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HRM and Firm Productivity: Does Industry Matter?

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Abstract
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Keywords
HRM, organization, performance, practices, research, data, productivity, firm, industry

Comments

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This paper has not undergone formal review or approval of the faculty of the ILR School. It is intended to make results of Center research available to others interested in preliminary form to encourage discussion and suggestions.

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Abstract

Recent years have witnessed burgeoning interest in the degree to which human resource systems contribute to organizational effectiveness. We argue that extant research has not fully considered important contextual conditions which moderate the efficacy of these practices. Specifically, we invoke a contingency perspective in proposing that industry characteristics affect the relative importance and value of high performance work practices (HPWPs). We test this proposition on a sample of non-diversified manufacturing firms. After controlling for the influence of a number of other factors, study findings support the argument that industry characteristics moderate the influence of HPWPs on firm productivity. Specifically, the impact of a system of HPWPs on firm productivity is significantly influenced by the industry conditions of capital intensity, growth and differentiation.

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HRM and Firm Productivity: Does Industry Matter?

> *... although not yet widely incorporated into research paradigms, industry characteristics may have far-reaching implications for HRM. Industries, like national cultures, are the contexts within which meanings are construed, effectiveness is defined, and behaviors are evaluated* (Jackson & Schuler, 1995: 252).

Recent years have witnessed burgeoning interest in the degree to which human resource systems contribute to organizational effectiveness. Pfeffer (1994, 1998), for example, argues that success in today's hyper-competitive markets depends less on advantages associated with economies of scale, technology, patents, and access to capital and more on innovation, speed, and adaptability. Pfeffer further argues that these latter sources of competitive advantage are largely derived from firms' human resources. Based on these and similar arguments, Pfeffer (1994, 1998) and others (e.g., Becker, Huselid & Ulrich, 2001; Kochan & Osterman, 1994; Lawler, 1992; 1996; Levine, 1995) strongly advocate greater firm investments in high performance or high involvement human resource practices.

We believe these sentiments to be true in the main; however, we also believe that these investments may be relatively more beneficial in some contexts relative to others. More specifically, as emphasized in the strategic management and industrial organization literatures (e.g., Porter, 1980; Dess, Ireland & Hitt, 1990), a firm's industry (or industries) is an important part of the milieu within which organizational policies and practices are framed and executed. We believe this to also be the case for HR policies and practices. This remains largely speculative, however, because of a lack of empirical research on how industry conditions influence the efficacy of alternative HR practice configurations. This study seeks to fill this important void in the strategic HR literature by examining how industry characteristics moderate the value of human capital and, by extension, the importance and value of utilizing *high performance work practices* (HPWPs) in organizations.

The paper is structured as follows: after a brief discussion of recent developments and themes in the strategic human resource management (SHRM) literature, we provide arguments highlighting the importance of industry relative to HR systems. Following this, we draw on the organization theory, industrial organization economics, strategic management and SHRM literatures to argue that HPWPs may be more valuable in the context of particular industry conditions. We then present and discuss results of an empirical test of these arguments.

Theoretical Perspectives

HRM in Context

Along with Pfeffer (1994, 1998), a number of authors have argued that recent systemic changes in firms' labor and product/service markets have elevated the importance of human resource issues and practices (e.g., Becker et al., 2001; Lawler, 1996; Schuler, 1990). Against this backdrop, researchers and practitioners have been exhorted to adopt a more *strategic* perspective on human resource management. Wright and McMahan (1992: 298) define strategic human resource management as "the pattern of planned human resource deployments and activities intended to enable an organization to achieve its goals." Researchers in the HR field have traditionally concentrated on technical innovations in practices, focusing on the effects of selection, training, appraisal and rewards on individual-level outcomes of job satisfaction or performance. Further, these subdiscipline innovations have occurred in relative isolation from one another (Wright & McMahan, 1992). SHRM addresses issues at a more 'macro' level. It is concerned with how organizational characteristics shape HR practices and priorities (Schuler & Jackson, 1989) and how these HR practices contribute to the bottom line (Martell & Carroll, 1995).

Reflecting this orientation, recent HR research has taken more of a macro or systems view, examining the impact of 'bundles' of HR practices on organizational outcomes. More recently, research attention has focused on *high performance work practices* (HPWPs), a term used to denote a system or bundle of management and HR practices designed to elicit

employee commitment and involvement such that employees become a source of sustainable competitive advantage (Lawler, 1992; 1996; Levine, 1995; Pfeffer, 1998). Levine (1995) discusses three preconditions necessary for creating successful employee involvement. First, workers must be given the opportunity and responsibility for organizational change and improvement. Second, employees must be motivated to avail themselves of this opportunity and responsibility. Third, workers must have the knowledge and skills enabling them to contribute to workplace improvement. HPWPs represent a system of mutually reinforcing, overlapping and synergistic HR practices which help to establish these preconditions and employee involvement (MacDuffie, 1995). Based on conceptual/prescriptive (e.g., Lawler, 1992; Levine, 1995; Pfeffer, 1998) and empirical work (e.g., Arthur, 1994; Huselid, 1995), HPWPs would include practices such as rigorous selection procedures, internal merit-based promotions, grievance procedures, cross-functional teams, high levels of training, information sharing, participatory mechanisms, group-based rewards and skill-based pay. Research on HPWPs includes Huselid's (1995) landmark study of U.S. corporations, which found a positive association between the use of what he termed "high performance" HR practices and firm success. Other studies have also indicated a relationship between variations in HR system configurations and firm outcomes (e.g., Arthur, 1994; Delery & Doty, 1996; Guthrie, 2001; Koch & McGrath, 1996; MacDuffie, 1995).

Recent strategic HR literature has also discussed the importance of achieving a fit between a firm's set of HR practices and contextual features, most notably organizational strategy. The underlying premise is that organizational effectiveness is augmented to the extent that there is an appropriate fit between a firm's approach to its HR systems and its approach to its competitive markets (Youndt, Snell, Dean & Lepak, 1996). However, research to date has not fully considered other important contextual conditions which may moderate the efficacy of alternative HR practice configurations. For example, while the strategic management literature emphasizes the role of industry as a critical contextual variable (see Dess, Ireland & Hitt, 1990), the role that industry conditions play in defining the value-adding potential of human resource practices has remained unexplored.

The Value of HPWPs: A Contingency Theory Perspective

Proponents of the resource based view of the firm (e.g., Barney, 1991; Wernerfelt, 1984) have argued that certain organizational resources are more valuable because they enable firms to create and sustain competitive advantage. Human capital, a key organizational resource, can be the basis of such advantage if it enables firms to exploit opportunities emanating from its competitive or task environment. Advocates for greater use of HPWPs argue that recent changes in firms' competitive environments have increased the degree to which human capital will be a source of valuable and inimitable competitive advantage. The arguments extend to suggest that these changes also imply a greater need for HR systems which develop and sustain human capital. For example, drawing upon Pfeffer (1994), Becker, Huselid, Pickus and Spratt (1997: 39) argue that the current economic environment "demands innovation, speed, adaptability, and low costs." They maintain that these environmental demands increase the importance of the core competencies and capabilities of employees relative to more traditional sources of competitive advantage such as, patents, economies of scale, access to capital and market regulation. Thus, their perspective is that the value of HPWPs**,** is magnified due to the hyper-competitive markets faced by today's firms.

Guided by contingency theory, our position is that the value of HPWPs varies as a function of a firm's environment. Contingency theory is based upon the thesis that organizations whose internal features best match the demands of the environment are best adapted for optimal functioning. Often contingency theory is deterministic in the sense that organizations must adapt to avoid loss of performance. Researchers such as Burns and Stalker (1961), Kast and Rosenzweig (1985) and Youndt et al. (1996), among others, have advocated a need for a contingency perspective in studying organizational phenomena. They argue that no single organizational practice is "best"; what really matters is the fit between practice and context. In other words, a fit between the environment and one or more aspects of organizational features will positively affect performance; a misfit will negatively affect such performance.

While much of contingency theory deals with structural contingency (Donaldson, 1995), a strong argument can be made that, as an important organizational sub-system or factor, HRM systems must also exhibit a fit with the environment. In a recent article exploring the issue of human resource "fit" versus "flexibility", Wright and Snell make an important point in stating that: "....today, most firms face environments characterized by increasing dynamism and competition. In such a case, sustainable fit can be achieved only by developing a flexible organization" (1998: 758). Porter (1985) also discusses the desirability of matching human resource management policies to the needs of the environment, believing that such a match can represent a significant source of competitive advantage. In other words, there are important interactions between a firm's human resource management practices and the sources of advantage found in firms' competitive markets and industries. More specific to the SHRM literature, perhaps the most widely cited and best-articulated contingency perspective is the "role behavior perspective" proposed by Jackson and Schuler (e.g., Schuler & Jackson, 1987; 1989). This approach stipulates that HR practices need to elicit employee behaviors which are aligned with the requirements imposed by contextual conditions. While the role behavior perspective focuses primarily on the need for HR practices to elicit employee behaviors consistent with firm strategy, the arguments extend fairly easily to other industry conditions. In fact, in their review article examining “Human Resource Management in the Context of Organizations and their Environments”, Jackson and Schuler specifically note this in stating that employee behavioral role requirements "depend on contextual factors such as business strategies and the nature of the industry" (1995: 239). Even Lawler, a leading proponent of using high involvement work practices, concedes that these practices are "not necessarily ... right .... for all environments" (1992: xiv).

Consistent with the industrial organization economics (Bain & Qualls, 1987; Scherer, 1980), strategy (Porter, 1980), and organizational theory (Pfeffer & Salancik, 1978; Thompson, 1967) literatures, Wright and Snell (1998) highlight the importance of industry as a critical contextual variable for HRM. Wright and Snell (1998) recognize this by emphasizing that the

increased dynamism and competition characterizing many industries requires a flexible organization and workforce enabling it to reconfigure resources and activities in response to environmental demands. Thus, consistent with the contingency perspective, one can argue that the relative importance of HPWPs depends on the environment and industry and that an appropriate fit between HPWPs and these conditions should contribute to superior performance.

Industry Conditions and Employee Discretion

Specific to the moderating effect of industry on the value of a firm's human capital, Lieberson and O'Conner (1972) noted that the influence of top management on organizational performance varies considerably across industries, and that managers have greater influence on performance in some industry contexts relative to others. More recently, Rajagopalan and Datta (1996) and Datta and Rajagopalan (1998) have established significant relationships between the industry context, CEO characteristics and firm performance. Studies linking industry, top management characteristics, and firm performance are consistent with the concept of "managerial discretion" advocated by Hambrick and Finkelstein (1987). Managerial discretion has been defined as latitude for action and has been proposed as a theoretical construct explaining variability in the relative influence that top managers have on organizational outcomes (Hambrick & Finkelstein, 1987; Hambrick & Abrahamson, 1995). A manager or group of managers who have multiple courses of action that lie within the zone of acceptance is said to have discretion. In essence, managerial discretion equates to the magnitude of the upper and lower bound of management's potential impact. Hambrick and Finkelstein (1987) argue that a firm's industry environment greatly affects the level of managerial discretion. In some task environments, such as in slow growth or undifferentiated industries, the potential for managers to "make a difference" is quite limited, while in other contexts, marked by greater discretion, managers can have more of an impact.

The above notion of "managerial discretion", typically applied by strategy researchers to the executive ranks, is similar to Mischel's (1977) interactionist perspective on strong versus weak situations, invoked as a general framework by management scholars in explaining

organizational behavior (e.g., Weiss & Adler, 1984). According to Mischel (1977), a strong situation is one which provides strong, fairly deterministic cues as to the appropriate behavior. In strong work situations, individual differences tend to have less influence on behavior and/or performance. Weak situations, on the other hand, tend to be more uncertain and ambiguous, leading to individual differences having more of an impact on behavior and performance. Researchers have shown, for example, that autonomy in one's job moderates the impact of individual dispositions on work performance (Barrick & Mount, 1993).

These perspectives have relevance for understanding the potential impact of HR systems on organizational effectiveness and performance. While Hambrick and Finkelstein (1987) argue that organizational leaders are more important in environments providing greater discretion, the potential for enhanced employee-based competitive advantage in high discretion environments should not be limited to the executive level. A number of contextual factors should affect employee discretion – creating “weaker” situations where, in the words of Pfeffer (1994), employees will be more of a "crucial, differentiating factor." A key set of factors relate to industry conditions. We propose that high performance HR systems are more efficacious in particular industry conditions, in general those that are associated with increased dynamism, complexity and/or uncertainty.

While the SHRM literature has focused on discussing and researching the notion of the "fit" of HR practices and employees with competitive strategy, Wright and Snell (1998) point out that the notion of "fit" implies a static, stationary contextual template to which practices and people can be "fitted." Clearly, task environments faced by firms vary in the extent to which they offer a stationary versus a moving target for achieving this fit. Firms facing more (less) dynamic, competitive environments, may find greater (lesser) value investing in high performance work practices promoting the acquisition, development and motivation of individuals who are able and willing to adapt to the needs of the competitive environment. These work environments will generally be imbued with higher levels of employee latitude for action and a greater, but varying, need for contributions on the part of employees. Thus, analogous to the concept of "managerial

discretion" developed to explain conditions under which leaders "matter", employees also "matter" more or less depending on the level of discretion in their operating environment. In weaker, high discretion contexts, marked by uncertainty and change, firms need HR systems that promote employee and organizational flexibility to continually re-establish fit (e.g., with changing market and production strategies) over time. Industry conditions account for "the broadest and perhaps most fundamental of the loci of discretion" (Hambrick & Abrahamson, 1995: 1428). Thus, in our view, industry conditions should have broad implications for the relative value of high performance HR systems.

Research Hypotheses

Our principal argument is fairly straightforward: since industries and competitive markets vary widely in the extent to which they can be characterized by the changes (e.g., dynamic, hyper-competitive, etc.) noted by authors (e.g., Becker et al., 2001; Pfeffer,1994; 1998), the relative need for HR systems which facilitate an employee-based capability for "innovation, speed, adaptability and low costs" (Becker et al. 1997) will also vary. This is an important point since the extensive use of HPWPs represents an investment of organizational resources. Basic microeconomics suggests that investments in human capital (employees) are justified to the extent that such investments yield future marginal returns (in the form of increased productivity and economic value) in excess of the marginal cost of such investments. This perspective is consistent with Lepak and Snell's (1999) argument that the appropriateness of different HR configurations (i.e., systems) depends on the value and uniqueness of a firm's human capital, with high performance HR configurations being most appropriate when employees are both very unique and very valuable. Based on their general arguments, more intensive use of HPWPs is justified as a firm's human capital increases in uniqueness and value; fewer investments in HPWPs are warranted when these human capital factors diminish.

As we specify below, industry characteristics affect the value-adding potential of firms' human capital and, by extension, the use of HPWPs. Thus, industry conditions should moderate

the affect of HPWPs on firm outcomes. In assessing the influence of HR systems on such outcomes, there are a number of performance measures which might apply, including human resource outcomes (e.g., turnover, absenteeism), organizational outcomes (e.g., productivity) and financial outcomes (e.g., profits, market value) (Dyer & Reeves, 1995). While it seems logical that HPWPs will have the greatest and most direct effect on human resource outcomes (Dyer & Reeves, 1995), we believe that industry conditions will be more manifest in their affect on the relationship between HPWPs and organizational outcomes. In other words, investments in human capital via HPWPs will tend to have a positive and universal impact on human resource outcomes such as turnover and absenteeism. In contrast, we expect that the impact of HPWPs on outcomes such as productivity will be contingent on industry (and other contextual conditions) affecting employee discretion.

In this paper we specifically focus on productivity as a measure of organizational effectiveness. We adopt this focus for a number of reasons. First, productivity is a crucial organizational outcome. At a general level, labor productivity is defined as "total output divided by labor inputs" (Samuelson & Nordhaus, 1989). It indicates the extent to which a firm's human capital is efficiently creating output. While labor productivity may not be the *sine qua non* for long-term organizational success, it is often a necessary, if not a sufficient, condition. Second, while human resource outcomes such as turnover may ultimately impact firm performance (e.g., Guthrie, 2001), many managers may not view HR outcomes such as turnover to be of great strategic importance (Dyer & Reeves, 1995). Third, because connections between human capital and productivity -- especially labor productivity -- are relatively direct, the face validity for this outcome is also relatively high (Dyer & Reeves, 1995). Fourth, in part because of the aforementioned reasons, productivity has been used as a measure of organizational effectiveness in a fairly large body of work in the SHRM literature (e.g., Arthur, 1994; Guthrie, 2001; Ichniowski, Shaw & Prennushi, 1997; Koch & McGrath, 1996; MacDuffie, 1995).

In the following paragraphs we discuss how key industry characteristics (namely, capital intensity, growth and differentiation) moderate the relationships between HPWPs and firm productivity.

Industry Capital Intensity. Capital intensity, an indicator of industry entry barriers, has important implications for industry competitors. Firms in capital-intensive industries are generally committed to a course of action; capital intensity often creates rigidity such that new products or markets cannot be accommodated as fixed costs are high and deviations tend to be expensive (Ghemawat, 1991; Hambrick & Lei, 1985). Firms in these industries tend to focus on leveraging their investments, resulting in a greater concern for cost and efficiency considerations (Hambrick & Schecter, 1983). This results in a reduced range of discretionary options, and increases the reliance upon organizational sub-systems promoting cost-reduction and rationalization (as opposed to innovation and creativity). Further, relative to more capital-intensive industries, human capital in more labor-intensive industries are more central to organizational success. That is, intangible (human) assets are likely to be more valuable relative to tangible (physical) assets. Moreover, as capital intensity increases, employee discretion will likely be more constrained by the greater levels of automation and task structure found in these industries (Terpstra & Rozell, 1993), creating a “stronger” situation for employees. Thus, firms competing in industries with lower levels of capital intensity should receive a larger "payoff" when utilizing commitment-enhancing HR systems (i.e., HPWPs) relative to control-oriented HR systems.

Industry Growth. Arguments can also be made in the context of industry market growth, an industry characteristic featured prominently in the organizational theory and strategic management literature (e.g., Anderson & Zeithaml, 1984). Demand growth has been associated with greater market opportunity and competitive variation, providing managers and employees with more discretionary opportunities. High growth industries are typically associated with significant market opportunities and competitive variation. They are characterized by decision-making in the entrepreneurial mode, with greater opportunities for industry initiatives and decision-making freedom. Hambrick and Finkelstein (1987) suggest that industry growth results

in an expanded set of options for firms, reducing the tendency for organization inertia. These industry features are associated with enhanced discretion and weaker work environments, increasing the relative benefit of investments in human capital through high performance HR policies and practices.

Industry Product Differentiation. Industries also differ in terms of "differentiation". Product differentiability forms an important basis for industry competition. In relatively undifferentiated industries, firms tend to have relatively similar, commodity-like products and attend primarily to cost and efficiency considerations (Porter, 1980). In relatively differentiated industries, competition turns on having products that stand out from competitors on the basis of product features, quality, design, etc. In highly differentiated industries there are typically more avenues for competition and a wider range of feasible competitive actions exist, with means-end linkages being relatively poorly understood. The multitude of ways in which firms can choose to create and maintain competitive advantage leads to firms more often breaking from past practices and norms (Porter, 1980; Sutton, 1991). Thus, on average, firms shift production and organizational processes more frequently to meet changing market and customer preferences. The increased uncertainty leads to less standardization, creating a work situation that is "weaker". These contexts likely magnify the value of utilizing high performance practices such as broadly defined tasks, decentralized decision-making, greater use of teams, cross-utilization, more training, etc. Jobs are more complex and varied, requiring more capable individuals possessing the skills and potential to succeed in more challenging circumstances. In contrast, a control-oriented approach to management, which tends to emphasize narrow, well-defined jobs, centralized decision-making, lower skill demands, little training and less interdependence would be more appropriate in an environment/industry where the basis for competition and, in turn, organizational sub-systems are more stable and predictable.

Study Hypotheses

Based on the above arguments, we test a number of hypotheses. Our first hypothesis builds on previous work and suggests a direct relationship between high performance work practices and firm productivity.

> *Hypothesis 1:* High performance work practices will be positively associated with firm productivity.

Our next set of hypotheses propose that industry conditions moderate this relationship.

> *Hypothesis 2(a):* Industry capital intensity will moderate the relationship between high performance work practices and firm productivity with the relationship being stronger in industries having lower levels of capital intensity
>
> *Hypothesis 2(b):* Industry growth will moderate the relationship between high performance work practices and firm productivity with the relationship being stronger in high growth industries.
>
> *Hypothesis 2(c):* Industry product differentiation will moderate the relationship between high performance work practices and firm productivity with the relationship being stronger in industries having higher levels of product differentiation.

Method

Sample and Data Collection

The sample of firms for this study was selected based on several criteria. First, we limited the study to firms in the U.S. manufacturing sector (firms with primary 2-digit SIC code 20-39). Second, since the influence of industry characteristics can only be meaningfully assessed in non-diversified firms, the sample had to be primarily single-business firms (operationalized as deriving at least 60% of sales revenues from a single 4-digit SIC). Third, similar to previous studies (e.g., Huselid, 1995), we required that firms meet minimum size

requirements, which we set at 100 employees and $50 million in sales. Fourth, only those firms where we could identify a senior HR executive were included. Names and addresses for these individuals were obtained from the *Directory of Corporate Affiliations*, *Hunt-Hanlon Select Guide to HR Executives* and the *Society for Human Resource Management Membership Directory*. Finally, firms had to be publicly traded so that organizational data could be obtained from published sources. The final sample of firms (which satisfied all the above criteria) consisted of 971 firms.

After pilot testing, surveys were mailed to the identified HR executives in the sample firms. The initial mailing was followed by a reminder letter, a second survey, and finally a telephone reminder. This resulted in a total of 144 responses (a 15 % response rate). However, for 12 of the 144 firms providing survey responses, relevant firm-level data proved unavailable due to de-listings because of acquisition, merger or going private. As a result, the usable sample for this study was 132 firms. Although somewhat low, our response rate is consistent with other studies of survey-based "high performance work systems" reviewed by Becker and Huselid (1998), which had response rates ranging from 6% to 28%, with an average of 17.4% (a test of non-response bias for this study is reported below).

Several weeks after the initial response was received, a second respondent was identified and mailed a survey. While initial respondents were typically Senior Vice–President or Vice President, HR, the modal title of the second respondent was HR Manager. We received second responses from a total of 33 of the sample firms. As described below, multiple survey responses from organizations were used to assess the reliability of the HR system measure.

Measures

Firm Productivity. As is common in the literature (Guthrie, 2001; Huselid, 1995; Koch & McGrath, 1996) firm productivity was operationalized as the ratio of firm sales to the number of employees. Data were obtained from Compustat. Given that productivity levels vary significantly across industries (even for industries within the manufacturing sector), it was important to control for these differences. Using a full set of industry codes as controls in our multivariate analyses is

problematic because it leads to an unfavorable ratio of cases to predictor variables (Brace, Kemp & Snelgar, 2000). As an alternative, we collected productivity data on every firm in each of our sample firm's 3-digit SIC industries, calculated industry means and standard deviations, and used these values to compute productivity z-scores. The z-scores for our sample firms represent their relative standing within their respective 3-digit industry and serves as a direct control for industry productivity differences.

High Performance Work Practices (HPWPs). Drawing upon previous empirical work (Guthrie, 2001; Huselid, 1995), the extent of a firm's use of HPWPs for exempt and non-exempt employees was measured by assessing the relative use of 18 practices. These practices included: intensive/extensive recruiting, hired on the basis of testing, use of internal promotions, use of performance (versus seniority) based promotions, receive performance feedback on a routine basis, receive multi-source performance feedback, use of skill-based pay, use of group-based (gainsharing, profit-sharing) pay, intensive/extensive training in firm-specific skills, intensive/extensive training in generic skills, use of cross-training or cross-utilization, use of employee participatory programs, provided operating performance information, provided financial performance information, provided information on strategic plans, use of attitude surveys, use of teams and access to grievance system.

Instead of clustering or categorizing firms into discrete typologies of industrial relations systems (e.g., Arthur, 1994), each firm's relative use of HPWPs was measured on a continuous scale. In this measurement approach, firms may vary in both the number of practices utilized and the extensiveness of employee coverage. In theory, organizations may range from those making no use of HPWPs to those using *all* of the practices for *all* employees. A high score on the HPWP measure indicates relatively intensive use and investment in high performance human resource practices; lower scores on this measure indicate less extensive use of HPWPs. Estimates of the proportion of each employee group (exempt and non-exempt) covered by each high involvement practice (0-100%) were obtained. Using the number of employees in each

group, a weighted average for each practice was computed. The Cronbach's alpha for the composite HPWP scale was .78.

Scholars in the strategic HR literature, however, have debated the merits of relying on internal indices of reliability (such as Cronbach's alpha) to support the reliability of HR system measures. In the context of a broader discussion regarding the existence and implication of error in the measurement of firm-level systems of HR practices (e.g., Gerhart, 1999; Gerhart, Wright, McMahan & Snell, 2000; Huselid & Becker, 2000), questions have been raised about the reliability of "single resource organizational survey" based measurements of HR practices and systems. Because of these concerns, researchers have been urged to collect descriptions of HR practices from multiple informed organizational respondents and to estimate measurement reliability across these responses (Gerhart et al., 2000). Following this advice, we collected multiple responses (2 or 3) from a subset of firms (n = 33) contained in our sample. As a check on the reliability of our HR data, we calculated the inter-class correlation coefficient, ICC(1), which can be conceptualized as the proportion of variance in a measure explained by group membership (Bryk & Raudenbush, 1992). As noted by Bliese (2000: 356), "when ICC(1) is large, a single rating from an individual is likely to provide a relatively reliable rating of the group mean; when ICC(1) is small, multiple ratings are necessary to provide reliable estimates of the group mean." For the HPWP scale, the ICC(1) value is .620 which, based on available standards (e.g., Bliese, 2000; Gerhart et al., 2000), would be characterized as "large" and supportive of an acceptable degree of agreement across raters.[1]

Industry Characteristics. *Industry Capital Intensity* was defined as the 3 year (1997-1999) average ratio of fixed assets/sales for firms in each industry (in Compustat) at the 3-digit

[1]ICC(1) values at the item level (i.e., agreement across raters= descriptions of *individual* HR practices) were lower and ranged considerably. This indicates that, in contrast with the evidence suggesting good agreement at the *system* level, raters= estimates for *individual* practices are more variable. Thus, the ICC(1) evidence is generally more supportive of examining the effects of a *system* of high performance work practices, relative to analyses conducted at the *individual* HR practice level. In this study analyses are conducted at the *system* level.

SIC level (Chang & Singh, 1999). *Industry Growth* was defined as the average annual growth rate in value of shipments in the five-year period 1992-97 based on the data available in the *U.S. Census of Manufactures*. This measure of industry growth has been widely used in the literature (Hambrick & Abrahamson, 1995; Rajagopalan & Datta, 1996). Following Haleblein and Finkelstein (1993) and Hambrick and Finkelstein (1987), *Industry Product Differentiation* was computed as a composite measure of industry R&D intensity and advertising intensity. Industry R&D intensity was measured as the three year (1997-99) average at the 3-digit SIC level, with R&D intensity for a given year being defined as the average ratios of R&D expenditures to total sales for all firms belonging to the sample firms' 3-digit SIC in Compustat (Baysinger & Hoskisson, 1989; Chang & Singh, 1999). Similarly, industry advertising intensity was operationalized as the three year average (1997-99) at the 3-digit SIC level, with advertising intensity for a given year being defined as the average ratio of advertising expenditures to total sales for all firms in the Compustat database within the 3-digit defined SIC industries. These two measures (industry R&D and advertising intensity) were standardized in z-score format (mean=0; s.d.=1) and averaged to yield a composite measure of industry product differentiation.

Control variables. Multivariate analyses controlled for firm size, firm growth, relative firm capital intensity and level of employee unionization. *Firm size* was operationalized as the natural logarithm of the number of employees (e.g., Dalton and Kesner, 1983; Guthrie, 2001) and *firm sales growth* was measured as the growth in firm sales over 1997-99. *Relative firm capital intensity* was defined as mean of firm capital intensity (fixed assets/sales) divided by industry capital intensity. These data were obtained from Compustat. Finally, the *level of unionization*, was operationalized as the proportion of a firm's workforce that was unionized. These data were obtained from survey responses.

Data Analysis And Results

Table 1 presents the means, standard deviations and zero-order correlations among all study variables. Average values and standard deviations on the measures of industry characteristics display reasonably high variance in the underlying sample, indicating that the sample does not reflect idiosyncratic industry conditions. Moreover, the modest inter-correlations among the independent variables reduce problems associated with multicollinearity. Further, it confirms the assumption that the underlying industry characteristics do not co-vary significantly and their effects need to be assessed independently. Also given a 15% response rate, we checked for possible non–response bias by comparing "late" versus "early" respondents along key study variables (first suggested by Oppenheim, 1966). The assumption behind this "time trend extrapolation test" (Armstrong & Overton, 1977) for non-response bias is that "late" respondents (those responses received after the second round of mailing and follow-up telephone calls) are very similar to non-respondents, given that they would have fallen into that category had not the second set of questionnaires been mailed. T-tests conducted showed no significant differences between the two groups (i.e., "early" versus "late" respondents) along any of the key study variables, namely, firm productivity, HPWPs, industry capital intensity, growth and product differentiation, attesting to the representativeness of the sample.

Table 1
Means And Correlation Coefficients

	Variables	Means	s.d.	1	2	3	4	5	6	7	8
1.	Firm Productivity	-0.19	0.66								
2	High Performance Work Practices	49.26	15.63	0.15							
3	Industry Capital Intensity	0.41	0.57	0.10	-0.11						
4.	Industry Growth	0.40	0.30	-0.08	0.04	-0.20					
5.	Industry Differentiation	-0.02	0.75	-0.06	0.15	-0.25	0.17				
6.	Firm Size	1.14	1.47	0.05	0.12	-0.20	-0.19	0.08			
7.	Firm Sales Growth	0.20	0.56	0.26	-0.06	-0.06	0.23	0.10	-0.02		
8.	Firm Unionization	16.35	26.33	-0.07	-0.11	-0.01	-0.10	-0.19	0.23	0.01	
9.	Firm Relative Capital Intensity	1.09	0.64	-0.05	0.09	0.02	-0.03	0.07	0.05	-0.23	-0.09

[a]Correlations greater than .14 are significant at $p < .10$, greater than .18 are significant at $p < .05$ and greater than .24 significant at $p < .05$

Given a continuous dependent variable (firm productivity) ordinary least squares regressions were used to test hypotheses 1-4. The first "main effects" model (Model 1) included the control and industry characteristics variables along with the HPWP measure. Models 2, 3 and 4 involve moderated regression models with the addition of the interaction effects (industry characteristics and HPWPs). The results of the OLS regressions are presented in Table 2.

Table 2
Regression Results: HPWPs, Industry Characteristics and Firm Productivity

Variable	Model 1	Model 2	Model 3	Model 4
Intercept	-0.582* (.252)	-0.803* (.274)	-.139 (.361)	-.649* (.250)
High Performance Work Practices	.008* (.004)	.013** (.005)	- .002 (.007)	.009* (.004)
Industry Capital Intensity	.115 (.094)	.535* (.245)	.092 (.109)	.070 (.110)
Industry Growth	-.263 (.210)	-.261 (.207)	-.169* (.868)	-.249 (.207)
Industry Differentiation	-.086 (.084)	-.083 (.083)	-.081 (.083)	-.664* (.294)
Firm Size	.026** (.043)	.033 (.043)	.035 (.043)	.011 (.043)
Firm Sales Growth	.375*** (.110)	.387*** (.109)	.439*** (.116)	.407*** (.110)
Firm Unionization	-.003 (.002)	-.002 (.002)	-.002 (.002)	-.002 (.002)
Firm Relative Capital Intensity	-.003 (.094)	.003 (.093)	.046 (.098)	-.009 (.093)
High Performance Work Practices X Ind. Capital Intensity		-.011* (.006)		
High Performance Work Practices X Ind. Growth			-.028† (.017)	
High Performance Work Practices X Ind. Differentiation				.011* (.005)
R^2	.147*	.175*	.169*	.179*
Change in R^2		.028	.022	.032

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

The first overall conclusion that can be drawn from Table 2 is that high performance work practices (HPWPs) explains a significant portion of the variance in firm productivity after controlling for firm and direct industry effects (p<.05). This supports Hypothesis 1 and indicates that the use of high performance work practices is positively associated with firm productivity.

The results associated with models 2-4 relate to the interaction effects of industry characteristics and the use of HPWPs, illustrating the impact of HPWPs on firm productivity under different industry conditions. Hypothesis 2(a) predicts that HPWPs will be more positively associated with firm productivity when industry capital intensity is low. To test this hypothesis we added the interaction of HPWPs and industry capital intensity to the base model. As evident from Model 2 of Table 2, this interaction term was significant in the regression model ($p < .05$), suggesting that industry capital intensity moderates the relationship between use of HPWPs and firm productivity. Using the procedure outlined by Aiken and West (1991), the plot of the interaction effects indicates that the relationship between HPWPs and firm productivity is relatively stronger when industry capital intensity diminishes. We conducted supplementary analyses using subgroups (displayed in Table 3) in which the sample was divided into two subgroups using the median spit on industry capital intensity. The OLS regression results for the two groups indicate that while there is a significant relationship between HPWPs and firm productivity in the low capital intensity subgroup ($p<.05$), no such relationship exists in the high capital intensity subgroup. These results, along with the moderated regression analysis findings, support Hypothesis 2(a).

Table 3
Sub-Group Regression Results: Firm Productivity

Variables	**Model 1** (Industry Capital Intensity)		**Model 2** (Industry Growth)		**Model 3** (Industry Differentiation)	
	High	**Low**	**High**	**Low**	**High**	**Low**
Intercept	-.169 (.363)	-.499† (.297)	-1.256*** (.304)	-.301 (.317)	-1.167** (.337)	.150 (.345)
High Performance Work Practices	-.001 (.006)	.011* (.004)	.012* (.004)	.007 (.006)	.013* (.005)	.001 (.005)
Firm Size	-.026 (.071)	.071 (.051)	.026 (.052)	.011 (.066)	-.030 (.054)	.073 (.066)
Firm Sales Growth	.781** (.286)	.312** (.110)	.385*** (.097)	.473† (.267)	.411*** (.113)	.461 (.279)
Firm Unionization	-.005† (.003)	.001 (.003)	-.002 (.002)	-.003 (.003)	-.004 (.003)	-.001 (.002)
Firm Relative Capital Intensity	.274† (.156)	-.286* (.118)	.136 (.109)	-.137 (.127)	.175 (.115)	-.300* (.141)
Industry Capital Intensity			.598* (.289)	.025 (.137)	.405 (.421)	.109 (.118)
Industry Growth	-.419 (.295)	-.399 (.291)			-.155 (.227)	.590 (.391)
Industry Differentiation	-.112 (.112)	-.024 (.128)	-.054 (.094)	-.127 (.139)		
F	2.04*	3.27**	3.47**	1.06	3.12**	2.06*
R^2	.237	.287	.327	.110	.300	.202

[a] † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Similarly, the interaction term involving industry growth and HPWPs in Model 3 indicates modest support ($p<.10$) for Hypothesis 2(b), which predicted that the relationship between HPWPs and firm productivity is moderated by industry growth. Again, plotting the interaction effects shows that the relationship between HPWPs and firm productivity is relatively stronger under circumstances of high industry growth. Further confirmation is provided by the results of our subgroup analysis (Table 3), which indicates that the relationship between HPWPs and firm productivity is significant in the high industry growth subgroup ($p<.05$) but not in the low industry growth subgroup. Finally, the significance ($p<.05$) of the regression coefficient associated with the interaction of industry product differentiation and HPWPs in Model 4 indicates that industry differentiation moderates the relationship between HPWPs and firm productivity. Plotting the interaction effects illustrates that the relationship between HPWPs and productivity is greater when industry differentiation is higher. Additional confirmation is available from the results of the subgroup analysis which indicates that the relationship between HPWPs and firm productivity is significant and positive in the high differentiation subgroup ($p<.05$) but not in the low differentiation subgroup. Thus, Hypothesis 2(c) is also supported.

Discussion And Conclusions

This analysis supports arguments and previous findings suggesting that firm competitiveness can be enhanced by utilizing high- performance work practices; (Arthur, 1994; Huselid, 1995; Koch & McGrath, 1996; Kochan & Osterman, 1994 Lawler, 1992; 1996; Levine, 1995; MacDuffie, 1995; Pfeffer, 1998). The primary contribution of this study, however, is to illustrate the potential for contextual conditions to moderate the relationship between HR systems and organizational effectiveness. Two primary perspectives, a *universal* approach and a *contingency* approach, have been used to model the link between HRM and firm effectiveness (Youndt, et al., 1996). The universal approach posits a direct relationship between "best practice" HRM and firm performance. In contrast, the contingency approach proposes that the effect of HRM on firm performance will depend on a firm's context or environmental exigencies.

Our results support the contingency perspective in that the characteristics of a firm's industry were shown to affect the impact of a system of high performance HR practices on firm productivity.

We suggest that industry conditions affect the discretion available to employees (Hambrick & Finkelstein, 1987) or, in the words of Mischel (1977), the extent to which employees work in a "strong" versus a "weak" situation. High discretion environments (i.e., "weaker" situations) magnify the potential for a firm's human resources -- the collective human and social capital of the workforce -- to impact organizational success. Specifically, study results indicate that three prominent industry features -- capital intensity, differentiation and growth -- influence the relative efficacy of high performance work systems. The moderated regression and sub-group analyses suggest that HPWPs display a stronger association with firm productivity in industries with lower capital intensity, greater differentiation or faster growth.

These results should be interpreted cautiously given the limitations inherent in this study. A legitimate concern is the question of simultaneity. While data are analyzed and discussed as if the use of HPWPs affects firm productivity, this interpretation is limited by the cross-sectional nature of the data. Respondents completed surveys and described HR systems in place during calendar year 1999. Firm productivity data are also from 1999. Thus, while it is more plausible to argue that HR systems and management practices influence labor productivity, it is certainly possible that firms experiencing higher productivity are better positioned to invest in greater levels of HPWPs. A second concern is bias introduced by non-respondents; i.e., the persons and companies which did respond to the survey may differ significantly from those which did not. Again, while this threat cannot be dismissed, the time trend extrapolation test for non-response bias lessens this concern.

Within the limitations outlined above, this study supports the argument that industry conditions influence the impact of HR systems and human capital. Arguments proffered by authors such as Pfeffer (1998), Lawler (1996), Becker et al. (2001) and others are undoubtedly true in the main: The basis for competition in many industries and markets is changing such that

the relative importance of "intangible assets" -- especially human capital -- is increasing.; and, as these trends continue, the strategic importance of utilizing sophisticated HR systems will likely magnify. However, as our results indicate, industry conditions do vary, and this variance influences the relative impact of HR on firm effectiveness.

Much work remains in determining the pathways by which HPWPs affect employees' attitudes, behaviors and, in turn, the manner in which these individual-level measures affect organizational-level measures of success. We hope that academics and practitioners will find this study a meaningful contribution to the literature examining HRM and firm outcomes.

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