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Peeling Back the Onion Competitive Advantage Through People: Test of a Causal Model

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Abstract

Proponents of the resource-based view (RBV) of the firm have identified human resource management (HRM) and human capital as organizational resources that can contribute to sustainable competitive success. A number of empirical studies have documented the relationship between systems of human resource policies and practices and firm performance. The mechanisms by which HRM leads to firm performance, however, remain largely unexplored. In this study, we explore the pathways leading from HRM to firm performance. Specifically, we use structural equation modeling to test a model positing a set of causal relationships between high performance work systems (HPWS), employee retention, workforce productivity and firm market value. Within a set of manufacturing firms, results indicate the primary impact of HPWS on productivity and market value is through its influence on employee retention.

Key words: Competitive Advantage, Strategic HR, Performance

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Peeling Back the Onion Competitive Advantage Through People: Test of A Causal Model

As other sources of competitive success have become less important, what remains as a crucial, differentiating factor is the organization, its employees, and how they work (Pfeffer: 1994).

The field of strategic management centers on the question of why some firms gain competitive advantage and consistently out-perform their rivals. Marked by increased rates of technological change, diffusion and hypercompetitive rivalry, the competitive landscape of the 21st century offers no easy answer to this question. Two primary theoretical perspectives for explaining competitive advantage have been advanced in recent years. Prevalent through the 1980s, the industrial organization framework (Porter, 1980) focused on the external environment as the key determinant of strategies for achieving competitive advantage. The industrial organization model focuses on the interface between strategy and the external environment, with competitive advantage being viewed as the outcome of a firm's ability to position itself within an attractive industry or industry segment (as defined by a favorable structure). The second theoretical perspective, which gained popularity during the 1990s, is often identified as the resourced-based view (RBV). Drawing on multiple theoretical perspectives, RBV argues that a firm represents a pool of resources and capabilities which, in turn, can be an important source of competitive advantage (e.g., Barney, 1991; Grant, 1996; Wernerfelt, 1994). The potential for competitive advantage derives form a firm's ability to exploit the unique features of its collection of resources and capabilities.

Coincident with the shift in the strategy literature -- from an emphasis on organizations' external environments to organizations' internal resources -- scholars in human resource management began to make arguments consistent with the RBV perspective. In his 1994 book, *Competitive Advantage Through People*, Jeffrey Pfeffer argued that success in dynamic, hyper-competitive markets depends less on advantages associated with economies of scale, technology, patents, regulation and access to capital and more on innovation, speed, and adaptability. Pfeffer

further argued that these latter sources of competitive advantage are largely derived from firms' employees and how they are managed. Based on these and similar arguments, Pfeffer (1994, 1998) and others (e.g., Becker, Huselid and Ulrich, 2001; Datta, Guthrie and Wright, forthcoming; Kochan and Osterman, 1994; Lawler, 1996; Levine, 1995; O'Reilly and Pfeffer, 2000) strongly advocate that firms adopt a set of management practices collectively referred to as *high performance* or *high involvement* human resource systems. These arguments and associated research are part of a developing literature that has been labeled *strategic human resource management* (SHRM).

Because of its emphasis on advantages associated with internal resources, the resource-based view of competitive advantage is often invoked by SHRM scholars as a theoretical framework for their work. Consistent with Barney's (1991) perspective, to the extent they are inimitable and value-adding resources, people-management systems and associated human capital enhancements can be a source of competitive advantage. With some exceptions (e.g., Cappelli and Neumark, 2001), a series of empirical studies over the last decade have supported the belief that human resource management systems can, in fact, impact organizational success (e.g., Arthur, 1994; Batt, 2002; Delery and Doty, 1996; Guthrie, 2001; Huselid, 1995; Ichniowski, Shaw and Prennushi, 1997; Koch and McGrath, 1996; MacDuffie, 1995).

While the RBV perspective offers theoretical insights, the process by which HRM creates firm value remains elusive. In a review of the SHRM literature, Becker and Gerhart (1996) posed the deceptively simple question "How do human resource decisions influence organizational performance?" (p. 779). As noted, while studies have provided evidence on the question of whether human resource management practices influence firm performance, few studies have addressed Becker and Gerhart's question as to *how* this occurs. As such, it is still true that "the mechanisms by which human resource decisions create and sustain value are complicated and not well understood" (Becker and Gerhart, 1996: 780). Or, more colloquially, extant research has done little to "peel back the onion" (Becker, Huselid, Pickus and Spratt, 1997) to reveal the processes by which HRM systems affect firm performance. In calling for research addressing this question, Becker and Gerhart wrote:

> *Future work on the strategic perspective must elaborate on the black box*
> *between a firm's HR system and the firm's bottom line. Unless and until*
> *researchers are able to elaborate and test more complete structural models -- for*
> *example, models including key intervening variables -- it will be difficult to rule out*
> *alternative causal models that explain observed associations between HR*
> *systems and firm performance* (1996: 793).

Several years following this assessment, it remains true that little is known about the mechanisms by which HR systems translate into competitive success. In this study, we address this gap by exploring the pathways leading from a set of human resource practices to firm value. More specifically, we test a model positing a set of causal relationships between high performance work systems (HPWS), employee retention, workforce productivity and firm market value. In doing so, we contribute to the emerging body of research on the nexus of strategy and human resource management to address the question of how HRM impacts competitive advantage and firm performance. In the pages that follow, we review relevant literature and theory, present and test and our research model and discuss the implications of our findings.

Theoretical Overview and Research Model

Strategic Human Resource Management (SHRM)

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." SHRM studies have focused on explicating the strategic role that HR can play in organizational functioning. More specifically, much of SHRM research has focused on establishing a link between strategic HR policies and practices and organizational level measures of performance. As part of this latter perspective, human resource systems are viewed as an integral part of the organizational "architecture" impacting organizational effectiveness. Unlike traditional research in the HR literature, SHRM research is typically conducted at the business unit or organizational-level of analysis. Reflecting this orientation, recent HR research has focused on *high performance work systems* (HPWS), a term used to denote a system of HR practices designed to enhance employees' skills, commitment and productivity such that employees become a source of sustainable competitive

advantage (Levine, 1995; Pfeffer, 1998). While there is no precise definition of a high performance work system, based on conceptual/prescriptive (e.g., Lawler, 1992; Levine, 1995; Pfeffer, 1998) and empirical work (e.g., Arthur, 1994; Huselid, 1995), these systems would include practices such as rigorous selection procedures, internal merit-based promotions, grievance procedures, cross-functional and cross-trained teams, high levels of training, information sharing, participatory mechanisms, group-based rewards and skill-based pay.

As discussed by Dyer and Reeves (1995), assessment of the influence of high performance work systems on firm effectiveness can be undertaken using multiple outcome measures. These include human resource outcomes (e.g., turnover, absenteeism), organizational outcomes (e.g., productivity) and financial outcomes (e.g., profits, market value). Studies in the SHRM literature have empirically linked HPWS with various performance measures within these outcome categories. Boselie and Dietz (2003), in their review, identify productivity as the most frequently examined outcome measure (e.g., Arthur, 1994; Guthrie, 2001; Koch and McGrath, 1996; MacDuffie, 1995), followed by financial results in the form of firm profitability or market value (e.g., Delery and Doty, 1996; Huselid, 1995), product/service quality (e.g., MacDuffie, 1995; Youndt, Snell, Dean and Lepak, 1996) and turnover (e.g., Arthur, 1994; Batt, 2002; Guthrie, 2001).

RBV and SHRM

The resource-based view assumes that each firm represents a collection of unique resources and capabilities that provide the basis of competitive advantage. According to this perspective, differences in firm performance can be attributed to these unique resources and capabilities rather than the industry's structural characteristics. Resources have the potential to create competitive advantage when they allow firms to formulate and implement strategies that are appropriate in the context of the industry in which the firm competes. Grant (1996) distinguishes between three types of resources: (1) tangible, (2) intangible, and (3) human resources, with human resources being characterized as the " …. productive services that human beings offer to the firm in terms of their skills, knowledge, and reasoning and decision making abilities." (p. 143). Similarly, Barney and Wright

(1998) and Wright et al. (1994) also focus on the characteristics of a firm's human resources in creating competitive advantage. These include elements of both human capital (employee knowledge, experience, skills and commitment) and social capital (relationships among employees and employees' relationships with others outside the firm).

As noted, SHRM scholars frequently employ RBV to frame research examining links between HRM systems and firm performance. As reviewed by Delery and Shaw (2001), the RBV perspective offers several advantages as a framework for strategic issues in HR research. First, it focuses on competitive advantage flowing from inimitable resources that create organizational value. This applies to human resources as an organizational resource because these value-creating assets are not "visible or transparent as to its source" (Pfeffer, 1994: 15). Second, consistent with the focus of much of the SHRM research, the RBV perspective focuses on competitive advantage at the firm level. Third, the RBV perspective focuses on complex organizational systems, suggesting that resources and capabilities that are socially complex are important sources of sustainable competitive advantage (Dierickx and Cool, 1989). This notion is embedded in the SHRM researchers' concept of synergistic and complex systems or bundles of HR practices (Lado and Wilson, 1994; MacDuffie, 1995). Empirical work examining HRM and firm performance indicates that HR practices are most effective when they exist as a coherent bundle or system, which is consistent with the generally thrust of a strategic approach to HRM (Wright and Snell, 1991).

Research Model

In a review of the RBV literature, Barney and Arikan (2001) conclude, "….. there is little doubt that resource-based logic has had an important impact on human resource research." In applying the RBV perspective, the SHRM literature often depicts the complex manner in which HRM creates firm value as a series of intervening or linked constructs (e.g., Becker et al., 1997; Dyer and Reeves, 1995; Guest, 1997). However, with limited exceptions (Batt, 2002; Huselid, 1995), empirical studies to date have not tested the causal pathways suggested by theorists in this literature. This has been referred to as the "black box" problem (Wright, Gardner and Moynihan, 2003). Becker et al. (1997), for

example, indicate the following causal pathway:

> *HR system → employee skills/motivation → productivity, creativity, discretionary effort → operating performance → firm performance.*

Similarly, Delery and Shaw (2001), in a review of the SHRM literature, depict the following sequence:

> *HRM → workforce characteristics → workforce performance/productivity → firm performance.*

Other reviews and theoretical treatments (e.g., Boselie and Dietz, 2003) posit both direct and indirect links between HR systems and performance outcomes. Thus, while theoretical treatments suggest that worker outcomes mediate the link between HRM and firm performance, relatively few studies have systematically investigated the existence of these pathways.

As described below, we employ structural equation modeling (SEM) to test for direct and indirect relationships between the use of high performance work systems and primary indicators of the outcome categories suggested by Dyer and Reeves (1995): employee turnover, workforce productivity and firm (capital market) performance. The use of SEM is particularly appropriate when testing theoretically derived paths among multiple exogenous and endogenous variables (Shook, Ketchen, Hult and Kacmar, 2004). It is also consistent with Becker and Gerhart's (1996: 793) admonition that SHRM should test "more complete structural models" explaining associations between HR systems and firm performance.

The interrelationships of primary interest are depicted on the right-hand side of Figure 1. As this figure indicates, based on previous work (Arthur, 1994; Batt, 2002; Guthrie, 2001; Shaw et al., 1998), we test for direct relationships between relative use of HPWS and reduced turnover. High performance work systems are thought to increase employee retention through a variety of mechanisms. First, improved selection systems, often found in high performance HR systems, should reduce quit rates. In addition, based on job characteristics theory (Hackman and Oldham, 1980), the manner in which work is structured in HPWS environments – greater autonomy, enlarged jobs, increased participation -- should increase intrinsic motivation, commitment and, in turn, reduce voluntary turnover (Batt, 2002). Direct relationships between the use of HPWS and workforce

productivity have also been documented in the literature (Ichniowski, Shaw and Prennushi, 1997; Koch and McGrath, 1996; MacDuffie, 1995). This relationship is thought to occur because the combination of superior hiring, enhanced training, aligned incentives and information sharing all result in a more talented, committed group of employees who utilize their tacit knowledge to enhance workforce productivity. While productivity may, in turn, enhance firm performance (e.g., Huselid, 1995), HR systems and human capital may also directly impact firm performance. As intangible assets, HR systems and human capital may increase the premium capital markets are willing to pay for a given portfolio of assets (Huselid, Jackson and Schuler, 1997). Previous empirical work (Huselid, 1995; Huselid, et al., 1997) has suggested this direct relationship.

Figure 1: Hypothesized Model
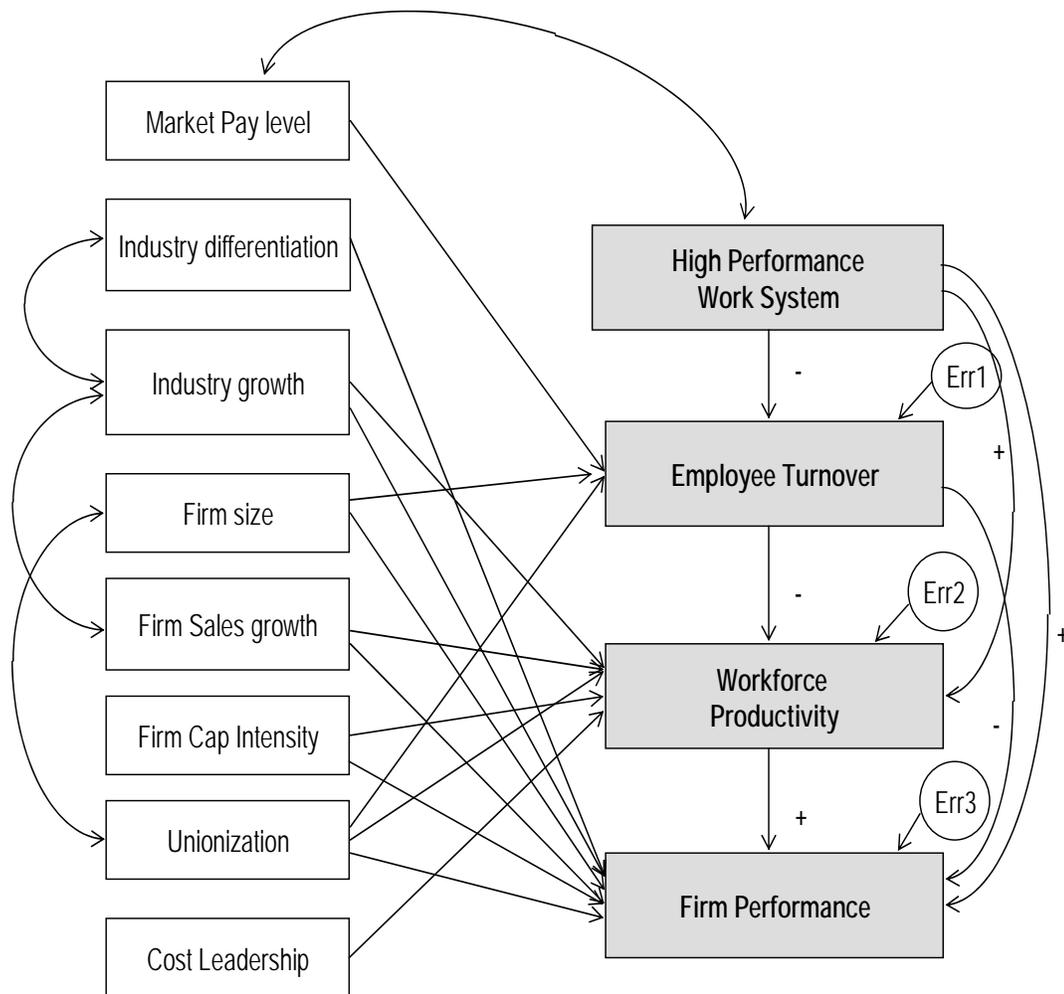
As noted, only a limited number of researchers have tested mediating relationships involving

high performance work systems. They include Batt (2002) and Huselid (1995), who have examined

the mediating properties of turnover. Human capital theory provides the primary logic for the impact of

turnover on organizational productivity. Voluntary turnover represents the loss of firm specific human

capital and lessens the productive capability of the workforce. Using a series of OLS regressions, Batt

(2002) demonstrated that the influence of HR systems on sales growth is reduced (but not eliminated)

following the introduction of turnover into her models. Huselid (1995) examined mediating

relationships by simultaneously introducing measures of turnover and workforce productivity into his

OLS models and found that the combination of these two measures reduced the influence of HPWS

on accounting and market valuation measures of firm performance. Taken together, the findings of

Batt (2002) and Huselid (1995) suggest mediating roles for turnover and workforce productivity in the HPWS – firm performance relationship.

In the following section we discuss the research method used to test the model of Figure 1. The model specifies both the direct and indirect relationships between high performance work systems, turnover, workforce productivity and firm performance, and controls for a number of variables that may influence the endogenous outcome variables of interest.

Method

Sample

The firms in the sample were selected based on several criteria. First, only publicly traded firms in the manufacturing sector (2-digit SIC code 20-39) having a minimum of 100 employees and $50 million in sales were included. Second, since we wanted to control for the influence of industry characteristics, the sample was limited to relatively undiversified firms (deriving at least 60% of sales revenues from a single 4-digit SIC). Third, 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*. A total of 971 firms met the above criteria.

After pilot testing, surveys were mailed in early 2000 to the senior-most HR executive identified in sample firms. This was followed by a reminder letter, a second survey and, finally, a telephone reminder. A total of 144 responses, representing a 15% response rate, were received. However, 13 of the 144 firms providing survey responses were eventually excluded because of non-availability of relevant firm-level data (due to de-listings resulting from acquisitions, mergers or firms going private), resulting in a usable sample of 131 firms. Our 15% response rate is consistent with other survey-based studies of "high performance work systems". Becker and Huselid (1998) reviewed studies having response rates ranging from 6% to 28%, with an average of 17.4%. The response rate is also comparable to large-scale surveys involving executives in strategy research (Capron, 1999; Powell and Dent-Micallef, 1997). In order to assess the reliability of our HR system measures, once

we received a "primary" response, we sent a "secondary" survey to a second HR person in

participating firms. This was an abridged survey, including only the HPWS practice items. 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 33 firms.[1]

Measures

 Firm Performance. Firm performance in the strategic management and HR literatures has been

measured using both accounting (e.g., ROA, ROE) and market-based measures (e.g., market-to-book

ratio). There is general agreement, however, that capital market measures are superior to accounting

measures of performance (e.g., Becker and Gerhart, 1996; Chakravarthy, 1986). Capital market

valuations are considered superior because these measures not only reflect historical performance, but

also the present value of estimated future cash flows. Specific to the influence of HR systems on firm

performance, authors have argued that the "invisible assets" of HR systems and human capital are more

likely to be reflected in market valuation, as opposed to accounting measures of performance. For

example, Becker et al. (1997) note "…human capital based competencies are in part the source of the

'intangible capital' represented by the difference between the book value of a firm's assets (i.e.,

shareholder's initial investment) and the current market value of those assets." Moreover, accounting

measures of performance are more subject to being managed and manipulated (Wernerfelt and

Montgomery, 1988). As such, we use the log transformation of firms' market-to-book ratios as our

measure of firm performance (the log transformation was used to correct for data skewness). Market-to-

book data for 1999 were obtained from the Compustat database.

 Workforce Productivity. Labor productivity is a crucial organizational outcome. At a general

level, labor productivity, defined as "total output divided by labor inputs" (Samuelson and Nordhaus,

1989), indicates the extent to which a firm's labor force is efficiently creating output. Labor productivity is

often considered a necessary, if not a sufficient, condition for long-term organizational success and

SHRM theorists (e.g., Delery and Shaw, 2001) have identified it as a crucial indicator of "work force

performance". Given the above, it is not surprising that productivity has been used as an outcome variable

in a large body of work in the SHRM literature. Based on prior literature (e.g., Koch and McGrath, 1996), productivity was operationalized as the log of the ratio of firm sales to the number of employees. Again, data used to compute the labor productivity in sample firms for 1999 was obtained from the Compustat database.

Turnover. As is common in the literature (e.g., Bennett et al, 1993; Shaw et al, 1998) we used respondent reports to measure turnover. Survey respondents were asked to provide information on the voluntary turnover rate (percentage of employees who voluntarily departed the firm) during 1999 for both exempt and non-exempt employees. Using the number of employees in each group (exempts and non-exempts), a weighted average of overall voluntary turnover for each firm was computed.

High Performance Work Systems. A variety of approaches to measuring high performance work systems exist in the literature. Our measure is based upon the work of Guthrie (2001) and Huselid (1995). For the year 1999, survey respondents were asked to describe the relative use of 18 practices for exempt and non-exempt employees. 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 (see the Appendix for a more complete description of the HPWS scale items).

Estimates of the proportion of each of two employee groups (exempt and non-exempts), covered by each high performance work system practice (0-100%) were obtained from survey respondents and was used to compute a weighted average for each practice. The mean of these 18 weighted averages represents a firm's HPWS score. Cronbach's alpha for the composite high performance work system scale was .78. A high score on the high performance work system measure

indicates relatively intensive use of a high performance work system; lower scores on this measure indicate less extensive use of a high performance work system.

SHRM scholars (e.g., Gerhart, 1999; Gerhart, Wright, McMahan and Snell, 2000; Huselid and Becker, 2000) have raised questions about the reliability of "single resource organizational survey" based measurements of HR practices and systems. To address these concerns, we sought second responses from firms who returned the first survey. We then used firms with multiple responses (n=33) to compute the intraclass correlation coefficient, ICC(1), as a check of the reliability of our HR data. ICC(1) can be conceptualized as the proportion of variance in a measure explained by group membership (Bryk and Raudenbush, 1992). Per 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 high performance work system scale, the ICC(1) value is .62 which, based on available standards (e.g., Bliese, 2000), would be characterized as "large" and supportive of an acceptable degree of agreement across raters.

Control variables. In testing the pathways between high performance work systems and firm performance, it is important to control for other influences on endogenous or dependent variables in our model. Multi-industry SHRM studies often use dummy-codes as proxies for industry differences, with "manufacturing industry" often being included as a single dummy code classification (e.g., Guthrie, 2001; Koch and McGrath, 1995). Given that our entire sample is drawn from the manufacturing sector, we use finer-grained measures of industry differences in the form of industry growth as well as R&D and advertising expenditures (as indicators of product differentiation). *Industry growth* was defined as the average five-year annual growth rate in value of shipments 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 and Abrahamson, 1995; Datta and Rajagopalan, 1998). Per Hambrick and Abrahamson (1995), advertising intensity and R&D intensity should be considered as complementary measures of differentiation. We computed *industry product differentiation* 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 and Hoskisson, 1989; Chang and 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 (mean=0; s.d.=1) and averaged to yield a composite measure of

industry product differentiation.

Our models also controlled for several firm characteristics -- specifically, firm size, firm growth, firm

capital intensity, firm market pay position, level of employee unionization and firm strategy. *Firm size* was

operationalized as the natural logarithm of the number of employees (e.g., Rajagopalan and Datta, 1996;

Koch and McGrath, 1996) in 1999. *Firm sales growth,* was operationalized as the growth in sales over a

three-year period (1997-99). *Firm capital intensity* was measured as the ratio of a firm's fixed assets

(plant, property & equipment) as a proportion of total sales. Data used to compute these control variables

were obtained from the Compustat database. In addition, we used survey responses to control for *level of*

unionization. We also used a measurement approach based on previous work (Becker and Huselid,

1998; Guthrie , 2001) to control for *market pay position.* Survey respondents were asked to estimate

their market pay position (in percentile format) for the total compensation of both exempt and non-

exempt employees. Similar to the HPWS measure, a weighted average was then computed. Finally,

using an instrument developed by Zahra and Covin (1993), we controlled for firms' *business-level*

strategy. This scale uses five items (e.g., level of operating efficiency, offering competitive prices) to

assess the extent to which a firm pursues a cost leadership strategy within its industry (Cronbach's

alpha = 0.77).

Data Analysis and Results

Table 1 presents the means, standard deviations and zero-order correlations among all study

variables. The mean voluntary turnover was 15% and, on average, 50% of the workforce in firms were covered by HPWS. These figures are consistent with prior research. Also, given our 15% response rate, we checked for possible non–response bias using two tests. First, we compared "late" versus "early" respondents along key study variables (first suggested by Oppenheim, 1966). The assumption behind this "time trend extrapolation test" (Armstrong and 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, high performance work system, and growth and product differentiation. Second, t-tests were used to compare the means of industry characteristics in the respondent and the non-respondent samples. No differences were detected.

Table 1
Means, Standard Deviations and Correlation Coefficients

	Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11
1.	Productivity	5.251	0.600	-										
2.	Firm Performance	0.616	0.889	0.304***	-									
3.	Voluntary Turnover	15.079	15.124	-0.327***	-0.170†	-								
4.	HPWS	50.949	16.331	0.151†	0.117	-0.391**	-							
5.	Market Pay Level	54.988	12.367	0.127	0.016	-0.245**	0.280**	-						
6.	Industry Differentiation	-0.05	0.756	0.008	0.419***	0.000	0.081	0.076	-					
7.	Industry Growth	0.432	0.308	0.004	0.257**	-0.031	0.101	-0.025	0.265**	-				
8.	Firm Capital Intensity	0.396	0.630	0.288**	0.049	-0.142	-0.154	0.216*	-0.154	-0.088	-			
9.	Firm Size	1.285	1.550	0.066	0.309***	-0.122	-0.098	-0.065	-0.023	-0.242**		-		
10.	Firm Sales Growth	0.727	1.386	0.188*	0.399***	-0.054	0.066	-0.048	0.165†	0.472***	-0.095	-0.074	-	
11.	Firm Unionization	16.049	27.185	-0.043	-0.034	-0.074	-0.015	-0.048	-0.227*	-0.153†	-0.016	0.280**	-0.140	-
12.	Firm Strategy	3.566	0.579	0.235**	0.194*	-0.289**	0.118	0.117	0.057	0.022	0.117	0.127	0.143	0.067

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$
N of cases = 131.

We tested the theoretical model depicted in Figure 1 using structural equation modeling (SEM) via AMOS 4.0 (Arbuckle and Wothke, 1999) and maximum likelihood (ML) estimation.   AMOS is part of the second generation of multivariate analytical tools (which includes LISREL) that have been extensively used in the strategy literature (e.g., Capron, 1999). The sample size for the model test was 131 cases. With respect to appropriate sample sizes for SEM, a number of studies have reported stable results in samples smaller than 100 (e.g., Barrett and Kline, 1981; Guadagnoli and Velicer, 1988). Boomsa (1982) found that sample sizes as small as 100 were accurate under ML estimation. Consistent with the approach taken by other researchers (e.g., Rothbard and Edwards, 2003; Seibert, Kraimer and Crant, 2001) to maintain a 5:1 ratio of observations to parameters (Bentler and Chou, 1987), we used a single indicator of each construct in the model (i.e., in particular, we used the computed HPWS and business-level strategy scales). Also consistent with other SEM users (e.g., Burke, Sarpy, Tesluk and Smith-Crowe, 2002; Edwards, Scully and Brtek, 1999) we maximized sample size by using ML estimation to impute missing data for voluntary turnover for the eight firms where these data were missing. According to Arbuckle and Wothke (1999), this procedure is less biased than the use of listwise case deletion. Supplemental analyses indicated that the deletion of these eight cases did not substantively alter SEM results**.**

We assessed overall model fit by examining the root mean squared error of approximation, commonly referred to as the RMSEA (Steiger, 1990), and the comparative fit index or CFI (Bentler, 1990). The RMSEA takes into account the error of approximation in the population and addresses the question: "How well would the model, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available?" (Browne and Cudeck, 1993: 137-38). The RMSEA has only recently been recognized as one of the most informative fit indices (Byrne, 2001), with a RMSEA value of .05 indicating a close fit and a value of .08 representing a reasonable approximation (Browne and Cudeck, 1993). The CFI indicates the relative improvement of the assessed model over a null model where all observed variables are uncorrelated. Bentler (1990) developed the CFI to take sample size into account and recommends it over the popular normed fit index (NFI). The CFI can range from zero to 1.00, with values over .95 indicating a well-fitting model (Hu and Bentler, 1999).

Looking first at the correlation matrix (Table 1), several observations are noteworthy with respect to the primary relationships of interest. Greater use of a HPWS is associated with reduced employee turnover ($r = -.391$, $p = .008$), somewhat greater workforce productivity ($r = .151$, $p = .088$) but is not significantly associated with firm performance ($r = .117$, $p = .189$). The bivariate correlations indicate that higher employee turnover is associated strongly with lower workforce productivity ($r = -.327$, $p = .001$) and, more modestly, with firm performance ($r = -.170$, $p = .064$). Also, as would be expected, firms having a more productive workforce also tend to exhibit better performance, i.e., higher market valuations relative to their book value ($r = .304$, $p = .001$).
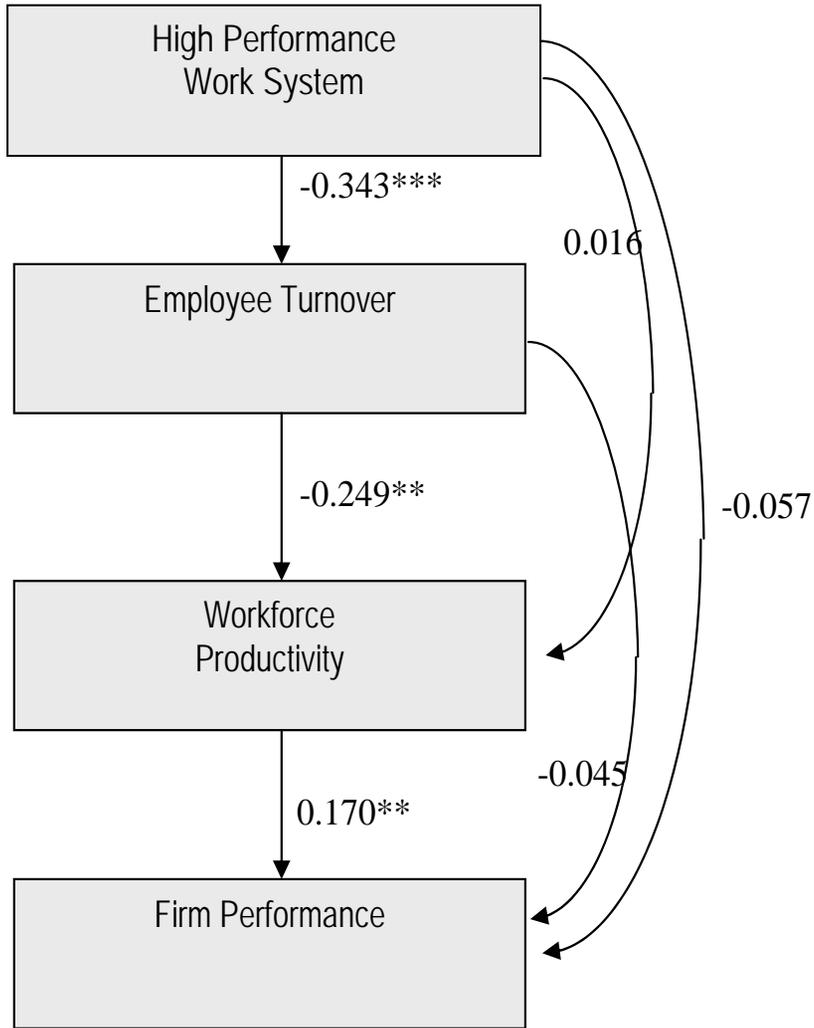
Turning now to the SEM results, we initially tested the model presented in Figure 1. The one-way arrows between exogenous variables and endogenous variables were specified based on previous work suggesting these relationships. With respect to turnover, since market pay level, firm size and unionization levels have all been found to increase employee retention (Guthrie, 2001), the model includes these paths. Firms in industries with greater R&D and advertising intensity (i.e., highly differentiated industries) tend to have higher market valuations (Wernerfelt and Montgomery, 1988). Also, firm capital intensity, industry and firm growth and unionization have been linked to market value (Becker and Olson, 1989; Huselid, 1995) and, as such, these paths to firm performance are specified. Workforce productivity is significantly enhanced by investments in plant, property and equipment (i.e., capital intensity) and may also be affected by union density and historical industry and firm growth patterns (Freeman and Medoff, 1984). Finally, measures of productivity may be positively influenced by business-level strategies emphasizing cost-efficiency (Zahra and Covin, 1993). Two-way arrows connect exogenous variables that have been found to co-vary in previous work. More specifically, firms that utilize high performance work systems also tend to pay above-market pay levels (Guthrie, 2001), larger firms tend to have higher unionization rates (Huselid, 1995), while industry growth is associated with industry differentiation levels and firm-level measures of growth. Thus, the paths in the hypothesized model are derived from theory and research.

The hypothesized model (Figure 1) proved a reasonable fit to the data (RMSEA = .060; CFI =

.992). Overall, the model explained 18.3% of the variance in employee turnover rates, 18.8% of the variance in workforce productivity and 50.1% of the variance in firm performance (i.e., market-to-book ratio). The path estimates displayed in Figure 2 indicate some divergence from the simple bivariate correlations. Consistent with the correlation results, greater use of high performance work systems is associated with significantly lowered employee turnover (b = -343, t = -4.011, p = .000). Also consistent with the correlation results, elevated rates of employee voluntary turnover decrease workforce productivity (b = -.249, t = -2.795, p = .005) and workforce productivity positively impacts firm performance (b = .170, t = 2.431, p = .015). However, the SEM results do not support direct paths between high performance work systems and workforce productivity (b = .016, t = .182, p = .856) nor between high performance work systems and firm performance (b = -.057, t = -.832, p = .405). Also contrary to the bivariate results, employee turnover does not directly impact firm performance (b = -.045, t = -.608, p = .543).
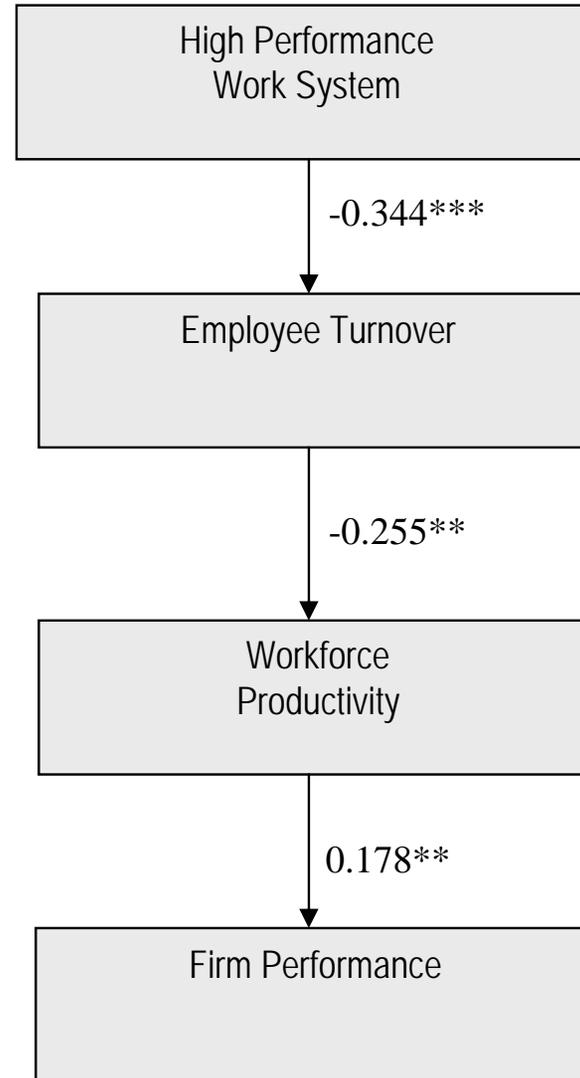
Thus, for sample firms, the SEM results support the conclusion that the influence of high performance work systems (HPWS) on workforce productivity and firm performance is mediated by employee turnover. As a formal test of these conclusions, we retained all control variables but removed the non-significant paths displayed in Figure 2 and re-estimated the model (compare Figure2 and Figure 3). We next compared the fit of the original model (Figure 2) with the fit of the revised, more pasimonious, model (Figure 3). Since the revised model is nested within the original model, the chi-square difference test can be used to test whether the more parsimonious model significantly degrades model fit (Byrne, 2001). In this comparison, the difference in fit between the hypothesized and revised models is non-significant (change in chi-square = .782, change in degrees of freedom = 3, p > .05). The fit indices also support the revised model, with the RMSEA = .054 and the CFI = .993. When a more parsimonious model does not significantly degrade model fit, the parsimonious model is preferred. Thus, the revised model (Figure 3) is the model of choice.

Figure 2: Path Coefficients for Hypothesized Model

High Performance Work System

-0.343***

Employee Turnover

-0.249**

Workforce Productivity

0.170**

Firm Performance

0.016

-0.057

-0.045

(Note: Control variables omitted in figure but included in SEM)
† $p < .10$;   * $p < .05$;   ** $p < .01$; *** $p < .001$

Figure 3: Revised Model with Path Coefficients

High Performance Work System

-0.344***

Employee Turnover

-0.255**

Workforce Productivity

0.178**

Firm Performance

(Note: Control variables omitted in figure but included in SEM)
† $p < .10$;   * $p < .05$;   ** $p < .01$; *** $p < .001$

Discussion and Conclusions

Within the strategic management literature, scholars have developed the resource-based view of the firm to address the question of why and how firms gain competitive advantage. SHRM researchers often couch their empirical work within the RBV framework. However, while SHRM researchers have shown empirical linkages between HRM and firm performance, previous work has provided little evidence as to how this transpires. This study was designed to help fill this void and contribute to the literature by examining the pathways from HRM to firm value.

Our results support previous findings suggesting that firm competitiveness can be enhanced by utilizing high performance work systems (e.g., Arthur, 1994; Koch and McGrath, 1996; Kochan and Osterman, 1994; MacDuffie, 1995). We extend extant literature by providing a test of a causal model focusing on the relationships between high performance work systems, employee turnover, workforce productivity and firm performance. We find that the best fit to our data is a model in which the impact of high performance work systems on firm performance is mediated by employee turnover and, in turn, workforce productivity. These findings are generally consistent with theoretical depictions of the manner in which strategic HR systems affect firm performance (e.g., Becker, et al., 1997; Delery and Shaw, 2001; Guest, 1997).

As noted earlier, Dyer and Reeves (1995) described several performance outcomes that strategic HR systems might impact: human resource outcomes (e.g., turnover), organizational outcomes (e.g., productivity) and financial/market outcomes (e.g., financial or capital market). Moreover, Dyer and Reeves (p. 661) noted that "…human resource strategies are likely to have their most direct effects on human resource outcomes, next greatest on organizational outcomes, and so forth. This reflects, in part, what such strategies are designed to do and, in part, the complexity of factors which affect outcomes such as profitability, not to mention stock prices." In discussing these same issues, Guest (1997) makes a similar point in noting that "we would

expect the impact of HRM to become progressively weaker as other factors intervene" (p. 269).

Our results underscore these points. The SEM results indicate that the standardized total effect

of high performance work systems on voluntary turnover, workforce productivity and firm

performance is .344, .088 and .016, respectively. In other words, while relative high

performance work system use accounts for over 34% of the variance in voluntary turnover rates,

this impact is reduced to approximately 9% for productivity and 1.6% for market valuation. This

impact on market valuation seems rather modest – however, with the median firm in our sample

having a market capitalization of over $500 million, the variance attributed to high performance

work systems amounts to the not-so-modest sum of over $8 million.

While our study provides interesting insights into the relationships between high

performance work systems, turnover, productivity and firm performance, findings should be

interpreted in the context of study limitations. A legitimate concern is the question of

simultaneity. While data are analyzed and discussed as if the relative use of high performance

work systems impacts human resource (e.g., turnover) and other outcomes (productivity, market

value), this interpretation is limited by the cross-sectional nature of the data. While it is more

plausible to argue that strategic HR systems and management practices influence labor

productivity, it is certainly possible that firms experiencing higher productivity and market

success are better positioned to invest in practices comprising a high performance work system.

Moreover, despite the fact that our findings revealing a mediating role for voluntary turnover are

consistent with other research (e.g., Batt, 2002), there remains the distinct possibility that

employees "volunteer" to leave less successful firms at a higher rate. Second, the fact that our

study was limited to firms in the manufacturing sector limits the generalizability of our findings.

Specifically, in sectors (e.g., services) where there are more direct and closer connections

between employees and customers, there may also be more direct links between HR systems

and revenue enhancement and other indicators of firm success. As an illustration of this, Batt's

(2002) study of the communications services industry found that high involvement work systems

had both direct and indirect (mediated by turnover) effects on sales growth. Future research

extending this study to the examination of similar relationships in the service sector should

provide important and interesting insights. Third, our investigation of the effects of high

performance work systems and turnover was not as refined as theoretical treatments might

suggest. The work of both Lepak and Snell (1999) and Delery and Shaw (2001) suggest that the

impact of HR systems and, in turn, employee retention, will vary depending on whether

employees are part of a firm's "strategic core". Delery and Shaw (2001), for example, note that

firms such as McDonalds have experienced competitive success despite very high turnover

rates. They argue that such firms are not adversely impacted by high turnover rates because

these particular employees are not critical to their core competencies. Thus, based on these

theoretical frameworks, a more refined future study can identify the "strategic" and "non-

strategic" employee groups within firms or industries and study the differential performance

impacts of HR systems and turnover for these different groups of employees.

In their 1996 *Academy of Management Journal* article, Becker and Gerhart exhorted

researchers to use structural models to illuminate the "black box" between HR systems and firm

performance. By doing so our study contributes to this academic body of research. In turn, it

also has implications for managerial practice. While it may be that in other sectors HR systems

have a more direct effect on firm performance, in our study of manufacturing firms we find that

this impact is mediated by employee and operational outcomes. In particular, while past work

has highlighted a link between HR and firm success, our study indicates that this relationship is

mediated by employee retention and its impact on labor productivity.

We started this paper by noting that research in strategic management often centers on

the question of how and why firms gain and sustain competitive advantage. While this study

helps delineate the manner in which high performance work systems affect competitive

success, much work remains in "peeling back the onion" (Becker et al. 1997) and refining the

pathways between HR systems, employee outcomes, and firm performance. We hope this

study informs and stimulates further work in this regard.

Endnotes

[1]Secondary responses were used solely for the assessment of reliability for a number of

reasons. First, the primary and secondary surveys differed somewhat. While the two surveys

were identical with regard to the HR question items (i.e., the components of the HPWS index),

we eliminated a set of questions that were not HR-specific. Second, while it would have been

ideal to have secondary responses from all sample firms, we had multiple responses for about

25% (n=33) of our sample firms. Given these facts, it seemed most appropriate to use the

single/primary responses to represent each sample firm. To assess whether the use of primary

versus secondary responses altered findings, we conducted supplemental analyses, utilizing an

"average" HPWS index for those firms where we had multiple responses. Results (i.e.,

significance of the main effects and interaction parameter estimates) were unchanged.

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APPENDIX

High Performance Work System Scale Items[a]

- One or more employment tests administered prior to hiring
- Hold non-entry level jobs as a result of internal promotions
- Promotions are primarily based upon merit or performance, as opposed to seniority
- Hired following intensive/extensive recruiting
- Are routinely administered attitude surveys to identify and correct employee morale problems
- Are involved in programs designed to elicit participation and employee input (e.g., quality circles, problem-solving or similar groups)
- Access to a formal grievance and/or complaint resolution system
- Provided operating performance information
- Provided financial performance information
- Provided information on strategic plans
- Receive formal performance appraisal and feedback on a routine basis
- Formal performance feedback from more than one source (i.e., from several individuals such as supervisors, peers, etc.)
- Compensation partially contingent on group performance (e.g., gainsharing, profit sharing, etc.)
- Pay is based on a skill or knowledge-based system (versus a job-based system); i.e., pay is primarily determined by a person's skill or knowledge level as opposed to the particular job that they hold
- Intensive/extensive training in company-specific skills (i.e., task or firm-specific training)
- Intensive/extensive training in generic skills (e.g., problem-solving, communication skills, etc.)
- Training in a variety of jobs or skills ("cross training") and/or routinely performing more than one job (are "cross utilized")
- Are organized in self-directed teams in performing a major part of their work roles

> [a]Respondents were instructed to provide responses that "best described HR practices in existence" during 1999. For each HPWS practice item, respondents estimated the "% (0-100%) of *non-exempt* employees covered by the practice" and the "% (0-100%) of *exempt* employees covered by the practice". The number of employees in each category was used to construct a weighted average for each item. The mean of these weighted averages was used as a firm's HPWS score.