THE EFFECTS OF WORKPLACE CLIMATES ON EMPLOYEE PERFORMANCE CAPACITIES: A KNOWLEDGE-BASED PERSPECTIVE

WILLIAM N. COOKE
Michigan State University

and

DAVID G. MEYER
University of Akron

Missing from nearly all of the empirical studies of the effects of high-involvement, high-commitment HRM systems on performance is any treatment, except by assumption, of the cognitive responses of employees to these systems. To examine these largely untested assumptions, we integrate and extend the literature on knowledge-based perspectives of firms and psychological workplace climates; developing a structural model of the multifaceted nature of knowledge and skill development climates and the direct and multiplicative effects of these climates on employee psychological states of performance. Estimated against a sample of 888 employees across eight automotive supplier firms, our modeling obtains substantial empirical support, which lends credence to the underlying assumptions made about employee cognitive responses in the strategic HRM literature. Among our more pronounced findings, employees' psychological states of performance are positively and strongly associated with climates within which employees place greater value on learning new skills and are more receptive to the diffusion of new technologies.

We gratefully acknowledge funding from the Russell Sage Foundation and Rockefeller Foundation and thank Ellen Kossek, Gretchen Spreitzer, Ryan Petty, and Shaun Pichler for comments on earlier drafts.

There is now a substantial empirical literature showing that high-involvement, commitment-based human resource management (HRM) systems are associated with superior performance. (Appelbaum & Batt, 1994; Batt, 2002; Delaney & Huselid, 1996; Huselid, 1995; MacDuffie, 1995; Wright *et al*., 2005; Youndt *et al*., 1996). It is generally inferred from these statistical associations that such HRM systems enhance the performance capacities of employees, capacities that are the product of not only competencies but also of the motivation and opportunities to utilize those competencies. But the degree of confidence placed in these inferred cause-effect relationships has been called into question. First, important empirical questions have been raised about potential biases resulting from measurement error, endogeneity, and omitted variables inherent in these estimations (Becker & Gerhart, 1996; Dyer & Reeves, 1995; Ferris *et al*., 1999; Khilji and Wang, 2006; Wright *et al*., 2005). Second and most importantly, inferences about causality have been largely based on assumptions, not evidence, that HRM policies and practices induce intended cognitive responses from employees, with consequent effects on their behavior and performance. Our ability to draw accurate inferences about the true effects of HRM systems on performance outcomes requires, therefore, that we further articulate and validate any underlying assumptions about employee cognitive responses to HRM policies and practices (Bowen & Ostroff, 2004; Ferris *et al*., 1999, Wright & Nishii, 2007).

The primary objective of this inquiry was to study these untested assumptions. In doing so, we take a 'knowledge-based' strategy perspective wherein the performance capacities of employees are a function of how effectively firms *build* and *utilize* their stocks of explicit and tacit knowledge (Spender, 1996; Grant, 1996). We argue that high-involvement, commitment-based HRM strategies are intended to develop such knowledge-based (KB) performance capacities. Because these KB capacities are dependent on employee cognitive responses to what employees actually experience and see affecting them at work, it follows that the fundamental strategic objective is to create the kinds of workplace experiences and conditions employees will respond to in ways sought by management. What employees see and experience is manifested in workplace climates and conditions that more or less support, reward, and reinforce expected behaviors as intended by HRM policies and practices; multifaceted climates and

conditions that mediate the effects of HRM practices on performance outcomes (Bowen & Ostroff, 2004; Collins & Smith, 2006; Kopelman, Brief & Guzzo, 1990).

In this study we specify a structural model in which the psychological states of employees' performance capacities are a function of employees' cognitive responses to 'knowledge and skill development' climates and supporting workplace factors. Performance capacities are conceptualized as including the psychological states of one's 'competence' (how well job tasks are performed) and 'impact' (importance of how well job tasks are performed on the performance of one's work area). Validated in the employee empowerment literature, these psychological states are strong predictors of actual performance outcomes (Spreitzer, 1995; Spreitzer, Kizilos & Nason, 1997). As developed herein, multifaceted knowledge and skill development climates are characterized by highly complex, reciprocal relationships among several salient facets. These facets shape employee cognitions about the value and need for learning new skills, about receptivity to the diffusion of new technologies and associated management processes, and about the opportunities available to learn new skills. Supporting workplace factors, on the other hand, capture employee perceptions about the specific work they perform and the conditions under which they perform their jobs.

Tested against data from surveys of manufacturing employees across eight automotive supplier firms, the model obtains substantial statistical support, with 45% of variance in 'competence' and 76% of variance in 'impact' accounted for. As hypothesized, our results show that various facets of knowledge and skill development climates are highly interrelated, especially between employee receptivity to new technologies and both the degree to which employees value learning new skills and perceived opportunities to learn new skills. Our evidence indicates that the combined effects of these multifaceted climates on perceived performance capacities, however, are largely channeled through employee perceptions about the value and need to learn new skills. Supporting workplace factors, furthermore, are found to be highly interrelated with knowledge and skill development climates and the meaningfulness of the work one performs is found to highly influence performance capacities.

The primary contribution of this inquiry is providing an understanding of the role of knowledge and skill development climates and the causal paths between employee

responses to these multifaceted climates and their perceived performance capacities, an understanding that is ultimately essential to explaining the effects on performance of otherwise readily observable HRM practices. The evidence obtained, moreover, generally supports the implicit and untested assumptions underlying the causal linkages between high-involvement, commitment-based HRM systems and performance outcomes. Hence, our study lends credence to the cause-effect inferences drawn in these empirical studies. Lastly, our application of a KB perspective highlights the importance of creating workplace climates that enhance the receptivity of employees to the diffusion of new technologies and associated management processes. This critical factor to building and effectively utilizing stocks of knowledge has been all but ignored in the strategic HRM literature.

THEORETICAL FRAMEWORK

A Knowledge-Based Perspective

Based on notions of contingency and configuration, the fundamental thesis of the HRM strategy literature is one of alignment, both vertical and horizontal. Whereas vertical alignment is externally focused on market-positioning strategies (Arthur, 1992; Cooke, 2007; Schuler & Jackson, 1987; and Youndt *et al*., 1996), horizontal alignment is internally focused. The objective of horizontal alignment is to deploy and integrate HRM policies and practices in ways that maximize their additive and interactive effects on the competencies and motivation of employees to optimally perform their jobs and routines (Boxall, 2007; Collins & Smith, 2006). The dominant theoretical basis for much of the strategic HRM literature and the emphasis on developing employee competencies and motivation is derived from the resource-based (RB) perspective of business strategy (Allen & Wright, 2007; Colbert, 2004; Lado & Wilson, 1994; Lepak & Snell, 1999; Wright, McMahan, & McWilliams, 1994). Under a RB perspective in which competitive advantage is derived from a firm's constellation of physical, human, and organizational resources, it is the causal ambiguity that underlies unique capabilities that potentially yields valuable, rare, imperfectly imitable, and imperfectly substitutable assets. Because such HR capabilities are derived from the socially complex tacit knowledge of employees that cannot be codified, they are non-imitable and presumably provide the bases for

achieving the *sustainability* of competitive advantages (e.g., see Barney & Wright, 1998; Barney, 2001; Teece, Pisano & Shuen, 1997).

It has been widely argued that it is the complex system of highly interrelated high-involvement, commitment-based practices that yield causal ambiguity and complexity (e.g., see Lado & Wilson, 1994). Most studies of these HRM system effects on performance have focused on different mixes of HRM practices, namely ones pertinent to training and skill development, empowerment, compensation and performance-based pay, selection and staffing, employment security, and working conditions. However, since any set of HRM practices can be replicated, it is implicit in this argument that the set of observable practices yield a set of unobservable principles, expectations, and rewards, which are manifested in what employees see and experience in their work areas and consequently respond to. It follows, therefore, that it is the ambiguity and complexity of workplace climate variables resulting from complex HRM systems that offer the potential for sustainable competitive advantages.

Although the strategic HRM literature is grounded in the RB perspective of competitive advantage, it has only begun to address how HRM strategies need to be treated more broadly and as integral to other internal organizational strategies, such as technology and innovation strategies (Boxall & Purcell, 2003; Cooke, 2007; Wright *et al.*, 2001). Cooke (2007), in particular, finds strong empirical support for his strategic choice modeling of workplace strategies by which firms place priority and complementary emphases on technological capabilities vis-à-vis high-involvement HR capabilities. Building off of the RB perspective (which treats knowledge as a resource) and earlier analyses of the role of knowledge and learning in organizations (e.g., Nelson & Winter, 1982; Nonaka & Takeuchi, 1995), it is the KB view of competitive advantage that emphasizes the inextricably intertwined nature of HR and technological capabilities. Indeed, a growing number of authors view the successful management of knowledge as the critical underlying factor of operational performance. Spender (1996), for example, concludes that knowledge "has become the most important 'strategic' factor of production, so managers must now focus on its production, acquisition, movement, retention and application." (p. 48). Similarly, Grant (2002) holds that knowledge is "the overwhelming important productive resource; indeed the value of people and machines

lies primarily in the fact that they embody knowledge." (p. 176) Boxall and Purcell (2003) make the case that the management of HR is largely one of creating and exploiting knowledge in ways that organizations are able to learn and adapt more quickly than competitors. Importantly, "Managing knowledge inevitably means managing both the company's proprietary technologies and system (which *do not* walk out the door at the end of the day) and the people (who *do*). It implies management of the ongoing interaction between these two aspects of a firm's knowledge system." (p. 88)

Treating organizational capabilities as the manifestation of an organization's knowledge, the management of knowledge consequently requires both the development and deployment of a firm's stock of knowledge. That stock includes both explicit and tacit knowledge. Explicit knowledge is knowledge that can be readily observed and, thus, codified, shared, and controlled by the organization. Tacit knowledge, on the other hand, is derived from experience and is largely unobservable except as the result of its application by individuals or groups. Hence it is controlled, consciously or unconsciously, by individuals or groups who alone decide to use it or not (Spender, 1996). Optimizing organizational capabilities, consequently, depends on a firm's ability to optimally build and tap its stock of knowledge.

The application of knowledge in practice is perhaps captured best by organizations' process management activities. These key activities specifically center on making controlled, incremental efficiency improvements in organizational routines (Benner & Tushman, 2002; Spear & Bowen, 1999). As such, incremental learning is inherently 'path dependent' on existing routines and innovation occurs along an organization's technological trajectory. Along that trajectory, it is the persistent attention to improving complex and subtle patterns of work behavior comprising organizational routines that invites innovation and enhances a firm's stock and utilization of explicit and tacit knowledge over time.

The ability to sustain any resource-based competitive advantage derived from a firm's stock of knowledge, furthermore, requires continual reinvestment in and coordination of that stock to avoid its decay or ossification and to maintain barriers to imitation of the causally ambiguous competencies created (Berman, Down & Hill, 2002; Reed & DeFillippi, 1990). The ability of a firm to fully exploit its stock of knowledge is

also partly dependent on a firm's effective utilization of its 'social capital', which resides in and is a product of relationships between people. By facilitating effective exchanges via networks of relationships, firms are better able to combine stocks of knowledge in ways that can enhance the efficiency and innovation of organizations (Kang, Morris & Snell, 2007; Leana & Van Buren, 1999; Nahapiet & Ghoshal, 1998).

In summary, our understanding of the effects of high-involvement, commitment-based HRM strategies on performance is well informed by applying an integrated RB and KB framework. In particular, achieving and sustaining competitive advantage requires HRM policies and practices that continually optimize both the stock of knowledge and the opportunities available to fully utilize that knowledge by making, for example, continuous investments in the training, education, and development of employees and providing employees with high-involvement opportunities to utilize and share their knowledge. Additionally, HRM policies and practices need to motivate employees to value continuous learning and to apply their skills and tacit knowledge of work routines and technologies in innovative ways. Here the HRM strategy literature has largely emphasized the use of performance-based pay, task performance feedback, employment security, recognition, and intrinsic rewards from participation to motivate employees. From a KB perspective it is also essential that firms create environments in which employees are receptive to the diffusion of new technologies and associated management processes.

Towards understanding that receptivity, the literature on the potential 'skilling' and 'deskilling' impact of technology is informative (Adler, 1992; Liker, Fruin, & Adler, 1999; Shaiken, 1984). Specifically, the greater or lesser the degree to which employees believe that the deployment of new technologies upgrades their jobs, protects them from future displacement and loss of employment, and otherwise improves working conditions, the more or less receptive they will be to the deployment of new technologies. In a similar vein, employee perceptions about the potential positive and negative effects of management processes on their jobs come into play. Whereas these processes may yield positive intrinsic rewards from participation and problem-solving, they may also have negative consequences on employees. In particular, much of the criticism leveled against lean production processes is that they intensify the required work effort by

'speeding up the line' and by forcing employees to 'work harder, not smarter'. Additionally, given the focus of management processes on achieving greater efficiencies, they are inherently designed to eliminate wastes, including unnecessary work time and redundant labor (Babson, 1995; Parker, 1993).

The consequences of employee receptivity to the diffusion of new technologies and associated management processes on the building and utilization of knowledge are several-fold. That is, the greater or lesser employee receptivity, the more or less employees will value and be committed to continuous learning, will engage in team work and effective exchanges of ideas, will apply their tacit knowledge, and will otherwise be committed to seeking incremental innovation along a firm's technological trajectory. Taking into account the centrality of employee receptivity to new technologies and associated management processes on performance, we henceforth refer to this broader conceptualization of high-involvement, commitment-based HRM strategies as 'KB workplace strategies'.

KB Workplace Strategy Climates

As stated earlier, how employees respond to HRM strategies depends on the workplace climate created by these strategies. In conceptualizing the role of climates on employee perceptions and attitudes, the literature distinguishes between attributes of climates that are of a more global or organizational-wide nature and others that are of a more individual, job specific psychological nature (Ashford, 1985; Brown & Leigh, 1996; Glick, 1985; Schneider, 1990). Consistent with this literature, Bowen and Ostroff (2004) have conceptualized *psychological* climates as ones that apply to individuals in their own specific work contexts based on the "experiential-based perceptions of what people 'see' and report happening to them as they make sense of their environment" (p. 205). In addition, employees are influenced by a firm's broader *organizational climate* derived from perceptions "of what the organization is like in terms of practices, policies, routines, and rewards… based on shared perceptions among employees within formal organizational units." (p. 205). Because our focus is on individual perceptions about how workplace climates affect one individually, which may or not be shared by co-workers, we incorporate the logic of psychological climate in our modeling. Nonetheless, because

climates are bound to differ across work areas as a result of differences in supervision within firms, individual perceptions are likely to be shared by one's immediate co-workers working in the same work area.

Unlike culture, which has deeper roots in the core values, norms, and underlying ideologies of organizations, climate is more at the surface and can be more readily altered by managers, supervisors, and those charged with formulating and implementing KB workplace strategies (Dennison, 1996; Ostroff, Kinicki & Tamkins, 2003). Thus, organizations can create climates manifesting what they want employees to see and experience based on the primary objectives of KB workplace strategies pursued. As such, the development of desired climates can be viewed as strategic in nature (Bowen & Ostroff, 2004). Although there is an extensive literature of the effects of organizational climates on employee attitudes and behavior, only a few have attempted to empirically test the linkages between HRM practices and climates and, in turn, with performance. As summarized next, these studies are informative but limited in regard to modeling the effects of KB workplace strategy climates on employee perceptions and behavior.

Schneider, White, and Paul (1998) developed and tested a model of the effects of service-oriented climates in bank branches on customer satisfaction. They also took into account various broadly constructed HRM factors (e.g., leadership, participation, and training), which they treated as 'foundation' variables important to creating climates for service. They found some support for inferring that HRM factors influenced the climate for service and found that climate had a reciprocal cause-effect relationship with customer satisfaction. They did not consider, however, whether or not HRM factors influenced customer satisfaction either directly or as might be mediated through the climate for service. Also in a study of bank branches, Gelade and Ivery (2003) estimated a structural model of the effects of several HRM-related variables and a "general climate" measure on a mix of performance outcomes. Their "general climate" factor was a composite measure of sub-factors depicting employee perceptions about top management's concern for employees, local managers' efforts to build teamwork, team goals, feedback, pay fairness, training, and opportunities to use one's abilities. Their selection of HRM practices was quite limited, including only calculations of staffing levels, percentage of overtime hours worked, and the percentage of staff that had been

certified as competent in providing customer service. Nevertheless, the authors found that these HR practices helped predict their general climate construct, which itself was strongly related to performance. They also found that their HRM practices were related to performance but that "general climate" partially mediated the effects of those HRM practices on performance.

In their study of technology companies, Collins and Smith (2006) estimated a structural model of the effects of high-commitment HRM systems, social climates, and knowledge exchange and combination on firm performance. HRM systems were measured against a 16-item composite index of the extent to which firms pursued high-commitment policies. Social climate was measured as a composite construct having three sub-dimensions: trust, cooperation, and shared codes and language. The intermediate outcome construct "knowledge exchange and combination" included eight items capturing employee beliefs about the extent to which employees exchanged and used ideas and the value associated with such exchange and combination. Collins and Smith first found that their index of HRM systems was strongly and positively related to all three social climate factors. Second, social climate was strongly and positively related to their intermediate outcome variable, "knowledge exchange and combination". Third, social climate mediated much but not all of the effects of HRM systems on knowledge exchange and combination. Social climate, however, fully mediated the effects of HRM systems on performance outcomes. Lastly, knowledge exchange and combination was strongly and positively related to performance outcomes and mediated nearly all of the effects of social climate on performance.

Based on these three studies, limited as they are, the evidence is fairly strong that HRM practices shape various workplace-type climates and workplace climates mediate the effects of HRM practices on performance. As developed next, we attempt to flush out more fully than have these studies the pertinent KB workplace climate factors that shape employee attitudes and beliefs about workplace strategies pursued and, in turn, examine the effects of knowledge and skill development climates on the performance capacities of employees. In contrast to these studies, we also attempt to flush out the interrelationships among the various facets of multifaceted knowledge and skill development climates.

A MODEL AND HYPOTHESES

As framed herein we contend that central to the pursuit of KB workplace strategies is the creation of knowledge and skill development climates that optimize employees' performance capacities. As diagrammed in Figure 1, our modeling is conceptually similar to Collins and Smith's (2006) modeling in that whereas they conceive of employees' abilities and motivation to exchange and combine ideas as being shaped by social climates, we conceive of employees' performance capacities as shaped by knowledge and skill development climates. Unlike Collins and Smith, however, who treat workplace social climates as a composite of trust, cooperation, and shared codes and language, we frame knowledge and skill development climates more broadly. Although similar in logic to Gelade and Ivery's (2003) concept of "general climate", our primary emphasis is on identifying psychological climate factors that shape employees' perceptions about knowledge and skill development but which, nonetheless, also influence performance capacities. Adopting Schnieder *et al.*'s (1998) concept of "foundation" factors, we furthermore include a set of workplace conditions that serve as broader foundation factors that support and reinforce a climate for knowledge and skill development.

[Put Figure 1 about here.]

In modeling the effects of knowledge and skill development climates on performance capacities, we embrace a RB view of organizations, wherein competitive advantaged is derived from and protected by causal ambiguity and complexity. That is, a firm's ability to create any sustainable competitive advantage from its workplace strategy is a product of what is not readily observable from the outside. Viewed in this light, knowledge and skill development climates are, likewise, highly complex systems within which the various facets underlying them are highly interrelated. Our focus on KB capacity-building, furthermore, makes explicit that KB workplace strategies are meant to convert human resources into ever more productive assets as market competition requires ever higher performance. As such, our modeling is grounded in firms' efforts to build "dynamic capabilities", whereby achieving sustainable competitive advantage depends in large part on the ability of firms to continuously and effectively hone integrated HRM and technology strategies (Teece, Pisano & Shuen, 1997; Winter, 2003). Treating KB

workplace strategies as dynamic in nature, firms are in states of continual adjustment in both their strategies and their KB capacity-building across work areas. By implication, knowledge and skill development climates are often in states of disequilibrium (Colbert, 2004; Reed & DeFillippi, 1990) and, thus, so too are the performance capacities of employees.

Additionally, the unit of analysis in nearly all of the strategic HRM studies examining the link between HRM systems and performance outcomes has been the firm. Implicit in these studies, however, organizational outcomes are the product of the aggregated effects of individual and work group behaviors in response to HRM systems deployed. By implication, explaining organization-wide outcomes resulting from HRM systems requires multiple-level analyses at the individual, work group, and organizational levels (Wright & Nishii, 2007), including related multiple-level assessments of workplace climates. In our effort to examine the lowest common denominator in assessing the effects of workplace climates on performance capacities, our focus is on the individual. Consequently, in our modeling we do not develop hypotheses about how workplace climates and conditions might lead to shared interpretations among employees and, in turn, influence more or less productive interactions among employees in their work groups and across work groups at organization-wide levels.

To model the interrelationships among key psychological climate facets underlying multifaceted knowledge and skill development climates and, in turn, estimate the effects of various facets on performance capacities at the individual level, we necessarily restricted our empirical inquiry to a small number of firms. In doing so we sacrificed having a large number of firms against which to examine differences in workplace strategy policies and practices in exchange for having a large number of individuals against which to examine individual employee perceptions about various facets of knowledge and skill development climates and their effects on psychological states of performance. Consequently, we are unable to directly examine how different workplace policies and practices lead to differences in climates and conditions of work. Because our modeling of knowledge and skill development climates is restricted in part by the kinds of workplace strategies pursued by our small sample of firms, before

identifying the various climate facets included in our empirical model and before articulating our hypotheses, we first describe our unique sample.

Sample

To complement a larger study in which executives were surveyed regarding workplace strategies pursued in the U.S. automotive supplier industry (citations withheld), our objective in this analysis was to examine employee reactions to workplace strategies deployed. Eight firms that were members of the Labor-Management Council for Economic Renewal located in southeastern Michigan agreed to participate in a survey of their employees in 2000. Facing intense international and non-union competition, the Council was established in 1990 to provide a forum for unionized manufacturing establishments to share labor-management experiences regarding efforts aimed at forging more cooperative relationships while pursuing lean production processes; twin goals against which the parties had made varied progress across work areas within their firms. As stated in its mission statement, the Council's mission was to increase "competitiveness and enhance the job security and quality of life for all employees through inter-firm cooperation, constructive labor-management relations, and by helping work sites provide employees a meaningful voice in the decisions that impact their lives".

The eight manufacturing plants that participated in the survey were all relatively small to medium size operations (ranging in size from 57 to 368 production workers) and produced a wide range of products (seating foam and components, sunroofs, engine gaskets, interior trim panels and paints, and transmission parts and mounts). Across the eight firms, the average age and years of service of production employees was 35 and 8 years, respectively. Approximately 30 percent were female and approximately 30 percent were minorities. On average, the highest hourly wage for production employees was $14.42, ranging across firms from a low of $11.66 to a high of $17.77. In addition, production workers at all plants were represented by various local unions of the UAW.

With respect to workplace strategies, firms had placed much greater emphasis on the application of new technologies and managerial processes than on HRM innovations in their efforts to achieve operational performance objectives. When asked about the degree to which they had placed emphasis on various operational activities over the

previous five years, all firms reported having placed substantially more emphasis on technology-related applications (defined as the use of the latest technologies, equipment, technical processes, engineering, and R&D) than they placed on "improvements in human resource and labor relations practices." Roughly 48 percent of existing machinery had been newly added or upgraded over the five years previous to our survey; approximately 55 percent of production employees had been trained in SPC/SQA; and just over 20 percent regularly used computers in performing their jobs.

In our sample, furthermore, all firms had embraced the fundamental premise of lean production, along with the promotion of cooperative union-management relations that encouraged employee involvement. From a KB perspective, teamwork provides a key avenue for increasing a work group's stock of knowledge and for tapping into the tacit knowledge of employees engaged in problem-solving. At the time of our inquiry, only 49 percent of production employees in our sample worked in designated work teams, quality circles, or other kinds of employee involvement groups. However, lean production systems typically include having employees rotate between jobs in their work areas as a means of enhancing employees' knowledge of broader routines, skills, and capacity to problem-solve in team settings. At the time of our inquiry, 73 percent of employees regularly rotated between jobs.

Additionally, in our sample of unionized firms we found no discernable differences in selection, staffing, due process practices, employment security provisions, and pay incentives. First, employees were recruited to fill entry-level jobs requiring basic reading, writing, and mathematical competencies. They got reassigned or promoted over time based on skills acquired through training and on-the-job learning and based on seniority accrued. Second, each firm had a fairly standard grievance procedure in place to resolve specific employee grievances about the application of terms and conditions of employment. As such, there are no readily observable differences across firms in regard to methods for resolving work-related issues and disputes. Third, none of the firms in our sample provided any distinctive employment security provisions, albeit each included basic seniority provisions common to union-management agreements governing layoffs. Lastly, whereas some form of performance-based pay incentive is generally considered a core commitment-based HRM practice, compensation across our sample was based on

negotiated wage rates (as would be found in most unionized firms). Therefore, in identifying key factors underlying knowledge and skill development climates or as foundation variables, we did not include factors that would have specifically captured differences in policies and practices governing selection, staffing, due process, employment security, or pay incentives; factors that might otherwise apply across other samples of firms, especially non-union firms.

Hypotheses

Performance Capacities. Our endogenous variables capture the psychological states of individuals in regard to their perceived competence and sense of impact as developed in the psychological empowerment literature. Specifically, Spreitzer (1995) developed a four-dimensional construct based on Thomas and Velthouse's (1990) theoretical model of employee empowerment. That construct has been widely applied and validated in the literature as being positively associated with individual and work team performance outcomes (Matheiu, Gilson, & Rudy, 2006; Seibert, Silver, & Randoff, 2006; Spreitzer *et al*., 1999). Of the four dimensions of the Spreitzer construct (meaningfulness, self-determination, competence, impact), two can be singled out as the most relevant to a firm's objective of optimizing the performance capacities of employees. These are the psychological states of one's 'competence' (i.e. the degree of confidence in one's own abilities to perform assigned tasks well) and one's own sense of 'impact' (i.e., the degree to which an employee attaches importance to his/her own performance on the performance success of his/her work area). Indeed, in deconstructing the four dimensions of empowerment, Spreitzer, Kizilos, and Nason (1997) found that only the competence and impact dimensions predicted performance.

Although both competence and impact are positively and independently associated with performance outcomes, competence also indirectly affects performance via its effects on impact. First, employees who believe they are more or less able to perform their jobs well, will likewise perceive that they contribute more or less to the success of their work areas than employees who do not perform their jobs as well. Second, the more or less competent employees perceive themselves to be, the more or less employees will be motivated to have impact by taking advantage of opportunities to

share ideas and engage in problem solving with co-workers. Given the wide range of other factors affecting both motivation and opportunities to fully utilize one's competence in ways that enhance the performance of any given work group, however, one's psychological state of competence is but one essential factor influencing one's psychological state of impact. It is hypothesized, therefore:

H1: *The more competent employees perceive themselves to be, the more positive will be employee perceptions about their impact on the performance of their work areas.*

Knowledge and Skill Development Climates. As developed by Lepak and Snell (1999), firms face a variety of choices in constructing their HR architectures. The HR architectures adopted by our sample of eight unionized manufacturing firms, however, can all be characterized as ones of 'developing human capital'. That is, the general form of each firm's architecture as applied to core production employees is one in which human capital is developed internally rather than strictly acquired externally, is one that is organizationally focused on encouraging longer term mutual human capital investments by employers and employees, and is one that is commitment-based in order to optimize returns to human capital investments.

Drawing on this basic HR architecture, our conceptualization of knowledge and skill development climates includes six distinctive but highly interrelated facets that influence employee cognitions about the longer term value and need for human capital investments and about commitment. Based on their experiences and what they see, employees respond to these various facets, which over time shape employees' psychological states of competence and impact. Treating the development of knowledge and skill development climates as having strategic purpose and focus, it follows that firms have reason to ensure that relevant HRM policies and practices pursued for the purpose of creating such a climate are aligned and having reinforcing effects on each other. As these various facets, moreover, are the manifestation of common expectations and rewards associated with creating knowledge and skill development climates, each facet has some common effects on employee cognitions. Therefore, over time each facet affects and is affected by each other facet. In presenting our model, therefore, we develop hypotheses about the reciprocal cause-effect relations among facets and about the influence of each facet on the performance capacities of employees.

First, the more effective firms are at creating climates that encourage and condition employees to *value* and to believe there is a *need* to continually learn new skills, the better firms are able to build dynamic capabilities and avoid the erosion of their stocks of knowledge. The more employees value learning new skills, the higher their performance capacities can be expected to become over time (provided they receive necessary training and development). Although the greater the perceived need to learn new skills will have a negative effect on employees' perceptions about their performance capacities, that greater need will increase the perceived value of learning new skills in order to continually improve their performance capacities. At the same time, the more employees value learning new skills, the more likely they will perceive a need to continually learn new skills. Consequently, the following hypotheses are made:

H2a: *The more employees value learning new skills, the higher will be their perceived performance capacities*.

H2b: *The more employees perceive they need to learn new skills, the lower will be their perceived performance capacities*.

H2c: *The more employees perceive they need to learn new skills, the more they will value learning new skills, and vice versa.*

As discussed earlier, it is also important to create a climate in which employees are receptive to the deployment of new technologies and to management processes designed to optimize the use of those technologies. The more positive or negative have been the consequences of newer technologies deployed in the workplace, the more positive or negative will be the climate for technological advancement and, in turn, the more or less receptive employees will be to the deployment of new technologies. That receptivity, we can expect, will influence both employee perceptions about their competencies and their motivation to achieving high performance. Employee receptivity to technological change, furthermore, can be expected to influence and be influenced by the value and need placed on learning new skills. In particular, the more or less receptive employees are to technological change, the more or less they will see the value in and the need for learning new skills, as technological change will be seen as having more or less positive effects on their work lives. At the same time, the more or less employees value and see a need for learning new skills, the more or less receptive they will be to

technological change. That is, they are more or less prepared to shed skills being made obsolescent by technological change in return for acquiring new skills necessary to effectively utilizing new technologies. Hence, we make the following hypotheses:

H2d: *The more receptive employees are to technological change, the greater will be their perceived performance capacities*.

H2e: *The more receptive employees are to technological change, the more they will perceive they need to learn new skills, and vice versa.*

H2f: *The more receptive employees are to technological change, the more they will value learning new skills, and vice versa.*

As argued by some authors in regard to psychological contracts and commitment-based HRM systems, the more committed firms are perceived to be in making human capital investments in their employees, the more willing are employees to exchange their effort and commitment towards improving their competencies and performance (Rosseau, 2001; Tsui *et al*., 1997; Whitener, 2001). Consequently, the more favorable the climate created by firms in providing good opportunities for investing in training and improving employees' skills, the higher the performance capacities of employees will become, all else the same. The greater or fewer the training opportunities employees perceive are available to them to improve their skills, furthermore, can be expected to influence and be influenced by employees' receptivity to new technologies and the degrees to which employees value and believe they need to learn new skills. First, the greater or fewer training opportunities employees see available to them to upgrade obsolescent skills, the more or less receptive they will be to technological change. The more or less receptive employees are to technological change, on the other hand, may influence their interests in seeking out potential training opportunities and, in turn, influence their perceptions about the extent of opportunities available to them for improving their skills. Second, over time, the greater or fewer the opportunities employees perceive they have to improve their skills, the more or less they will perceive there is a value and need to learning new skills. The more or less employees perceive there is a value and need to learning new skills, however, the higher or lower will be their interests in seeking out potential training opportunities and, in turn, the greater or fewer opportunities they will perceive they have to improve skills. Therefore, the following hypotheses are made:

H2g: *The more opportunities employees perceive they have to improve skills, the greater will be their perceived performance capacities*.

H2h: *The more opportunities employees perceive they have to improve skills, the more receptive they will be to new technologies, and vice versa*.

H2i: *The more opportunities employees perceive they have to improve skills, the more they will perceive a need to learn new skills, and vice versa*.

H2j: *The more opportunities employees perceive they have to improve skills, the more they will value learning new skills, and vice versa.*

Employee perceptions about employment security is another key facet underlying knowledge and skill development climates in that uncertainty about one's employment future in an organization is likely to have negative effects on employee attitudes and behaviors (Mishra & Spreitzer, 1998; Zatzick & Iverson, 2006). In our model, all else the same, employees facing work climates marked by greater or lesser employment security can be expected to be more or less motivated to perform their jobs well and more or less likely to believe that how well they perform their jobs is important to the success of their work areas. Furthermore, the more or less secure employees perceive themselves to be, the more or less confidence they can be expected to have in their competencies to perform their jobs and routines well.

The generally negative effects of greater uncertainty about employment security are, likewise, bound to cause employees to perceive other facets of knowledge and skill development climates less favorably than they would be perceived under otherwise more secure conditions of employment. It follows that the more or less secure employees believe themselves to be, the more or less they will (1) perceive they have good opportunities to receive training to improve their skills, (2) be receptive to new technologies that could displace them, and (3) value and feel a need for learning new skills in order to continually improve their performance. At the same time, the less favorably employees perceive these other facets of knowledge and skill development climates to be, the less secure employees will perceive themselves to be. That is, the more or less favorably employees (1) view their opportunities to receive training to improve skills, (2) are receptive to new technologies, (3) value learning new skills, and (4) perceive a general need to learn new skills, the more or less secure employees will

perceive themselves to be. Based on the apparent independent and interdependent consequences associated with perceptions about employment security, the following hypotheses are made:

H2k: *The more secure employees perceive their employment to be, the greater will be their perceived performance capacities*.

H2l: *The more secure employees perceive their employment to be, the greater the opportunities they will perceive they have to improve skills, and vice versa.*

H2m: *The more secure employees perceive their employment to be*, *the more receptive they will be to new technologies, and vice versa*.

H2n: *The more secure employees perceive their employment to be, the more they will perceive a need to learn new skills, and vice versa*.

H2o: *The more secure employees perceive their employment to be*, *the more they will value learning new skills, and vice versa.*

The final facet of knowledge and skill development climates examined in our modeling is the emphasis placed by management on performance feedback. The extensive literature on task performance feedback is wrought with persistent and unresolved questions about the complex nature and conditions under which feedback to employees influences their behavior and performance (see Kluger & DeNisi, 1996 for a thorough review and assessment of this literature). A basic thesis of the literature, nonetheless, is that behavior is goal directed and that employees need task performance feedback so that they can evaluate and adjust their performance in light of performance goals or standards articulated by management. It follows that climates within which employees receive more regular and meaningful feedback from their supervisors about how well they are doing in light of what supervisors are seeking to achieve in their respective work areas, the better able are employees to evaluate their competencies and the importance of doing their jobs well on the success of their work areas. The greater the effort management is seen making to provide meaningful feedback, moreover, the stronger is the sense employees will have that management is committed both to achieving continuous improvements in performance and to having employees fully participate in achieving their work area's performance goals.

Furthermore, employee perceptions about performance feedback influence and are influenced by other facets of knowledge and skill development climates. On the one hand, the more or less employees perceive they get meaningful performance feedback, the more or less they will (1) perceive they are secure, (2) perceive they have good opportunities to improve their skills, (3) be receptive to new technologies, (4) perceive a need to continually learn new skills, and (5) value learning new skills. On the other hand, the more or less favorably employees perceive each of the above facets to be, the more or less they will perceive they get meaningful performance feedback. Hence, we make the following hypotheses:

H2p: *The more employees perceive they receive meaningful performance feedback, the greater will be their perceived performance capacities*.

H2q: *The more employees perceive they receive meaningful performance feedback, the more secure employees will perceive themselves to be, and vice versa.*

H2r: *The more employees perceive they receive meaningful performance feedback, the greater the opportunities they will perceive they have to improve skills, and vice versa.*

H2s: *The more employees perceive they receive meaningful performance feedback*, *the more receptive they will be to new technologies, and vice versa*.

H2t: *The more employees perceive they receive meaningful performance feedback, the more they will perceive a need to learn new skills, and vice versa*.

H2u: *The more employees perceive they receive meaningful performance feedback*, *the more they will value learning new skills, and vice versa.*

Workplace Foundation Factors. In addition to creating a climate of knowledge and skill development as part of its KB workplace strategy, a firm must also decide how best to create broader workplace conditions that serve as foundation factors supporting and reinforcing its efforts to optimize the performance capacities of its employees. Pertinent to such foundation factors are experientially-based perceptions or beliefs employees have about the work they perform and the conditions under which they perform their jobs. As discussed earlier, we found no distinguishing differences in staffing, selection, due process, and pay incentive practices across our sample of eight firms. Thus we do not include foundation factors that depict these practices as they are

essentially controlled for by our sampling. Instead, in our conceptualization of Workplace Foundation Factors we include employee perceptions about meaningfulness of work, self-determination, working conditions, and intensity of work effort. The more or less positive the perceptions or beliefs employees have about these factors, the more or less positively they (1) will perceive their performance capacities to be and (2) will view the firm's knowledge and skill development climate. Hence, our foundation factors influence knowledge and skill development climates and, at the same time, have direct effects on performance capacities.

With respect to meaningfulness and self-determination, the psychological empowerment literature holds that employees who find greater meaning, intrinsic reward, and importance in the work they do (meaningfulness) and who enjoy greater control in how they perform their assigned tasks and routines (self-determination) will be more satisfied with the work they do and more motivated to perform their jobs well (Spreitzer *et al*., 1997). It follows that jobs and routines yielding greater meaningfulness and self-determination will over time induce employees to improve their competencies and attach greater importance to having a positive impact on their work area's performance. Thus it is hypothesized that:

H3a: *The more meaningful the work performed as perceived by employees, the greater will be their perceived performance capacities.*

H3b: *The greater the self-determination employees exercise in the work they perform, the greater will be their perceived performance capacities.*

Drawing on the high-involvement, high-commitment HRM strategy and implicit contract literatures, a third factor that can be expected to influence employees' performance capacities are working conditions. Employees' commitment to organizational goals, that is, is conditioned by employee perceptions about management's concern for employee well-being, which in part is manifested in working conditions. For instance, working conditions under which employees are treated more or less fairly by supervision and in which health, safety, and the like are given more or less priority concern by management, are likely to be viewed more or less favorably by employees. The more or less favorable these working conditions are perceived to be, the more or less employees will be motivated to continually improve their competencies and be inclined

to attach importance to having an impact on the performance of their work areas. It is hypothesized, therefore, that:

H3c: *The more positive are employee perceptions are about their working conditions*, *the greater will be their perceived performance capacities.*

Another foundation factor and one conceptually similar to 'working conditions' is the intensity of work performed. On the one hand, greater intensification of work can be expected to directly lead to greater labor productivity as a result of greater effort made by employees. Thus, employees will perceive that they are both more competent and have a greater impact on the performance of their work areas. On the other hand, higher levels of exhaustion, physical pain, and tension are likely to diminish both an employee's satisfaction with work and motivation to continuously improve performance. As a consequence, greater work intensity will diminish employees' psychological states of competence and impact. Whether greater intensity has more of a positive or negative effect on employees' performance capacities, therefore, requires an empirical answer.

Workplace foundation factors are all expected to have reciprocal relationships among themselves, as well as with each of the facets underlying knowledge and skill development climates. Because our primary focus in on identifying and understanding the complexity of various facets of knowledge and skill development climates and for the sake of brevity, we do not elaborate on these expected reciprocal relationships. In estimating our model, nonetheless, we specify reciprocal cause-effect relationships among all workplace foundation factors and between these and the various facets underlying knowledge and skill development climates.

METHODS

Measures

As described earlier, the data used in this study are drawn from a unique sample of eight firms. Production employees were surveyed on location during regular working hours and across shift schedules as needed. Participation in the survey was voluntary and only a member of the research team was present to administer the confidential questionnaire. Response rates ranged from 55% to 86% across the eight plants, yielding an overall response rate of 69% and a total of 888 completed questionnaires. As

provided in the Appendix (Table A1), all measures of our latent variables were based on employee responses to three-item construct questions using a seven-point response scale (wherein 1 was "strongly disagree", 4 was "hard to decide", and 7 was "strongly agree"). Based on Cronbach alphas, all latent constructs obtained generally acceptable levels of reliability at .70 and higher.

Given our focus on capturing individual perceptions about psychological workplace climate variables and about individual psychological states of competence and impact, all measures are necessarily based on individual self-reporting. Consequently, one must consider the potential for obtaining biased estimates as a result of possible percept-percept inflation (Crampton & Wagner, 1994). Although we cannot rule out or estimate the degree of any such inflation, the degree of such bias on the given estimation is minimized for several reasons. First, respondents were ensured confidentiality and were provided sufficient time during work hours to carefully consider their answers. The questionnaires included no individual or work area identifiers and no management or union leaders were present while employees completed questionnaires, which were individually collected by a member of the research team. Additionally, employees were allowed unlimited time to complete the survey before returning to work. Second, we attempted to minimize the degree to which respondents were asked semantically synonymous and similarly worded questions of a global nature to which respondents might be tempted to provide logically consistent, synonymous answers. The questions making up items of our various constructs, furthermore, were dispersed throughout the questionnaire and we included one negatively stated item in our endogenous variable 'Competence' and in our exogenous variable 'Need for More Skills' (described subsequently). Third, questions were not of a nature that might prompt respondents to invoke their dispositional nature toward the world and thus provide either consistently positively- or negatively-oriented answers. Nor were the questions of a nature that might elicit the respondents to invoke their personally held implicit theories about concepts rather than describe the reality of their workplace climates, work conditions, and psychological states of performance capacities. Finally, there is little reason to believe that the questions addressed ambiguous or poorly understood work contexts, which

otherwise might through some social cues prompt respondents to provide superficially intelligent answers to seldom considered contexts.

Performance Capacities. Adopting standard items from Sprietzer (1995), 'Competence' was based on questions such as "I am capable of performing all of my various job tasks." However, we included one negatively stated question in this construct, "I have not mastered the skills necessary for my job." 'Impact' was based questions such as "It is important to the success of my work area that I do my job well."

Knowledge and Skill Development Climates. This composite construct had six interrelated sub-constructs. The latent variable 'Value Learning New Skills' is intended to capture the degree to which employees placed importance on learning new skills; for example, asking "Learning new job skills is important to me." 'Need to Learn New Skills' was based on several questions about one's perceived need for additional skill development, including one item that was negatively stated, "I have more skills than I need to perform my current job well." 'Receptivity to New Technologies' was based on questions about the perceived effects newer technologies had had on working conditions, learning new skills, and promotions to higher level, higher paying jobs. Our 'Opportunities to Improve Skills' construct was designed to measure employee perceptions about a firm's human capital investment commitment based on how good employees' opportunities were to receive training and improve skills (e.g., "I have good opportunities to improve my skills here."). The 'Employment Security' construct was based on questions asked about one's expectation of long term employment and a company's efforts at keeping employees working full time. Lastly, our 'Performance Feedback' construct was based on questions about the degree to which employees received meaningful feedback and knew how well they were performing regardless of the formality of any such feedback.

Workplace Foundation Factors. Under this composite construct are four sub-constructs. Adopting standard items from Spreitzer (1995), 'Meaningfulness' was based on questions such as "The work I do is important to me." and 'Self-Determination' was based on questions such as "I get to decide how best to do my job." Our 'Working Conditions' construct is intended to capture respondents' fairly general perceptions about having been treated fairly (e.g., "I am treated fairly."), and satisfaction with working

conditions, including health and safety. Lastly, items making up 'Work Intensity' asked respondents about the extent to which they felt tense and exhausted and felt pain from their work (e.g., "I often feel exhausted at the end of my shift.").

Specification

To estimate the implicit structural model depicted in Figure 1, we used covariance structure analysis (LISREL), with predicted paths based on our stated hypothesized relationships. Therefore, unidirectional paths are applied (1) between each of our exogenous and endogenous variables, and (2) between Competence and Impact. Because we hypothesized that each of the exogenous variables underlying Knowledge and Skill Development Climates is positively related to each other variable but that these relationships are all reciprocal in their effects on each other, we apply two-way paths among these exogenous variables. Lastly, we did not state hypotheses about the relationships among the exogenous Workplace Foundation Factors but instead treated these foundation variables as interrelated among themselves and with Knowledge and Skill Development Climate variables. Consequently, we apply two-way paths among the Workplace Foundation Factors and with all Knowledge and Skill Development Climate variables.

RESULTS

The measurement models were estimated using maximum likelihood with all latent variables included simultaneously. All estimated measurement models are highly statistically significant. All sets of three measures comprising all of our factors are highly significantly related to each construct, yielding strong evidence of the validity of the operationalization of our latent variables. (See Table 1 for descriptive statistics and correlations and Table A1 for pertinent measurement model coefficients.) With two exceptions, all measures loaded positively on each construct. Two constructs, however, utilized measures that led to bi-polar loadings. The first is our latent exogenous climate variable Need to Learn New Skills. Here, one item labeled 'More Skills' ("I have more skills than I need to perform my current job very well.") loaded positively (0.77), whereas the other two items 'Do Better' ("I could do better in my current job if I got more training.") and 'Learn More Skills' ("I need to learn more skills to perform my

current job very well.") loaded negatively on the construct (at -1.53 and -1.64, respectively). The resulting latent variable Need to Learn New Skills is, consequently, interpreted to mean that the variable is more positive the more strongly respondents believe they **do not** need more skills and the less strongly they believe they could do better in performing their current jobs either by acquiring more training or skills (and conversely).

[Table 1 about here]

The result of these bi-polar loadings means that given our hypotheses about the variable Need to Learn New Skills, interpretation of the signs of the coefficients between Need to Learn New Skills and all other variables needs to be the opposite of the reported signs. Hence, all of the negative signs reported between Need to Learn New Skills and all other exogenous climate variables should be interpreted as positive associations, whereas the positive sign between Need to Learn New Skills and Competence should be interpreted as a negative association. Although the second factor that obtained bi-polar loadings is Competence, the signs on those loadings do not distort the interpretation of Competence.

Overall, the structural model yielded an adequate fit to the data, wherein $\chi^2[521] = 1543.6$, $\chi^2/df = 2.92$, CFI = .90, SRMR = .057, and RMSEA = .047. Because a diagrammatic presentation of our results is visually confusing, we report the results in Tables 2 and 3. As reported in Table 2, not only are all of the various facets of Knowledge and Skill Development Climates significantly interrelated, as are the Workplace Foundation Factors, most foundation factors are significantly interrelated with the facets of Knowledge and Skill Development Climates. As hypothesized, furthermore, Competence is positively and highly significantly related to Impact. The effects of our exogenous variables on Performance Capacities appear to be channeled largely through several salient variables but taken in combination, all variables account for 45 percent of variation in Competence and 76 percent of variation in Impact.

Tests of Hypotheses

Among Knowledge and Skill Development Climate Variables. Each of the variables underlying Knowledge and Skill Development Climates are found to be

positively associated with each other variable and highly significantly so (see estimates reported in Table 2). Hence, significant statistical support is obtained for all hypotheses made regarding relationships among the six facets of Knowledge and Skill Development Climates. Based on the relative size of the estimated unstandardized coefficients, the more highly interrelated variables include the following. The strongest association among all variables is found between Value Learning New Skills and Receptivity to New Technologies, with a coefficient of .83. The next highest coefficients are found between the variable Opportunities to Improve Skills and the variables Employment Security (β = .54) and Performance Feedback (β = .53). The estimated coefficient of the interrelationship between the variables Need for New Skills and Value Learning New Skills is also relatively large at .45.

[Table 2 about here]

In comparing the relative importance of the different facets underlying Knowledge and Skill Development Climates, the variable Receptivity to New Technologies appears to play the most influential role in shaping climates that foster knowledge and skill development. We say that because, unlike any other variable, the estimated coefficients between Receptivity to New Technologies and the remaining five variables are all greater than .25; and as already noted, the largest coefficient obtained between any two climate variables is between Receptivity to New Technologies and Value Learning New Skills at .83.

Between Workplace Foundation Factors and Knowledge and Skill Development Climates. Although no specific hypotheses were stated in regard to the effects of Workplace Foundation Factors on other exogenous Knowledge and Skill Development Climate variables, the evidence provides relatively strong statistical support for our broader proposition that Workplace Foundation Factors serve as important foundation variables for Knowledge and Skill Development Climates. Based on the relative size of estimated coefficients, it appears that Working Conditions is fairly closely associated with several facets of Knowledge and Skill Development Climates. Here we find that Working Conditions (fair treatment and good working conditions) is quite highly associated with Performance Feedback (β = .74) and Employment Security (β = .68). Working Conditions is also highly associated with Opportunities to Improve Skills (β =

.53) and Receptivity to New Technologies (coefficient β = .39). To a lesser degree, Working Conditions is positively and significantly associated with Value Learning New Skills (β = .24) but is insignificantly associated with Need to Learn New Skills. Meaningfulness also appears to be an important foundation variable. In particular, Meaningfulness is positively associated with Performance Feedback (β = .45), Value Learning New Skills (β = .40) and Receptivity to New Technologies (β = .37).

Between Exogenous and Endogenous Variables. As discussed, there are inherent reciprocal relations among all of the factors underlying both Knowledge and Skill Development Climates and Workplace Foundations Factors, some of which are quite strong. In combination these factors explain 45 percent of the variance in Competence and, along with the effects of Competence, explain 76 percent of the variance in Impact (see Table 3). The evidence indicates that the effects of Knowledge and Skill Development Climates on Performance Capacities are primarily channeled through three variables. First, as hypothesized, the more employees Value Learning New Skills, the more positive (on average) are their psychological states of Competence, significant at the ≤ .01 level. Second, as hypothesized, the more employees Need to Learn New Skills, the more negative are their psychological states of Competence, significant at the ≤ .01 level. In comparing the relative effects of both variables on Competence, Value Learning New Skills appears to have the stronger effect with an estimated coefficient of .57 (.76 when standardized) in comparison to the estimated -.44 coefficient (-.60 when standardized) for Need to Learn New Skills.

[Table 3 about here.]

As no other Knowledge and Skill Development Climate variables are statistically significantly related to Competence, the effects of the remaining variables on Competence appear to be indirect via their associations with the variables Value Learning New Skills and Need to Learn New Skills. As discussed earlier, the most pronounced relationship among variables is between Value Learning New Skills and Receptivity to New Technologies, with an estimated coefficient of .83. Hence, whereas Receptivity to New Technologies does not appear to have a direct effect on Competence, it is bound to have a substantial indirect effect on Competence via its strong association with Value Learning New Skills. Need to Learn New Skills is also strongly related to Value

Learning New Skills, with an estimated coefficient of .45. Therefore, whereas Need to Learn New Skills is negatively related to psychological states of Competence, that negative effect is offset in part via the positive and sizeable association Need to Learn New Skills has with Value Learning New Skills. In addition, the second variable most strongly associated with Need to Learn New Skills is Receptivity to New Technologies, with a coefficient of .26. Thus, again the effects of Receptivity to New Technologies on Competence are captured indirectly via its association with Need to Learn New Skills.

The only facet of Knowledge and Skill Development Climates that is significantly associated with Impact is Performance Feedback, wherein the estimated coefficient is .18, significant at the $\leq .01$ level. Because Performance Feedback is strongly associated with employees' perceptions about Opportunities to Improve Skills ($\beta = .53$) and Employment Security ($\beta = .50$), the effects of these latter two variables on Impact are partially captured via their associated effects with Performance Feedback. With respect to the direct effects of foundation variables on Performance Capacities, only the variable Meaningfulness is statistically significant. Here we find Meaningfulness to have a relatively moderate effect on Competence ($\beta = .17$) and a relatively substantial effect on Impact ($\beta = .42$). Because Meaningfulness is strongly associated with Working Conditions ($\beta = .46$) and with Self-Determination ($\beta = .41$), the effects of these latter two foundation variables on Competence and Impact are partially captured via their associated effects with Meaningfulness.

Performance Capacities. Strong statistical evidence is obtained supporting the hypothesis that the higher one's perceived Competence, the higher one's perceived Impact. Specifically, the estimated coefficient between Competence and Impact is positive, relatively large at .56, and significant at the $\leq .01$ level of confidence.

DISCUSSION

The existing empirical literature showing that high-involvement, commitment-based HRM practices are positively associated with performance outcomes has assumed that such effects are the result of positive cognitive responses by employees to these practices. The objective of this study was to look inside this black box of assumptions, within which lies those unobserved cognitive responses. Applying a knowledge-based

perspective to the resource-based perspective underlying most of these strategic HRM analyses, we developed a model of the effects of multifaceted knowledge and skill development climates on the performance capacities of employees. Overall, the empirical model specified and tested in this study obtained substantial statistical support.

In spite of this statistical robustness, the findings and inferences that can be drawn must be viewed with due caution. Although the theoretical hypotheses about the structural paths proposed in our model are intended to be broadly generalizable, the empirical estimates themselves face well-rehearsed limitations, which minimize their generalizability. In particular, the empirical evidence about the relative importance of various variables are based on cross sectional survey data of employees working across a large number of work areas but in just a handful of unionized automotive supplier firms, all of which were going through transitions in their labor-management relations at the time of our survey. Furthermore, given our focus on the effects of individual perceptions of climates on individual psychological states of performance, by necessity both the exogenous and endogenous variables in our model are based on individual self-reporting. In spite of our efforts to minimize potential percept-percept biases and although our results strongly suggest that we were successful in minimizing any such biases, the specter of common response biases remains. In addition, this is the first study we are aware of that models the effects of KB workplace strategy climates on the performance capacities of employees. Therefore, further development and refinement of the theoretical modeling and operational constructs, as well as additional testing of such modeling against other samples, are called for.

Bearing in mind these caveats, we can, nevertheless, draw some general inferences from our results and speak to the relative importance of associated relationships found in our sample. First, the empirical evidence strongly reinforces the proposition that various facets of knowledge and skill development climates are unique in their own ways but are, nonetheless, highly interrelated. These facets are highly interrelated because (1) they comprise a strategic effort by firms to align relevant HRM policies and practices that create and reinforce a given climate and (2) they share common guiding principles, expectations, and rewards permeating all facets that employees see and experience within their work areas. As such, and in line with a

resource-based view of organizations, the dynamics underlying multifaceted knowledge and skill development climates are highly complex and ambiguous. As a consequence, were organizations to improve upon or worsen employee perceptions about any one facet, they would improve upon or worsen employee perceptions about each other facet, not only directly but also in second-order, multiplicative ways.

Based on our results, the key workplace climate facet influencing employee performance capacities is the one that shapes and conditions employee perceptions about the *value* of learning new skills. The more favorable those perceptions, the more positive become employee psychological states of competence and, in turn and indirectly, psychological states of impact. Hence, the more successful management or supervision is at fostering and conditioning the belief among employees that learning is valuable to them and the organization or work area, the more inclined employees will be to value learning new skills and to accept inevitable demands to continually improve their skill sets as job tasks and routines are continually altered and expanded.

As discussed, other facets of KB workplace climates play essential roles affecting employees' perceptions about a firm's climate of valuing learning. One facet in particular that comes into play is the climate regarding technological change. In our sample, how strongly employees value learning is very highly interrelated with employee receptivity to new technologies diffused. This rather pronounced finding goes to the core of a KB view of firms. In our context, the greater care management takes in managing the effects of the diffusion of new technologies and related management processes on the work lives of employees, the much more likely employees will see the value in continuously learning new skills. Given there is also a reinforcing reciprocal relationship between valuing learning and receptivity to the diffusion of new technologies, the ability of firms to build and exploit knowledge requires considerable attention to both facets.

These findings regarding the important role of employee receptivity to the diffusion of new technologies lend support to a resource-based view that the effectiveness of HRM strategies rests in part not only with the horizontal alignment of various HRM practices but also with the alignment of HRM strategies with technology strategies. Future research that takes into account technology systems, not as independent systems juxtaposed against HRM systems, but as fully integrated, tightly coupled systems, we

believe, holds substantial promise. Only modeling that fully explicates the independent, interaction, and multiplicative effects of human and technological capabilities will allow us to sort through how HRM practices truly influence performance outcomes. Such modeling, moreover, would allow us to better estimate the size of those HRM effects, which may be much greater or much lesser than recent estimates suggest.

Our results further indicate that all other facets of multifaceted knowledge and skill development climates, likewise, come into play in fostering a climate in which employees value learning. Obviously, firms need to demonstrate that they are committed to investing in training and development. The greater or lesser the perceived opportunities to learn new skills that employees see available to them, the more or less reason they have to value learning. Similarly, climates that make it more apparent to employees that their longer term employment security depends on continual investments in their own knowledge and skills, the more likely employees will come to value learning new skills. In addition, employees will be more likely to value learning under climates in which employees receive more meaningful performance feedback, feedback that makes explicit the goals management seeks to achieve and against which employees can evaluate their current performance capacities. Needless to say, over time the relationships between these additional facets of workplace climates and that facet which fosters having employees value learning are reciprocal in their effects.

The evidence also supports the general proposition that the favorableness of knowledge and skill development climates is partially a function of broader workplace foundation factors. In particular, workplaces in which the conditions of work (including fair treatment and healthy and safe environments) are viewed as more favorable and in which work tasks and routines are perceived as more meaningful, improve knowledge and skill development climates. Keeping in mind the reciprocal effects between these foundation factors and knowledge and skill development climate factors, the lesson for management is again one emphasizing that a holistic approach to formulating and implementing workplace strategies is required.

The ability of firms to develop optimal knowledge and skill development climates also requires firms to take into account employees' perceived *needs* to learn new skills. As developed herein, the perceived need employees have to learn new skills positively

affects (and is positively affected by) the perceived value in learning new skills. Importantly, however, greater perceived needs to learn new skills lead to diminished psychological states of competence. Even though lower levels of competence reduce employees' impact on work group performance, firms wanting to build dynamic capabilities and avoid ossification of their stocks of knowledge must continually reinvest in those stocks. Therefore, firms will necessarily operate within contexts marked by frequent points of disequilibrium and adjustment as they build their KB capacities over time. Although these ebbs and flows in human capital investments will result in fluctuating levels of performance across individuals and work groups, overall employee performance can be expected to rise over time as the firm's KB capacity increases. Of course our cross-sectional evidence merely points out the relevance of disequilibrium and adjustment in building stocks of knowledge over time. Future research applying longitudinal methodologies will be needed to ascertain how firms best manage continual investments in employees while minimizing intermittent losses in performance in their longer-term efforts to enhance their firm's KB capacity.

Lastly, our evidence indicates that the psychological states of individuals regarding their impact on performance (Impact) can be explained quite well by our modeling in that 76 percent of variance was accounted for. That said, most of the effects of KB workplace strategies on Impact are largely channeled through several factors and, consequently, most factors indirectly affect Impact via their associations with these several variables. First, Competence (i.e. one's psychological state of how well one performs his/her job tasks) is directly influenced primarily by the degree to which employees value learning new skills, by their perceived need to learn new skills, and by the perceived meaningfulness of the work they do. Second, Impact is most heavily and directly influenced by Competence. Also having direct effects on Impact are the perceived meaningfulness of one's work and the perceived usefulness of performance feedback received. We conclude that complex, multifaceted KB workplace climates (supported and reinforced by various foundation variables) play the central role in explaining psychological states of competence and impact. At question, does the modeling and evidence presented explain the underlying cause-effect association between differences in HRM practices and performance outcomes reported in the strategic HRM

literature? A fully satisfactory answer requires much further analysis than we can make in this inquiry, but our inquiry sheds valuable light on both the question at hand and implications for future research.

Looking at the right hand side of our model, the endogenous variables employed were taken directly from Spreitzer's (1995) construct of psychological empowerment. That construct has been found to be highly reliable and validated as an antecedent to measurable performance outcomes. As such it is reasonable to conclude that had we been able to estimate the effects of employees' psychological states of competency and impact against actual performance measures, we would have found the expected linkage between employees' cognitions and their work area performance. Such a conclusion is further bolstered by Collins and Smith's (2006) finding that performance was strongly related to their intermediate outcomes construct "knowledge exchange and combination", a construct much like our intermediate outcome construct "performance capacities".

Given that only Collins and Smith (2006) and we in the present analysis have attempted to articulate and test the associations between these intermediate outcomes and workplace climates, much remains to be done theoretically and empirically towards developing these intermediate outcome constructs that link climates to performance. From a strategic HRM perspective, the contribution of employees to performance over time is a product of their competencies and their motivation to optimize both their competencies and the opportunities available to utilize those competencies. It is this set of intermediate psychological states that lead to actual performance outcomes. The literature would benefit, therefore, by further inquiries refining the bases of these intermediate psychological states. Here we recommend that future research develop the bases of these intermediate psychological states of performance by combining the elements of both Spreitzer's and Collins and Smith's constructs. Although both capture well employee motivation and perceived effectiveness, Spreitzer's construct captures best the psychological state of competence, whereas Collins and Smith's construct captures best the KB opportunities that can be exploited by employees to have an impact on performance.

Upon looking at the left hand side of our model, more questions are raised than answered. Because there is very little variation in observable HRM practices across and

within our sample of eight firms, we cannot estimate the effects of various high-involvement, high-commitment HRM practices on our latent climate variables. The few earlier studies examining this linkage appear to generally confirm the proposition that workplace climates are at least partially derived from HRM practices but the available evidence remains quite limited. The HRM factors examined by Schneider *et al.* (1998) and Gelade and Ivery (2003) included only a few measures, not a set or system of high-involvement, high-commitment HRM practices. Only Collins and Smith (2006) have examined a fairly comprehensive set of high-commitment practices via their composite index of HRM policies. However, their composite index was based on HR manager reports about the extent to which firms embraced high-commitment policies. They neither measured observable HR practices, nor asked employees what they actually observed as HRM practices. Hence, future research will need to address much more fully and effectively the linkage between actual workplace practices comprising high-involvement, high-commitment systems and the climates created by them. Future studies that capture more directly the essence of what various HR and technology policies and practices were *intended* to accomplish strategically, furthermore, could prove enlightening. Capturing that strategic essence will require making explicit the guiding principles, expectations, and rewards intended by workplace strategy policies and practices pursued.

Finally, to the extent to which future research can demonstrate the various linkages between practices, climates, intermediate psychological states of performance, and actual performance, we can become more or less confident that HRM strategies make a difference in operational performance achieved. We conclude, however, that the assumptions about cognitive responses and consequent effects on employee behavior and performance implicit in much of the recent literature showing that high-involvement, high-commitment HRM systems are associated with superior performance are reasonable assumptions. The empirical evidence presented herein provides further credence to those assumptions. Of course much remains to be sorted out and we hope that our suggestions for future research prove fruitful.

Figure 1
Conceptual Model of the Effects of Knowledge-Based Workplace Strategy Climates on the Performance Capacities of Employees

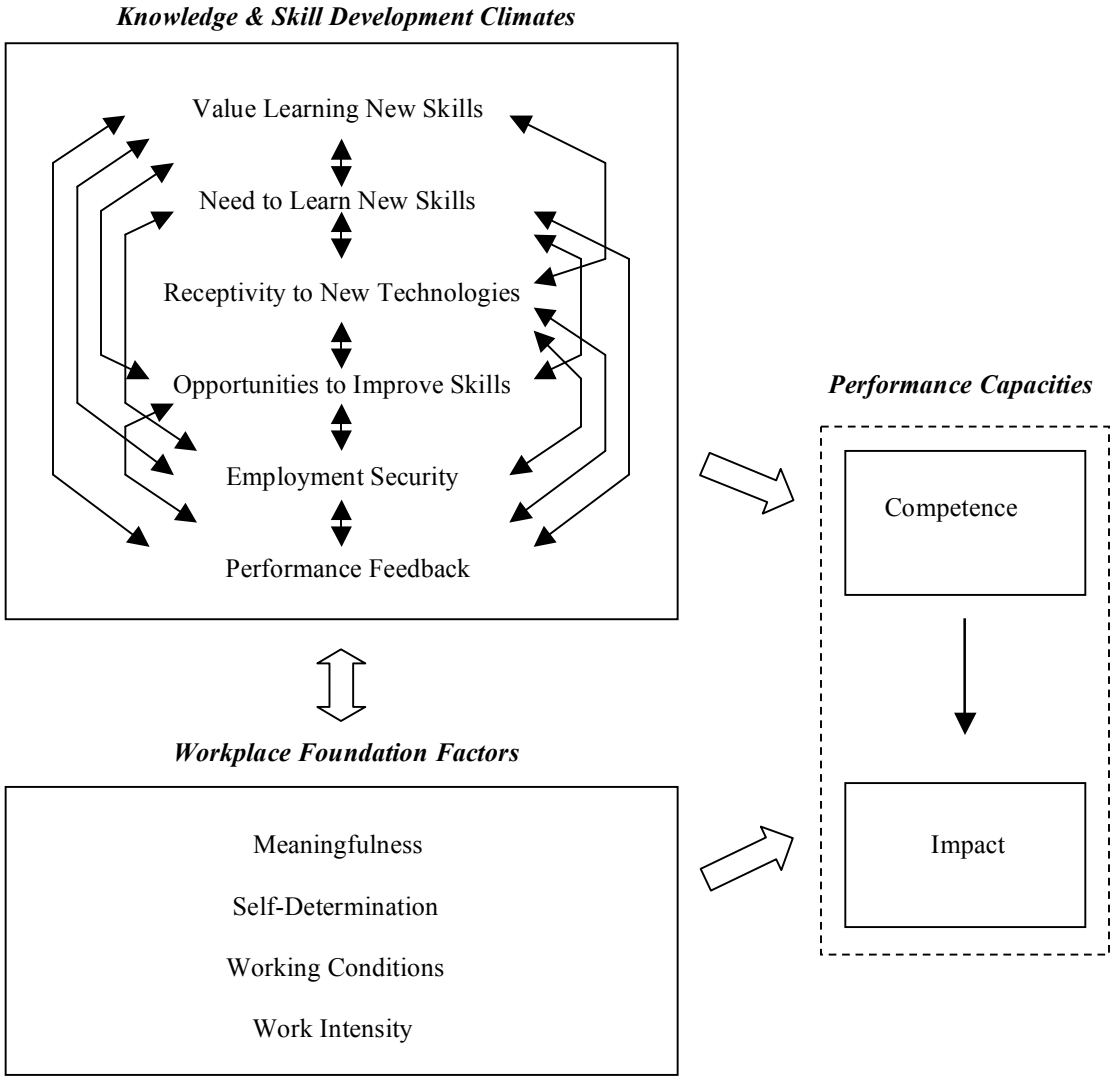

TABLE 1

Means, Standard Deviations, and Correlations of the Measures

Measure	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. More Classes	5.1440	1.7943																								
2. New Skills Important	5.5711	1.7408	.273																							
3. New Job Skills	6.0183	1.2443	.420	.413																						
4. More Skills	4.6778	1.9572	-.157	-.021	-.005																					
5. Do Better	4.1483	2.1953	.354	.152	.178	-.273																				
6. Learn More Skills	3.5763	2.0430	.378	.189	.261	-.317	.557																			
7. New Technologies Improve Conditions	5.0126	1.7602	.203	.213	.241	.018	.082	.121																		
8. New Technologies Provide Skill Opportunities	5.5172	1.5281	.269	.378	.500	-.013	.103	.184	.406																	
9. New Technologies - Better Job	5.3694	1.8189	.219	.327	.495	.031	.097	.177	.293	.497																
10. Good Opportunity for Training	3.5280	1.9828	.066	.087	.069	.040	.047	.125	.257	.200	.203															
11. Good Opportunity for Skill	3.6994	1.9396	.132	.121	.117	-.004	.094	.182	.280	.235	.202	.721														
12. More Training	4.1062	2.0009	.130	.106	.120	.006	.104	.196	.274	.218	.190	.589	.628													
13. Work Long Term	4.4261	1.9269	.073	.001	.039	-.067	.053	.074	.118	.087	.089	.217	.205	.184												
14. Company Best Full Time	5.2317	1.6844	.035	.044	.073	-.008	-.014	.015	.158	.188	.123	.190	.221	.209	.203											
15. Good Future	3.9101	1.7974	.126	.030	.073	-.018	.060	.126	.190	.150	.171	.353	.413	.394	.512	.346										
16. Meaningful Feedback	3.4472	2.0709	.069	.066	.118	-.002	.066	.168	.125	.136	.149	.288	.330	.300	.136	.192	.296									
17. Performance Knowledge	5.7847	1.4619	.027	.056	.127	.093	-.131	-.084	.076	.135	.081	.062	.085	.090	.039	.125	.107	.154								
18. How Well	4.6182	1.8037	.080	.070	.086	-.006	.041	.093	.092	.072	.148	.276	.299	.299	.152	.202	.277	.446	.223							
19. Work Important	5.7506	1.4306	.201	.084	.321	-.046	.113	.140	.187	.200	.196	.153	.213	.202	.292	.093	.258	.183	.129	.163						
20 Job is Personally Meaningful	5.5080	1.5951	.229	.150	.220	.001	.112	.179	.195	.186	.186	.172	.226	.197	.235	.100	.231	.208	.130	.206	.552					
21. Work Personally Rewarding	4.6827	1.8907	.165	.070	.173	-.038	.087	.163	.181	.155	.143	.185	.243	.233	.275	.155	.272	.318	.178	.225	.489	.577				
22. Decide Best	4.5096	1.9412	.011	.083	.126	-.002	-.035	.031	.147	.135	.163	.166	.213	.121	.112	.171	.185	.336	.272	.291	.135	.191	.248			
23. Independence	4.5619	1.8211	.058	.055	.128	-.017	.004	.061	.184	.160	.151	.182	.198	.178	.155	.167	.206	.320	.242	.338	.171	.223	.313	.491		
24. Decide Work	4.7705	1.8177	.015	.099	.103	.040	-.018	.005	.125	.107	.134	.075	.133	.050	.108	.158	.131	.165	.214	.157	.161	.210	.167	.408	.427	
25. Fair Treatment	4.1797	1.9700	.044	.098	.133	-.083	-.028	.096	.162	.190	.211	.259	.297	.290	.244	.255	.351	.380	.143	.449	.163	.213	.232	.292	.353	.190
26. Satisfied Working	3.9954	1.8629	.086	.079	.106	-.027	-.008	.090	.215	.157	.155	.305	.325	.326	.312	.304	.380	.299	.159	.326	.242	.235	.286	.255	.307	.278
27. Safe	4.1768	1.8254	.129	.057	.161	.042	.005	.044	.174	.199	.170	.272	.280	.283	.290	.222	.375	.253	.069	.261	.241	.219	.262	.137	.213	.047
28. Tense	4.1152	1.9996	-.015	-.010	-.046	.041	.063	.052	-.106	-.078	-.047	-.087	-.147	-.138	-.058	-.112	-.132	-.147	-.109	-.164	-.056	-.079	-.151	-.108	-.153	-.076
29. Pain	4.7181	1.9086	-.057	-.015	.002	.010	.050	-.018	-.137	-.069	-.107	-.145	-.151	-.119	-.109	-.062	-.144	-.047	.036	-.099	-.010	-.053	-.096	-.001	-.071	-.071
30. Exhaust	4.7304	1.8374	-.003	-.017	-.036	.012	.057	.008	-.064	-.059	-.047	-.097	-.101	-.130	-.002	-.050	-.148	-.102	-.048	-.141	.002	-.006	-.085	-.083	-.149	-.025
31. Not Mastered Skill	2.7112	2.0227	.150	.068	.051	-.236	.298	.423	.078	.021	.138	.153	.168	.148	.021	.040	.055	.178	-.090	.089	.033	.070	.064	.049	.083	.029
32. Job Confidence	6.3893	.9167	.039	.073	.283	.222	-.143	-.100	.066	.146	.141	-.057	-.068	-.028	.083	.057	.065	-.011	.282	.059	.274	.214	.164	.114	.098	.123
33. Capable of Performance	6.2812	1.029	.049	.076	.269	.192	-.169	-.135	.081	.186	.151	-.059	-.051	-.004	.032	.056	.016	-.043	.310	.046	.222	.147	.123	.100	.135	.160
34. Job Important to Work Area	6.2486	1.0360	.149	.118	.305	.099	-.004	.026	.128	.216	.231	.058	.088	.093	.166	.087	.152	.070	.222	.148	.448	.425	.309	.160	.096	.176
35. Significant Influence on Success	5.1332	1.5853	.099	.041	.139	.022	.019	.065	.165	.137	.078	.161	.167	.215	.112	.115	.209	.168	.235	.216	.269	.273	.237	.239	.249	.134
36. Success Work Area - Job	6.0619	1.1557	.136	.102	.297	.032	.023	.088	.170	.228	.180	.091	.146	.174	.166	.103	.186	.166	.245	.214	.432	.408	.381	.170	.167	.133

All correlations above .087 are significant at $p \leq .01$.

TABLE 1 (continued)

Means, Standard Deviations, and Correlations of the Measures

	25	26	27	28	29	30	31	32	33	34	35
26. Satisfied Working	.479										
27. Safe	.370	.498									
28. Tense	-.315	-.255	-.174								
29. Pain	-.176	-.196	-.202	.338							
30. Exhaust	-.188	-.192	-.132	.448	.378						
31. Not Mastered Skill	.059	.104	.031	.073	.011	.039					
32. Job Confidence	.072	.030	.074	-.025	.046	.002	-.245				
33. Capable of Performance	.065	.094	.050	-.041	-.006	-.004	-.283	.656			
34. Job Important to Work Area	.110	.142	.158	-.019	-.023	.018	-.080	.496	.418		
35. Significant Influence on Success	.152	.211	.184	-.044	-.033	-.047	-.010	.232	.199	.310	
36. Success Work Area – JoB	.193	.183	.213	-.076	-.017	-.007	- .072	.375	.351	.605	.424

All correlations above .087 are significant at $p \leq .01$.

TABLE 2

Coefficients of the Exogenous Latent Variables on the Exogenous Latent Variables (Standard errors in parentheses)

	Value Learning New Skills	Need to Learn New Skills	Receptivity to New Technologies	Opportunities to Improve Skills	Employment Security	Performance Feedback	Meaningfulness	Self-Determination	Working Conditions	Work Intensity
Value Learning New Skills	1									
Need to Learn New Skills	-0.45*** (0.04)	1								
Receptivity to New Technologies	0.83*** (0.03)	-0.26*** (0.04)	1							
Opportunities to Improve Skills	0.18*** (0.04)	-0.20*** (0.04)	0.40*** (0.04)	1						
Employment Security	0.13*** (0.05)	-0.14*** (0.04)	0.30*** (0.04)	0.54*** (0.05)	1					
Performance Feedback	0.21*** (0.05)	-0.14*** (0.05)	0.28*** (0.05)	0.53*** (0.04)	0.50*** (0.04)	1				
Meaningfulness	0.40*** (0.04)	-0.24*** (0.04)	0.36*** (0.04)	0.34*** (0.04)	0.44*** (0.05)	0.45*** (0.05)	1			
Self-Determination	0.20*** (0.05)	-0.03 (0.05)	0.32*** (0.04)	0.29*** (0.04)	0.34*** (0.04)	0.67*** (0.04)	0.41*** (0.04)	1		
Working Conditions	0.23*** (0.05)	-0.09 (0.05)	0.39*** (0.04)	0.53*** (0.03)	0.68*** (0.04)	0.74*** (0.04)	0.46*** (0.04)	0.55*** (0.04)	1	
Work Intensity	-0.06 (0.05)	-0.06 (0.05)	-0.17*** (0.05)	-0.23*** (0.04)	-0.24*** (0.05)	-0.29*** (0.05)	-0.13*** (0.05)	-0.22*** (0.05)	-0.49*** (0.04)	1

*** - p < .01

TABLE 3
Coefficients of the Exogenous Latent Variables on the Endogenous Latent Variables and Between Competence and Impact

(Standard errors in parentheses)

Variables	**Competence**	**Impact**
Value Learning New Skills	0.57*** (.18)	-0.13 (0.15)
Need to Learn New Skills	0.44*** (0.06)	-0.06 (0.06)
Receptivity to New Technologies	-0.23 (0.17)	0.18 (0.14)
Opportunities to Improve Skills	-0.09 (0.07)	-0.03 (0.05)
Employment Security	0.11 (0.06)	-0.02 (0.06)
Performance Feedback	-0.03 (0.10)	0.18*** (0.09)
Meaningfulness	0.17*** (0.05)	0.42*** (0.04)
Self-Determination	0.10 (0.06)	-0.11 (0.06)
Working Conditions	-0.06 (0.10)	0.03 (0.09)
Work Intensity	0.02 (0.05)	0.04 (0.04)
Competence	----	0.56*** (0.07)
R^2	.45	.76
N	888	888

*** $p \leq .01$

REFERENCES

Adler, P. S. 1992. Introduction. In P.S. Adler (Ed.), ***Technology and the future of work:*** 3-14. New York: Oxford University Press.

Allen, M. R., & Wright, P. M. 2007. Strategic management and HRM. Chapter 5 in P. Boxall, J. Purcell, & P. Wright (Eds.), ***Oxford University Press handbook of human resource management***. Oxford: Oxford University Press, (in press).

Appelbaum, E., & Batt, R.. 1994. ***The new American workplace: Transforming work systems in the United States***. Ithaca, N.Y.: ILR Press.

Arthur, J. B. 1992. The link between business strategy and industrial relations systems in American steel minimills. ***Industrial and Labor Relations Review***, 45: 488-506.

Ashforth, B.E. 1985. Climate formation: Issues and extensions. ***Academy of Management Review,*** 10: 837-841.

Babson, S. 1995. Lean production and labor: Empowerment and exploitation. In S. Babson (Ed.) ***Lean work: Empowerment and exploitation in the global auto industry.*** Detroit: Wayne State University Press. 1-37.

Barney, J. B. 2001. Is the resource-based 'view' a useful perspective for strategic management research? Yes. ***Academy of Management Review***, 26: 41-56.

Barney, J. B., & Wright, P. M. 1998. On becoming a strategic partner: The role of human resources in gaining competitive advantage. ***Human Resource Management***, 37: 31-46.

Batt, R. 2002. Managing customer services: Human resource practices, quit rates, and sales growth. ***Academy of Management Journal***, 45: 587-597.

Becker, B., & Gerhart, B. 1996. The impact of human resource practices on organizational performance: Progress and prospects. ***Academy of Management Journal,*** 39: 779-801.

Benner, M. J., & Tushman, M. 2002. Process management and technological innovation: A longitudinal study of the photography and paint industries. ***Administrative Science Quarterly***, 47: 676-706.

Berman, S., Down, L. J., & Hill, C. W. L. 2002. Tacit knowledge as a source of competitive advantage in the National Basketball Association. ***Academy of Management Journal,*** 45: 13-31.

Bowen, D. E., & Ostroff, C. 2004. Understanding HRM—firm performance linkages: The role of the 'strength' of the HRM system. ***Academy of Management Review***, 29: 203-221.

Boxall, P. 2007. The goals of HRM. Chapter 1 in P. Boxall, J. Purcell, & P. Wright (eds.), ***Oxford University Press handbook of human resource management***. Oxford: Oxford University Press (in press).

Boxall, P., & Purcell, J. 2003. ***Strategy and human resource management***. New York: Palgrave Macmillan.

Brown, S.P., & Leigh, T.W. 1996. A new look at psychological climate and its relationship to job involvement, effort and performance. ***Journal of Applied Psychology***, 81: 358-368.

Colbert, B. A. 2004. The complex resource-based view: Implications for theory and practice in strategic human resource management. ***Academy of Management Review***, 29: 341-358.

Collins, C. J., & Smith, K. G. 2006. Knowledge exchange and combination: The role of human resource practices on the performance of high-technology firms. ***Academy of Management Journal***, 49: 544-560.

Cooke, W. N. 2007. Integrating technology and human resources: The influence of global business strategies on workplace strategy choices. ***Industrial Relations*** 46: 241-270.

Crampton, S. M., & Wagner, J. A. 1994. Percept-percept inflation in microorganizational research: An investigation of prevalence and effect. ***Journal of Applied Psychology***, 79: 67-76.

Delaney, J. T., & Huselid, M. A. 1996. The impact of human resource management practices on perceptions of organizational performance. ***Academy of Management Journal***, 39: 949-969.

Delery, J. E., & Doty, D. H. 1996. Modes of theorizing in strategic human resource management: Tests of universalistic, contingency, and configurational performance predictions. ***Academy of Management Journal***, 39: 802-835.

Dyer, L., & Reeves, T. 1995. Human resource strategies and firm performance: What do we know and where do we need to go? ***International Journal of Human Resource Management,*** 6: 656-???.

Ferris, G. R., Hochwarter, W. A., Buckley, M. R., Harrell-Cook, G., & Frink, D. D. 1999. Human resource management: Some new directions. ***Journal of Management***, 25: 385-415.

Gelade, G. A., & Ivery, M. 2003. The impact of human resource management and work climate on organizational performance. ***Personnel Psychology***, 56: 383-404.

Glick, W.H. 1985. Conceptualizing and measuring organizational and psychological climate: Pitfalls in multilevel research. ***Academy of Management Review,*** 10: 601-616.

Grant, R. M. 1996. Toward a knowledge-based theory of the firm. ***Strategic Management Journal***, 17: 109-122.

Grant, R. M. 2002. ***Contemporary strategy analysis***. Oxford, UK: Blackwell Publishers.

Huselid, M. A. 1995. The impact of human resource management practices on turnover, productivity, and corporate financial performance. ***Academy of Management Journal***, 38: 75-99.

Khilji, S. E., & Wang, X. 2006. 'Intended' and 'implemented' HRM: The missing linchpin in strategic human research management research. ***International Journal of Human Resource Management***, 17: 1171-1189.

Kluger, A. N., & DeNisi, A. 1996. The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. ***Psychological Bulletin***, 119: 254-284.

Kopelman, R. E., Brief, A. P., & Guzzo, R. A. 1990. The role of climate and culture in productivity. In Schneider, B. (Ed.) ***Organizational climate and culture***. San Francisco: Jossey-Bass. 383-412.

Lado, A. A., & Wilson, M. C. 1994. Human resource systems and sustained competitive advantage: A competency-based perspective. ***Academy of Management Review***, 19: 699-727.

Leana, C. R., & VanBuren, H. J. 1999. Organizational social capital and employment practices. ***Academy of Management Review***, 24: 538-555.

Lepak, D. P., & Snell, S. A. 1999. The human resource architecture: Toward a theory of human capital allocation and development. ***Academy of Management Review***, 24: 31-48.

Liker, J. K., Fruin, W. M., & Adler, P. S. 1999. ***Remade in America: Transplanting and transforming Japanese management systems***, (Eds). New York: Oxford University Press.

Mathieu, J. E., Gilson, L. L., & Ruddy, T. M. 2006. Empowerment and team effectiveness: An empirical test of an integrated model. ***Journal of Applied Psychology***, 91: 97-108.

Miles, R. E., & Snow, C. C. 1984. Designing strategic human resource systems. ***Organizational Dynamics***, 13: 36-52.

Mishra, A. K., & Spreitzer, G. M. 1998. Explaining how survivors respond to downsizing: The roles of trust, empowerment, justice, and work redesign. ***Academy of Management Review***, 23: 567-588.

Nahapiet, J., & Ghoshal, S. 1998. Social capital, intellectual capital, and the organizational advantage. ***Academy of Management Review***, 23: 242-266.

Nelson, R. R., & Winter, S. G. 1982. ***An evolutionary theory of economic change***. Cambridge, Mass.: Belknap Press.

Nonaka, I., & Takeuchi, H. 1995. ***The knowledge-creating company: How Japanese companies create the dynamics of innovation***. New York: Oxford University Press.

Parker, M. 1993. Industrial relations myth and shop floor reality: The "team concept" in the auto industry. In N. Lichtenstein & H. J. Harris (Eds.) ***Industrial democracy in America: The ambiguous promise***, Cambridge: Cambridge University Press. 249-274.

Reed, R., & DeFillippi, R. J. 1990. Causal ambiguity, barriers to imitation, and sustainable competitive advantage. ***Academy of Management Review***, 15: 88-102.

Rousseau, D. M. 2001. Schema, promise, and mutuality: The building blocks of the psychological contract. ***Journal of Occupational and Organizational Psychology***, 74: 511-541.

Schneider, B., White, S. S., & Paul, M. C. 1998. Linking service climate and customer perceptions of service quality: Test of a causal model. ***Journal of Applied Psychology***, 83: 155-163.

Schneider, B. (Ed.) (1990). ***Organizational climate and culture***. San Francisco: Jossey-Bass.

Schuler, R. S., & Jackson, S. E. 1987. Linking competitive strategies with human resource management practices. ***Academy of Management Executive***, 1: 207-219.

Schuler, R. S., Dowling, P. J., & DeCieri, H. 1993. An integrative framework of strategic international human resource management. ***Journal of Management***, 19: 419-459.

Seibert, S. E., Silver, S. R., & Randolph, W. A. 2004. Taking empowerment to the next level: A multiple-level model of empowerment, performance, and satisfaction. ***Academy of Management Journal***, 47: 332-349.

Shaiken, H. 1984. ***Work transformed***. Lexington, MA: Lexington Books.

Spear, S., & Bowen, K. 1999. Decoding the DNA of the Toyota production system. ***Harvard Business Review***, 77: 97-108.

Spender, J. C. 1996. Making knowledge the basis of a dynamic theory of the firm. ***Strategic Management Journal***, 17: 45-62.

Spreitzer, G. M. 1995. Psychological empowerment in the workplace: Dimensions, measurement, and validation. ***Academy of Management Journal***, 38: 1442-1465.

Speitzer, G. M., Kizilos, M. A., & Nason, S. W. 1997. A dimensional analysis of the relationship between psychological empowerment and effectiveness, satisfaction, and strain. ***Journal of Management***, 23: 679-704.

Spreitzer, G., Noble, D., Mishra, A., & Cooke, W. 1999. Predicting process improvement team performance in an automotive firm: Explicating the roles of trust and empowerment. In E. Mannix & M. Neale (Eds.) ***Research on Groups and Teams***, Greenwich, CT: JAI. 71-92.

Teece, D. J., Pisano, G., & Shuen, A. 1997. Dynamic capabilities and strategic management. ***Strategic Management Journal***, 18: 509-533.

Thomas, K. W., & Velthouse, B. A. 1990. Cognitive elements of empowerment: An 'interpretive' model of intrinsic task motivation. ***Academy of Management Review***, 15: 666-681.

Tsui, A. S., Pearce, J. L., Porter, L. W., & Tripoli, A. 1997. Alternative approaches to the employee-organization relationship: Does investment in employees pay off? ***Academy of Management Journal***, 40: 1089-1121.

Whitener, E. M. 2001. Do 'high commitment' human resource practices affect employee commitment: A cross-level analysis using hierarchical linear modeling. ***Journal of Management***, 27: 515-535.

Winter, S. G. 2003. Understanding dynamic capabilities. ***Strategic Management Journal***, 24: 991-995.

Wright, P. M., McMahan, G. C., & McWilliams, A. 1994. Human resources and sustained competitive advantage: A resource-based perspective. ***International Journal of Human Resource Management***, 5: 301-326.

Wright, P. M., Dunford, B., & Snell, S. A. 2001. Human resources and the resource-based view of the firm. ***Journal of Management***, 27: 701-721.

Wright, P. M., Gardner, T. M., Moynihan, L. M., & Allen, M. R. 2005. The relationship between HR practices and firm performance: Examining causal order. ***Personnel Psychology***, 58: 409-446.

Wright, P. & Nishii, L. (forthcoming) Strategic HRM and organizational behavior: Integrating multiple levels of analysis. In Guest., D., Paauwe, J., & Wright, P. (eds.) ***Human Resource Management and Performance: Progress and Prospects***., Blackwell Publishing.

Youndt, M. A., Snell, S. A., Dean, J. W., & Lepak, D. 1996. Human resource management, manufacturing strategy, and firm performance. ***Academy of Management Journal***, 39: 836-966.

Zatzick, C. D., & Iverson, R. D. 2006. High-involvement management and workforce reduction: Competitive advantage of disadvantage? ***Academy of Management Journal***, 49: 999-1015.

TABLE A1

Variables: Cronbach Alpas, Names, Items and Coefficients of Measurement Models

(1-7 scale, strongly disagree to strongly agree)

Knowledge & Skill Development Climate Factors

Value Learning New Skills (Cronbach's Alpha: .76)
1. (More Classes) I would like to take more training classes to improve my skills. [0.99***]
2. (New Skills Important) Learning new skill is more important to me today than it was 5 years ago. [0.90***]
3. (New Job Skills) Learning new job skills is important to me. [0.95***]

Need to Learn New Skills (Cronbach's Alpha: .77)
1. (More Skills) I have more skills than I need to perform my current job very well. [0.77***]
2. (Do Better) I could do better in my current job if I got more training. [-1.53***]
3. (Learn More Skills) I need to learn more skills to perform my current job very well. [-1.64***]

Receptivity to New Technologies (Cronbach's Alpha: .78)
1. (New Technologies Improve Conditions) Newer technologies improve working conditions. [0.88***]
2. (New Technologies Provide Skill Opportunities) Newer technologies provide me with opportunities to learn new skills. [1.13***]
3. (New Technologies - Better Job) Newer technologies provide opportunities to get promoted to higher level, higher paying jobs. [1.21***]

Opportunities to Improve Skills (Cronbach's Alpha: .88)
1. (Good Opportunity for Training) My company provides good opportunities to get more training. [1.62***]
2. (Good Opportunity for Skill) I have good opportunities to improve my skills here. [1.70***]
3. (More Training) I expect that I will receive more training in the near future. [1.46***]

Employment Security (Cronbach's Alpha: .76)
1. (Work Long Term) I expect to work here for a long-time. [1.16***]
2. (Company Best Full Time) My company does its best to keep employees working full time. [0.72***]
3. (Good Future) I have a good future in this company. [1.49***]

Performance Feedback (Cronbach's Alpha: .73)
1. (Meaningful Feedback) I get meaningful feedback on how well I am doing as I am working. [1.33***]
2. (Performance Knowledge) I know whether I am performing well or poorly. [0.46***]
3. (How Well) I can find out how well I am doing. [1.22***]

Work Climate Factors

Meaningfulness (Cronbach's Alpha: .84)
1. (Work Important) The work I do is important to me. [1.03***]
2. (Job is Personally Meaningful) My main job tasks are personally meaningful to me. [1.24***]
3. (Work Personally Rewarding) The work I do is personally rewarding. [1.34***]

Self-Determination (Cronbach's Alpha: .79)
1. (Decide Best) I get to decide how best to do my job. [1.32***]
2. (Independence) I have considerable opportunity for independence and freedom in how I do my job. [1.36***]
3. (Decide Work) I can decide on my own how to go about doing my work. [1.02***]

Working Conditions (Cronbach's Alpha: .80)
1. (Fair Treatment) I am treated fairly. [1.35***]
2. (Satisfied Working) I am satisfied with my working conditions. [1.35***]
3. (Safe) My company provides a healthy and safe place to work. [1.11***]

Work Intensity (Cronbach's Alpha: .77)
1. (Tense) I am often tense and wound-up at the end of my shift. [1.37***]
2. (Pain) I often experience some pain from my work. [1.03***]
3. (Exhaust) I often feel exhausted at the end of my shift. [1.20***]

Performance Capacities

Competence (Cronbach's Alpha: .78)
1. (Not Mastered Skill) I have not mastered the skills necessary for my job. [-.93***]
2. (Job Confidence) I am confident about my ability to do my main job. [1.00, metric]
3. (Capable of Performance) I am capable of performing all of my various job tasks. [1.09***]

Impact (Cronbach's Alpha: .70)
1. (Job Important to Work Area) How well I do my job is important to my work area. [1.00, metric]
2. (Significant Influence on Success) I have a significant influence on the success of our work area. [0.94***]
3. (Success Work Area - Job) It is important to the success of my work area that I do my job well. [1.11***]

*** Significant at the $\leq .01$ level.