and organisation*. Sussex, UK: Wiley.
- Wright PM, Gardner T, Moynihan L. (2003). The impact of human resource practices on business unit operating and financial performance. *Human Resource Management Journal*, 13, 21–36.
- Wright PM, Gardner TM, Moynihan LM, Park HJ, Gerhart B, Delery JE. (2001). Measurement error in research on human resources and firm performance: Additional data and suggestions for future research. *PERSONNEL PSYCHOLOGY*, 54, 875–902.
- Wright P, Snell S, Jacobsen P. (2004). Current approaches to HR strategies: Inside-out vs. outside-in. *Human Resource Planning*, 27, 36–46.

- Youndt M, Snell S. (1995). Human resource management and firm performance: Testing a contingency model of executive controls. *Journal of Management*, 21, 711–737.
- Youndt MA, Snell SA, Dean JW, Lepak DP. (1996). Human resource management, manufacturing strategy, and firm performance. *Academy of Management Journal*, 39, 836–866.

APPENDIX

Studies Included in Table 1

- Addison JT, Belfield CR. (2001). Updating the determinants of firm performance: Estimation using the 1998 UK Workplace Employee Relations Survey. *British Journal of Industrial Relations*, 39, 341–366.
- Agarwala T. (2003). Innovative human resource practices and organizational commitment: An empirical investigation. *International Journal of Human Resource Management*, 14, 175–197.
- Ahmad S, Schroeder RG. (2003). The impact of human resource management practices on operational performance: Recognizing country and industry differences. *Journal of Operations Management*, 21, 19–43.
- Appleyard MM, Brown C. (2001). Employment practices and semiconductor manufacturing performance. *Industrial Relations*, 40, 436–471.
- Arthur JB. (1994). Effects of human resource systems on manufacturing performance and turnover. *Academy of Management Journal*, 37, 670–687.
- Bae J, Chen S, David Wan TW, Lawler JJ, Walumbwa FO. (2003). Human resource strategy and firm performance in Pacific Rim countries. *International Journal of Human Resource Management*, 14, 1308–1332.
- Bae J, Lawler JJ. (2000). Organizational and HRM strategies in Korea: Impact on firm performance in an emerging economy. *Academy of Management Journal*, 43, 502–518.
- Batt R. (2002). Managing customer services: Human resource practices, quit rates, and sales growth. *Academy of Management Journal*, 45, 587–597.
- Batt R, Colvin AJS, Keefe J. (2002). Employee voice, human resource practices, and quit rates: Evidence from the telecommunications industry. *Industrial & Labor Relations Review*, 55, 573–594.
- Bennett N, Ketchen J, David J, Schultz EB. (1998). An examination of factors associated with the integration of human resource management and strategic decision making. *Human resource management*, 37, 3–16.
- Björkman I, Xiucheng F. (2002). Human resource management and the performance of Western firms in China. *International Journal of Human Resource Management*, 13, 853–864.

- Black SE, Lynch LM. (2001). How to compete: The impact of workplace practices and information technology on productivity. *Review of Economics & Statistics*, 83, 434–445.
- Caligiuri PM, Stroh LK. (1995). Multinational corporation management strategies and international human resource practices: Bringing IHRM to the bottom line. *International Journal of Human Resource Management*, 6, 494–507.
- Cappelli P, Neumark D. (2001). Do ‘high-performance’ work practices improve establishment-level outcomes? *Industrial & Labor Relations Review*, 54, 737–775.
- Chandler GN, McEvoy GM. (2000). Human resource management, TQM, and firm performance in small and medium-size enterprises. *Entrepreneurship: Theory & Practice*, 25, 43–57.
- Chandler GN, Keller C, Lyon DW. (2000). Unraveling the determinants and consequences of an innovation-supportive organizational culture. *Entrepreneurship: Theory & Practice*, 25, 59–76.
- Collins CJ, Clark KD. (2003). Strategic human resources practices and top management team social networks: An examination of the role of HR practices in creating organizational competitive advantage. *Academy of Management Journal*, 46, 740–751.
- Cooke WN. (1994). Employee participation programs, group-based incentives, and company performance: A union non-union comparison. *Industrial & Labor Relations Review*, 47, 594–609.
- Delaney JT, Huselid MA. (1996). The impact of human resource management practices on perceptions of organizational performance. *Academy of Management Journal*, 39, 949–969.
- Delery JE, Doty DH. (1996). Modes of theorizing in strategic human resource management: Tests of universalistic, contingency and configurational performance predictions. *Academy of Management Journal*, 39, 802–835.
- Fey CF, Bjorkman I. (2001). The effect of human resource management practices on MNC subsidiary performance in Russia. *Journal of International Business Studies*, 32, 59–75.
- Fey CF, Bjorkman I, Pavlovskaya A. (2000). The effect of human resource management practices on firm performance in Russia. *International Journal of Human Resource Management*, 11, 1–18.
- Fulmer IS, Gerhart B, Scott KS. (2003). Are the 100 best better? An empirical investigation of the relationship between being a “great place to work” and firm performance. *PERSONNEL PSYCHOLOGY*, 56, 965–993.
- Gelade GA, Ivery M. (2003). The impact of human resource management and work climate on organizational performance. *PERSONNEL PSYCHOLOGY*, 56, 383–404.

- Gomez-Mejia LR. (1988). The role of human resources strategy in export performance: A longitudinal study. *Strategic Management Journal*, 9, 493–505.
- Guest DE, Michie J, Conway N, Sheehan M. (2003). Human resource management and corporate performance in the UK. *British Journal of Industrial Relations*, 41, 291–314.
- Guthrie JP. (2001). High-involvement work practices, turnover, and productivity: Evidence from New Zealand. *Academy of Management Journal*, 44, 180–190.
- Guthrie JP, Spell CS, Nyamori RO. (2002). Correlates and consequences of high involvement work practices: The role of competitive strategy. *International Journal of Human Resource Management*, 13, 183–197.
- Harel GH, Tzafrir SS. (1999). The effect of human resource management practices on the perceptions of organizational and market performance of the firm. *Human resource management*, 38, 185–199.
- Harel GH, Tzafrir SS, Baruch Y. (2003). Achieving organizational effectiveness through promotion of women into managerial positions: HRM practice focus. *International Journal of Human Resource Management*, 14, 247–263.
- Harris LC, Ogbonna E. (2001). Strategic human resource management, market orientation, and organizational performance. *Journal of Business Research*, 51, 157–166.
- Harter JK, Schmidt FL, Hayes TL. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. *Journal of Applied Psychology*, 87, 268–279.
- Hoque K. (1999). Human resource management and performance in the UK hotel industry. *British Journal of Industrial Relations*, 37, 419–443.
- Huang T. (2000). Are the human resource practices of effective firms distinctly different from those of poorly performing ones? Evidence from Taiwanese enterprises. *International Journal of Human Resource Management*, 11, 436–452.
- Huselid MA. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal*, 38, 635–672.
- Huselid MA, Becker BE. (1997). The impact high performance work systems, implementation effectiveness, and alignment with strategy on shareholder wealth. *Academy of Management Proceedings*, 144–148.
- Huselid MA, Jackson SE, Schuler RS. (1997). Technical and strategic human resources management effectiveness as determinants

- of firm performance. *Academy of Management Journal*, 40, 171–188.
- Ichniowski C, Shaw K. (1999). The effects of human resource management systems on economic performance: An international comparison of U.S. and Japanese plants. *Management Science*, 45, 704–721.
- Ichniowski C, Shaw K, Prennushi G. (1997). The effects of human resource management practices on productivity: A study of steel finishing lines. *American Economic Review*, 87, 291–313.
- Jangwoo L, Miller D. (1999). People matter: Commitment to employees, strategy and performance in Korean firms. *Strategic Management Journal*, 20, 579–593.
- Jayaram J, Droge C, Vickery SK. (1999). The impact of human resource management practices on manufacturing performance. *Journal of Operations Management*, 18, 1–20.
- Ji, Li. (2003). Strategic human resource management and MNEs' performance in China. *International Journal of Human Resource Management*, 14, 157–173.
- Khatri N. (2000). Managing human resource for competitive advantage: A study of companies in Singapore. *International Journal of Human Resource Management*, 11, 3–36.
- Lahteenmäki S, Storey J, Vanhala S. (1998). HRM and company performance: The use of measurement and the influence of economic cycles. *Human Resource Management Journal*, 8, 51–65.
- Lam LW, White LP. (1998). Human resource orientation and corporate performance. *Human Resource Development Quarterly*, 9, 351–364.
- Lincoln JR, Kalleberg AL. (1996). Commitment, quits, and work organization in Japanese and U.S. plants. *Industrial & Labor Relations Review*, 50, 39–59.
- Liouville J, Bayad M. (1998). Human resource management and performances: Proposition and test of a causal model. *Human Systems Management*, 17, 183–192.
- MacDuffie JP. (1995). Human resource bundles and manufacturing performance: Organizational logic and flexible production systems in the world auto industry. *Industrial & Labor Relations Review*, 48, 197–221.
- Martell K, Carroll SJ. (1995). Which executive human resource management practices for the top management team are associated with higher firm performance? *Human resource management*, 34, 497–512.
- Ngo H, Turban D, Lau C, Lui S. (1998). Human resource practices and firm performance of multinational corporations: Influences of country origin. *International Journal of Human Resource Management*, 9, 632–652.

- Park HJ, Mitsuhashi H, Fey CF, Björkman I. (2003). The effect of human resource management practices on Japanese MNC subsidiary performance: A partial mediating model. *International Journal of Human Resource Management*, 14, 1391–1406.
- Paul AK, Anantharaman RN. (2003). Impact of people management practices on organizational performance: Analysis of a causal model. *International Journal of Human Resource Management*, 14, 1246–1266.
- Ramsay H, Scholarios D, Harley B. (2000). Employees and high-performance work systems: Testing inside the black box. *British Journal of Industrial Relations*, 38, 501–531.
- Richard OC, Johnson NB. (2001). Strategic human resource management effectiveness and firm performance. *International Journal of Human Resource Management*, 12, 299–310.
- Rodríguez JM, Ventura J. (2003). Human resource management systems and organizational performance: An analysis of the Spanish manufacturing industry. *International Journal of Human Resource Management*, 14, 1206–1226.
- Rogg KL, Schmidt DB, Shull C, Schmitt N. (2001). Human resource practices, organizational climate, and customer satisfaction. *Journal of Management*, 27, 431–450.
- Shaw JD, Delery JE, Jenkins, J, Douglas G, Gupta N. (1998). An organization-level analysis of voluntary and involuntary turnover. *Academy of Management Journal*, 41, 511–525.
- Snell SA, Youndt MA. (1995). Human resource management and firm performance: Testing a contingency model of executive controls. *Journal of Management*, 21, 711–737.
- Stroh LK, Caligiuri PM. (1998). Strategic human resources: A new source for competitive advantage in the global arena. *International Journal of Human Resource Management*, 9, 1–17.
- Vandenberg, Richardson RJ. (1999). The impact of high involvement work processes on organizational effectiveness. *Group & Organization Management*, 24, 300–339.
- Varma A, Beatty RW, Schneier CE, Ulrich DO. (1999). High performance work systems: Exciting discovery of passing fad? *Human Resource Planning*, 22, 26–37.
- Way SA. (2002). High performance work systems and intermediate indicators of firm performance within the US small business sector. *Journal of Management*, 28, 765–785.
- Welbourne TM, Andrews AO. (1996). Predicting the performance of initial public offerings: Should human resource management be in the equation? *Academy of Management Journal*, 39, 891–919.

- West MA, Borrill C, Dawson J, et al. (2002). The link between the management of employees and patient mortality in acute hospitals. *International Journal of Human Resource Management*, *13*, 1299–1310.
- Wright PM, McCormick B, Sherman WS, McMahan GC. (1999). The role of human resource practices in petro-chemical refinery performance. *International Journal of Human Resource Management*, *10*, 551–571.
- Youndt MA, Snell SA, Lepak DP. (1996). Human resource management, manufacturing strategy, and firm performance. *Academy of Management Journal*, *39*, 836–866.