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HUMAN RESOURCE MANAGEMENT, MANUFACTURING STRATEGY, AND FIRM PERFORMANCE

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This study examines two alternative views—universal and contingency—of the human resources (HR)–performance relationship in manufacturing settings. Results from a survey of 97 plants primarily support a contingency approach to human resource management (HRM). An HR system focused on human capital enhancement was directly related to multiple dimensions of operational performance (i.e., employee productivity, machine efficiency, and customer alignment), but subsequent analysis revealed that this main effect was predominately the result of linking human-capital-enhancing HR systems with a quality manufacturing strategy. Other manufacturing strategies also moderated the HR-performance relationship.

It has become a widely held premise that people provide organizations with an important source of sustainable competitive advantage (Prahalad, 1983; Pfeffer, 1994; Wright, McMahan, & McWilliams, 1994) and that the effective management of human capital, not physical capital, may be the ultimate determinant of organizational performance (cf. Adler, 1988; Reich, 1991). The value of human capital may be especially apparent in modern manufacturing organizations that have invested heavily in production innovations such as advanced manufacturing technology, statistical process control, and computer numerically controlled machine tools. Such initiatives tend to depend heavily on employee skills and commitment as key components in the value creation process (cf. Snell & Dean, 1992). Accordingly, it is instrumental for manufacturing firms to harness the productive potential of their employees in order to achieve superior performance.

Though human resource (HR) activities are frequently acknowledged to play a central role in linking employee capabilities with the performance

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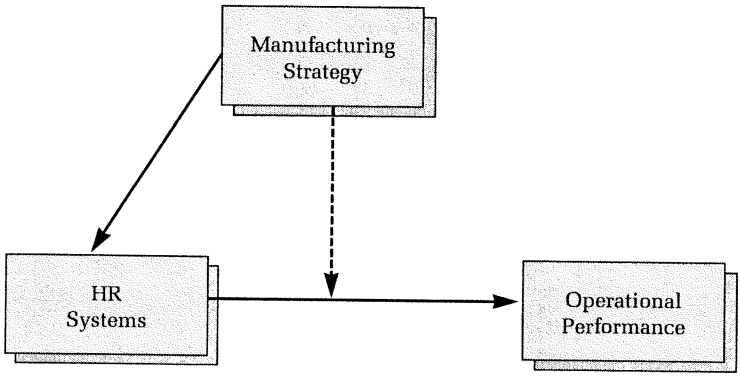
requirements of a firm, the specific form of this relationship is still open to debate. To date, two primary perspectives—a *universal* approach and a *contingency* approach—have been used to describe the link between human resource management (HRM) and firm performance. The universal, or ''best practices,'' perspective implies a direct relationship between particular approaches to human resources and performance, and the contingency perspective posits that an organization's strategic posture either augments or diminishes the impact of HR practices on performance. Analytically, this distinction has been operationally defined as main effects for the universal perspective and as interaction (or moderation) effects for the contingency perspective.

Although on the surface the universal and contingency perspectives may appear to be competing, we would argue that they can be complementary. A good deal of evidence suggests that individual HR practices, as well as internally consistent systems or bundles of HR practices, can indeed directly influence organizational performance (e.g., Arthur, 1994; Huselid, 1995; Kleiner, Block, Roomkin, & Salsburg, 1987; Kochan & Osterman, 1994; MacDuffie, 1995; Osterman, 1994; Pfeffer, 1994; Russell, Terborg, & Powers, 1985; Terpstra & Rozell, 1993). Going beyond these direct HR-performance relationships, however, other evidence suggests that the impact of HR practices on firm performance may be further enhanced when practices are matched with the competitive requirements inherent in a firm's strategic posture (e.g., Cappelli & Singh, 1992; Jackson, Schuler, & Rivero, 1989; Miles & Snow, 1984; Wright, Smart, & McMahan, 1995). In short, the universal approach helps researchers document the benefits of HR across all contexts, ceteris paribus, and the contingency perspective helps us look more deeply into organizational phenomena to derive more situationally specific theories and prescriptions for management practice. Although support for one perspective over another is ultimately an empirical issue, the two perspectives are not necessarily mutually exclusive.

As stated at the outset, these points are particularly germane to ongoing debate within the field of modern manufacturing management. In particular, the jury is still out on the value of ''deskilling'' versus ''upskilling'' approaches to HRM in manufacturers (Hirschhorn, 1984; Kern & Schumann, 1990; MacDuffie, 1995; Majchrzak, 1988; Walton & Susman, 1987; Zuboff, 1988). Indeed, many have taken the position that the upskilling or deskilling decision ultimately rides on the particular manufacturing strategy a firm adopts (Klein, 1991; Parthasarthy & Sethi, 1992; Upton, 1995). To date, however, much of the evidence remains anecdotal and continues to blur the distinction between what authors say manufacturers should do and what has actually worked in practice. With these issues in mind, we conducted this study with three overall objectives: to (1) determine the extent to which HR systems directly enhance performance, (2) analyze the moderating effects of manufacturing strategy on the relationship between HR and operational performance, and (3) assess the extent to which particular manufacturing strategies and HR systems are actually used in conjuction with one another

FIGURE 1
Human Resource Management, Manufacturing Strategy, and Performance



across an entire sample of manufacturers. Figure 1 summarizes our research model.

THEORETICAL BACKGROUND AND HYPOTHESES

To explore the relationships among HRM, manufacturing strategy, and performance, we first examine the theoretical and empirical support for both the universal and contingency perspectives.

The Universal Approach to HRM

Over the years, researchers have amassed a fair amount of empirical evidence that certain HR practices can directly affect firm performance. For example, studies show that comprehensive selection and training activities are frequently correlated with both productivity and firm performance (Kleiner et al., 1987; Russell et al., 1985; Terpstra & Rozell, 1993; U.S. Department of Labor, 1993). More recently, researchers have found that bundles, or systems, of HR practices had more influence on performance than individual practices working in isolation (Arthur, 1994; Huselid, 1995; MacDuffie, 1995). An underlying theme in this research is that firms should create a high degree of internal consistency, or fit, among their HR activities. As Baird and Meshoulam emphasized, a firm's HR activities "must fit with and support each other" (1988: 122) if peak organizational performance is to be achieved.

Supporting the HR systems and internal fit viewpoints, Arthur (1992, 1994) found that HR practices focused on enhancing employee commitment (e.g., decentralized decision making, comprehensive training, salaried compensation, employee participation) were related to higher performance. Conversely, he also found that HR practices that focused on control, efficiency, and the reduction of employee skills and discretion were associated with

increased turnover and poorer manufacturing performance. Similarly, in a study of high performance work practices, Huselid (1995) found that investments in HR activities such as incentive compensation, selective staffing techniques, and employee participation resulted in lower turnover, greater productivity, and increased organizational performance through their impact on employee skill development and motivation.

Although support for a universal, or best practices, approach to HR exists, there are notable differences across studies as to what constitutes a "best" practice (see Table 1 for a summary of best human resource practices). Nonetheless, several themes emerge across the studies. At their root, most of the studies focus on enhancing the skill base of employees through HR activities such as selective staffing, comprehensive training, and broad developmental efforts like job rotation and cross-utilization. Further, the studies tend to promote empowerment, participative problem solving, and teamwork with job redesign, group-based incentives, and a transition from hourly to salaried compensation for production workers.

The logic connecting these HR practices and firm performance is intuitively appealing and supported by theoretical arguments from a number of disciplines. From micro economics, human capital theory suggests that people possess skills, knowledge, and abilities that provide economic value to firms. Since firm investments to increase employee skills, knowledge, and abilities carry both out-of-pocket and opportunity costs, they are only justified if they produce future returns via increased productivity (Duncan & Hoffman, 1981; Rumberger, 1987; Tsang, 1987). In other words, increased productivity derived from human capital investments depends on the contribution of employees to a firm. Therefore, the higher the potential for employee contribution in a firm, the more likely it is that the firm will invest in human capital (via human resource management activities) and that these investments will lead to higher individual productivity and firm performance (Becker, 1976; Parnes, 1984). As many contemporary manufacturers are said to be increasing the potential for employee contributions in their production equations (Walton & Susman, 1987), human capital theory would suggest that HR practices can directly influence firm performance.

From strategic management and organizational economics, the resource-based theory of competitive advantage focuses on the role internal resources like employees play in developing and maintaining a firm's competitive capabilities (Barney, 1991; Wright & McMahan, 1992; Wright et al., 1994). In fact, numerous researchers have recently noted that *people* may be the ultimate source of sustained competitive advantage since traditional sources related to markets, financial capital, and scale economies have been weakened by globalization and other environmental changes (e.g., Reich, 1991; Ulrich & Lake, 1990). Pfeffer (1994), in particular, has made the case that firms wishing to succeed in today's global business environment must make appropriate HR investments to acquire and build employees who possess better skills and capabilities than their competitors. These theoretical arguments, bolstered by available empirical evidence, point to the performance

TABLE 1
Summary of Best Practices in Human Resources

Freund & Epstein (1984)	Arthur (1992)	Pfeffer (1994)	Delaney, Lewin, & Ichniowski (1989), Huselid (1995)	MacDuffie (1995)
Job enlargement	Broadly defined jobs	Employment security	Personnel selection	Work teams
Job rotation	Employee participation	Selective recruiting	Performance appraisal	Problem-solving groups
Job design	Formal dispute resolution	High wages	Incentive compensation	Employee suggestions
Formal training	Information sharing	Incentive pay	Job design	Job rotation
Personalized work hours	Highly skilled workers	Employee ownership	Grievance procedures	Decentralization
Suggestion systems	Self-managed teams	Information sharing	Information sharing	Recruitment and hiring
Quality circles	Extensive skills training	Participation	Attitude assessment	Contingent compensation
Salary for blue-collar workers	Extensive benefits	Empowerment	Labor/management participation	Status differentiation
Attitude surveys	High wages	Job redesign/teams	Recruiting intensity	Training of new employees
Production teams	Salaried workers	Training and skill development	Training hours	Training of experienced employees
Labor/management committees	Stock ownership	Cross-utilization	Promotion criteria (seniority vs. merit)	
Group productivity incentives		Cross-training		
Profit sharing		Symbolic egalitarianism		
Stock purchase plan		Wage compression		
		Promotion from within		

potential of a universal approach to HR focused on human capital enhancement. Accordingly, they suggest

> *Hypothesis 1: A human-capital-enhancing human resource system will be positively associated with operational performance.*

A Contingency Approach to SHRM

According to the contingency approach to strategic human resource management (SHRM), however, the impact of HR practices on firm performance is conditioned by an organization's strategic posture. For example, at a basic level, one might argue that HR is superfluous to performance in manufacturers unless human capital is somehow a central component of a firm's manufacturing strategy. That is, if a firm's approach to competition depends on, or makes use of, the talents and capabilities of employees, then HR practices would be more likely to have an impact on performance; otherwise the connection between HR and performance might be minimal. Indeed, the prevailing wisdom in manufacturing for many years was to replace labor with physical capital, thereby minimizing the effect that employees could have on performance and effectively removing HR from the production equation (Zuboff, 1988).

Although some firms still compete this way, a variety of strategies are used in contemporary manufacturing settings. In general terms, researchers have made a distinction between "low road" strategies that focus on cost reduction and "high road" strategies tending to focus on quality, variety, or service (Osterman, 1994: 179). Breaking this distinction down further, researchers have typically focused on three primary manufacturing strategies: cost, quality, and flexibility (e.g., Garvin, 1993; Leong, Snyder, & Ward, 1990; Schroeder, Anderson, & Cleveland, 1986; Skinner, 1969; Upton, 1995; Wheelwright, 1981). Each of these strategies, contingency theorists would argue, implies something different about the potential role of human resources in improving firm performance. Such a perspective suggests that the best HR system is contingent on the manufacturing strategy of a firm. A number of theoretical arguments support this position.

According to the behavioral perspective (Jackson et al., 1989; Miles & Snow, 1984; Schuler & Jackson, 1987; Wright & McMahan, 1992), for example, organizational characteristics such as strategy require unique attitudes and role behaviors if performance is to be effective, and HR activities are the primary means used to elicit and reinforce the kinds of employee behaviors a firm requires. Similarly, control theory advocates (e.g., Snell, 1992) contend that effective performance depends on matching appropriate HR practices with the administrative context established by a given strategy. Snell and Youndt (1995) found that the effect of input control, behavior control, and output control on sales growth and return on assets (ROA) was contingent on the clarity of cause-effect relationships and standards of performance (cf. Ouchi, 1977, 1978; Thompson, 1967).

Although the behavioral perspective and control theory tend to focus attention on managing a firm's current employees' behaviors in an effort to maximize performance, firms also focus on competency management through acquiring, developing, and utilizing employees with particular knowledge, skills, and abilities (Wright & Snell, 1991; Wright et al., 1995). More specifically, Wright and his colleagues (1995) found that organizations exhibited higher performance when they recruited and acquired employees possessing competencies consistent with the organizations' current strategies. Reversing the causal arrow, they also found that organizations exhibited higher performance when they sought out a strategy that matched their current employees' competencies (cf. Snow & Snell, 1993). This work provides empirical support for the general assumption that a tighter fit between human resource competencies and strategy leads to superior performance (Baird & Meshoulam, 1988; Miles & Snow, 1984, 1994).

Although these arguments lend credence to the contingency perspective in general, they do not speak directly to the context of manufacturing strategy and performance in particular. Thus, in the following sections we discuss the specific theoretical links we anticipated among manufacturing strategy, HR systems, and operational performance.

Cost strategies. Organizations can create customer value by either reducing costs or increasing benefits in the production equation (i.e., value = benefits/costs). Since people are one of the most costly and uncontrollable resources affecting this equation, the conventional wisdom in manufacturing had been to control costs by diminishing the amount of human capital needed in the production process by substituting mechanized systems for labor. Such technological advances not only have the potential to reduce costs through the elimination of people, but can also suppress the wage levels of remaining employees if the new production systems require lower skill levels and decision-making capabilities (Majchrzak, 1988). In many cases, programmed production systems and highly structured jobs have become de facto methods for deskilling manufacturing workers and reducing their discretion (Helfgott, 1988: 67).

In contexts in which production systems are purposely designed to minimize the impact of individual differences, the most consistent approach to HR would be one based on notions of command and control, where emphasis is placed on efficiently managing a low-skilled, manual workforce. In such settings, the use of elaborate staffing systems, such as comprehensive employment testing, which seeks to find the best qualified candidates, would have a negligible impact on performance (Hofstede, 1978). Furthermore, as work is routinized to the point at which labor is essentially a commodity, the added expense of elaborate training systems would rarely be justified since their utility tends to be diminished (Cascio, 1991). Therefore, training efforts would only need to focus on general information, such as company policies and procedures, or be used as a remedial activity aimed at correcting skill deficiencies, not as a method for driving superior performance.

Performance appraisal would also need to concentrate on areas such as error reduction and process standardization in order to reduce costs and improve efficiency (Majchrzak, 1988). Research suggests that results-based appraisal methods would likely be most appropriate for these purposes (cf. Ouchi, 1977; Snell & Youndt, 1995). However, a developmental approach to appraisal focused on strengthening employee skills and capabilities would likely have minimal utility (as noted, employees are accorded little discretion). At the extreme, appraisal systems would exist merely as perfunctory methods for detecting and correcting errors. As for pay systems, most manufacturers have relied on hourly pay for their lower-level workers in order to maintain control over labor costs (Gomez-Mejia & Balkin, 1992). If incentive compensation were to be used in conjunction with a cost strategy, we would expect it to focus on individual performance since contributions can easily be measured and attributed to specific individuals in standardized production settings (Gerhart & Milkovich, 1993; Gomez-Mejia & Balkin, 1992). In short, administrative HR systems (i.e., selection for manual skills, policies and procedures training, results-based performance appraisal, hourly pay, and individual incentives) are consistent with the requirements of a cost strategy focused on standardizing processes, reducing errors, and maximizing production efficiency.

Quality strategies. In contrast to traditional cost strategies that can encourage deskilling are quality strategies that focus on continually improving manufacturing processes to increase product reliability and customer satisfaction (Fine & Hax, 1985; Garvin, 1993). In such strategic contexts, the ultimate determinant of organizational competitiveness may be the intellectual capital of firms. As Walton and Susman noted, "In plant after plant we see . . . output is more sensitive to variations in human skills, knowledge, and attitudes and to mental effort rather than physical effort" (1987: 99). More specifically, employees in such environments are required to make the transition from *touch labor,* where their responsibilities are limited to only the physical execution of work, to *knowledge work,* where their responsibilities expand to include a richer array of activities such as planning, troubleshooting, problem solving, quality assurance, scheduling, maintenance, and so forth (Ayers & Miller, 1986; Helfgott, 1988; Hirschhorn, 1984; Kern & Schumann, 1990; Shaiken, 1984; Snell & Dean, 1994; Wilkinson, 1983; Zuboff, 1988).

Indeed, most total quality management theorists (e.g., Crosby, 1979; Deming, 1982, 1986) have argued that skill acquisition and development lie at the heart of a successful quality strategy. More specifically, the technical and problem-solving skills of employees tend to be more important in total quality environments (Hayes, Wheelwright, & Clark, 1988) because employees must understand statistical process control (SPC) as well as be able to work in teams to diagnose and solve problems. Reflecting this relationship, selective staffing and comprehensive training programs that emphasize attracting and developing individuals with superior technical, problem-

solving, and interpersonal skills should be instrumental for increasing productivity and ensuring conformance to customer requirements.

Though many quality theorists have scorned the use of performance appraisal (cf. Deming, 1986), this disdain has been premised on managers' focus on the results and administrative aspects of evaluation to the exclusion of employee behavioral and developmental issues. More recently, observers such as Blackburn and Rosen (1993) and Ghorpade and Chen (1995) have noted that, in addition to skill development, performance appraisal plays a crucial developmental role in quality-focused organizations. The concept of continuous improvement that underlies most quality initiatives, for example, suggests that diagnosis and employee feedback are required for eliminating defects, increasing product reliability, and conforming to product specifications.

Given the team-based, problem-solving nature of total quality management programs, firms adopting a quality strategy must facilitate employee interaction and information exchange. Researchers (Gomez-Mejia & Balkin, 1992; Pearce, 1987) have contended that group-based performance incentives promote these behaviors in production environments characterized by a high degree of interdependence, where no clear identification of individual contributions can be made. Similarly, a shift from hourly to salaried compensation tends to promote egalitarianism, which facilitates group information sharing and problem solving (cf. Arthur, 1992; Pfeffer, 1994). In summary, human-capital-enhancing HR systems—those with such features as selective staffing, selection for technical and problem-solving skills, comprehensive training, training for technical and problem-solving skills, developmental and behavior-based performance appraisal, group incentives, and salaried compensation—that focus on skill acquisition and development are consistent with the performance requirements underlying a quality strategy.

Flexibility strategies. As more and more manufacturers are achieving low-cost and high-quality market positions, firms are seeking alternative sources of competitive advantage. Increasingly, manufacturers concentrate on flexibility as a way to outdistance their competition (Upton, 1995). In general terms, flexibility refers to a firm's agility, adaptability, and responsiveness. However, flexibility remains a very elusive concept and conjures up many different meanings among manufacturers (Dean & Snell, 1995; Upton, 1995). For example, some firms view flexibility as the ability to scale production up and down quickly in an effort to increase delivery performance, and other firms see flexibility as the ability to quickly expand the scope of their product offerings by producing small lots and accommodating nonstandard orders (DeMeyer, Nakane, Miller, & Ferdows, 1989; Leong et al., 1990).

In the past, many advocates of a flexibility strategy argued that agility and responsiveness could be achieved through sophisticated technologies such as computer-integrated manufacturing (CIM). However, current research findings have shown that manufacturing flexibility depends much more on people than on technical factors per se. As Upton noted,

> Although high levels of computer integration can provide critically needed advantages in quality and cost competitiveness, all the data in my study point to one conclusion: Operational flexibility is determined primarily by a plant's operators and the extent to which managers cultivate, measure, and communicate with them. Equipment and computer integration are secondary (1995: 75).

Consequently, if firms want to successfully pursue a flexibility strategy, they must develop and maintain a highly skilled, technologically competent, and adaptable workforce that can deal with nonroutine and exceptional circumstances requiring creativity and initiative (Adler, 1988; Hayes et al., 1988; Upton, 1995).

The above reasoning suggests that flexibility strategies would likely be complemented by comprehensive staffing systems aimed at acquiring talented employees who possess high levels of both problem-solving and technical skills that allow them to understand an entire production process, thereby facilitating quick production line and product changes (cf. Parthasarthy & Sethi, 1992). Similarly, comprehensive training programs focusing on both problem-solving and technical skills would be advantageous in such environments.

Continuous employee feedback and developmental performance appraisal would likely be of great value to manufacturers pursuing flexibility strategies because unpredictable environments require mutual adjustment for coordination (March & Simon, 1958; Thompson, 1967). Flexibility strategies would also likely benefit from compensation systems that support a multiskilled and adaptable workforce. According to Gomez-Mejia and Balkin (1992), skill-based pay tends to work best in circumstances requiring adaptability, where technology and organizational structure experience frequent changes, and where employee exchanges are common. Thus, skill-based pay should be particularly beneficial to firms seeking to increase their flexibility by frequently scaling up and down production processes, quickly adapting to changes in product mix, routinely handling nonstandard orders, and the like. Additionally, since flexible production environments are characterized by a high degree of employee interdependence and require group problem solving, group-based performance incentives are likely to be appropriate. In short, much like quality strategies, flexibility manufacturing strategies require human-capital-enhancing HR systems that focus on skill acquisition and development in an effort to facilitate adaptability and responsiveness.

The above arguments show that although firms can pursue a multitude of manufacturing strategies, both independently and in concert, each of their strategic orientations implies a somewhat different approach to HR (Jackson et al., 1989). Cost manufacturing strategies tend to focus on internal effectiveness, thereby reducing the impact of human capital on performance. Accordingly, administrative approaches to HR that focus on standardized policies and procedures would likely be most appropriate. On the other hand, quality and flexibility manufacturing strategies tend to require the upskilling of

employees, thereby necessitating a human-capital-enhancing approach to HR that focuses on skill acquisition and development. Table 2 summarizes the distinctions between administrative HR systems and those designed to enhance the level of human capital within firms. Taken as a whole, the contingency perspective suggests the relationship between various HR systems and performance depends upon the type of manufacturing strategy being pursued. More specifically,

> *Hypothesis 2: Manufacturing strategy moderates the relationship between human resource systems and operational performance.*
>
> *Hypothesis 2a: A cost manufacturing strategy will positively moderate the relationship between an administrative human resource system and operational performance.*
>
> *Hypothesis 2b: A quality manufacturing strategy will positively moderate the relationship between a human-capital-enhancing human resource system and operational performance.*
>
> *Hypothesis 2c: A flexibility manufacturing strategy will positively moderate the relationship between a human-capital-enhancing human resource system and operational performance.*

In summary, we do not view the universal and contingency perspectives as necessarily competing, and our hypotheses are not set up to convey a critical test between the two. Rather, a universal approach implies a main effect between HR systems and performance, whereas a contingency perspective implies a set of interaction effects between HR systems and manufactur-

TABLE 2
Summary of Administrative and Human-Capital-Enhancing Human Resource Practices

HR Practices	Administrative	Human-Capital-Enhancing
Staffing	Physical skills	Selective staffing Technical skills Problem-solving skills
Training	Policies Procedures	Comprehensive training Technical skills Problem-solving skills
Performance appraisal	Administrative Results-based	Developmental Behavior-based
Compensation	Hourly Individual incentives Internal equity	Salary Skill-based Group incentives External equity

ing strategy as they relate to performance. Of course, both of these conditions can exist simultaneously. In such a situation a main effect is no longer a *general* effect, but rather a *conditional* effect that depends on the specific form of the interactions (Aiken & West, 1991; Jaccard, Turrisi, & Wan, 1990). We explore both the analytical and interpretational implications of this proposition in the sections below.

METHODS

Data and Procedures

A potential pool of 512 manufacturing plants was drawn from several segments of the metal-working industry: primary metals (Standard Industrial Classification [SIC] 33), fabricated metal products (SIC 34), industrial and metal-working machinery (SIC 35), transportation equipment (SIC 36), and precision instruments (SIC 37). We identified plants within these industries using the *Harris Pennsylvania Industrial Directory*. Plants, rather than entire firms, were the units of analysis because manufacturers frequently have several different production facilities that can be managed in very different ways.

General managers. The initial contacts for this study were the general managers of the plants or business units at each site. In the context of a larger research project, we mailed each general manager a cover letter and questionnaire measuring HRM activities and plant performance. After three weeks, a prompting letter and a second questionnaire identical to the first were mailed to all general managers who had not yet responded. A final total of 160 (31 percent) of the general managers participated in the study.

Functional managers. Each general manager was also asked to provide the names of managers in each of four functions: operations, quality, production, and human resources. Of the 160 participating general managers, 123 provided the names of functional managers. We asked each functional manager about the process and content of the selection, training, performance appraisal, and rewards systems used in their organizations. After three weeks, a second letter and questionnaire were mailed to nonresponsive managers. In total, 102 (82 percent) of the operations managers, 109 (89 percent) of the quality, 97 (79 percent) of the production control, and 90 (73 percent) of the HR managers participated.

Approximately one and a half years after the initial surveys were completed, we mailed a second wave of questionnaires to all managers who had responded to the first wave. The questionnaires in this wave measured manufacturing strategy and performance and were identical for all managers. A case was considered valid if we had at least two informants per site for each variable. Using this criteria, our final sample size was 97. A comparison of plants in our final sample with a random sample of nonparticipating plants showed no significant differences in size, unionization, and industry membership (see descriptions of these measures below).

Measures

Because we had multiple respondents for each variable, mean values across respondents were used in all cases for subsequent analysis. To make certain that data could be aggregated to the plant level, we calculated interrater agreement (IRA) according to the methods prescribed by James, Demaree, and Wolf (1984, 1993). (For further discussions of r_{wg} as a measure of interrater agreement, see Kozlowski and Hattrup [1992] and Schmidt and Hunter [1989]).

Operational performance. Operational performance was measured in both waves of questionnaires and assessed each firm's current performance relative to other firms in its industry in terms of product quality, employee morale, on-time delivery, inventory management, employee productivity, equipment utilization, production lead time, and scrap minimization. For the purposes of this study, we chose to use self-report performance measures for several reasons. First, since our study focused on plants, many of which were cost centers as opposed to profit centers, objective financial performance measures were unavailable for our entire sample. Second, because of the cross-industry nature of our sample, standardized measures of these dimensions were unavailable for comparisons. Accordingly, we followed Beard and Dess (1981) and asked managers to assess their own plant's performance relative to that of rivals within their industry.

Recognizing the potential problems with self-report measures, we took several steps to ensure the reliability and validity of the indexes used in this study. In accordance with past research, we averaged the performance measures for the two time periods (t, t + 1.5 years) to help guard against random fluctuations and anomalies in the data. In addition, to minimize other effects from random error, we used multiple items and multiple respondents to assess performance. Although any single item or observation contains true variance as well as systematic and random error, averaging across alternative measures reduces the random error component.

Beyond issues of reliability (such as random error), systematic error that might detract from the validity of our performance measures was also a concern. To ensure content validity, we used a representative sample of items from the entire construct domain of operational performance: product quality, employee morale, on-time delivery, inventory management, employee productivity, equipment utilization, production lead time, and scrap minimization. As in other research focused on the performance construct, these measures include both indicators of efficiency and effectiveness (cf. Venkatraman & Ramanujam, 1986). To assess the convergence and divergence among these items (i.e., construct validity), we used principal components factor analysis with varimax rotation to determine the underlying dimensionality of our performance measures. A two-stage rule was used to categorize items into factors (cf. Nunnally, 1978). First, to make certain that a given item represented the construct underlying each factor, we used a factor weight of .40 as the minimum cutoff. Second, to avoid problems of cross-

loadings, we required that each item be clearly defined by only one factor. Operationally, if the difference between weights for any given item was less than .10 across factors, we deleted the item from the final scale. Each of the performance items met these criteria. The final factor structure revealed three stable factors representing *machine efficiency* (e.g., equipment utilization, scrap minimization), *customer alignment* (e.g., product quality, on-time delivery), and *employee productivity* (e.g., employee morale, employee productivity). Each factor's eigenvalue and Cronbach alpha exceeded 1.00 and .60, respectively.

Human resource management practices. The HR practices used in this study focused on the four most commonly recognized areas of HRM: staffing, training, performance appraisal, and compensation. *Staffing* practices included four different scales used to measure (1) selectivity in hiring, (2) selection for manual and physical skills, (3) selection for technical skills, and (4) selection for problem-solving skills. *Training* practices also included four different scales used to measure (1) comprehensiveness, (2) policies and procedural training, (3) training for technical skills, and (4) training for problem-solving skills. *Performance appraisal* practices included three different scales used to measure (1) developmental focus, (2) results-based appraisal, and (3) behavior-based appraisal. *Compensation systems* included (1) hourly pay, (2) salary, (3) skill-based pay, (4) individual incentives, (5) group incentives, (6) individual equity, and (7) external equity.

To empirically validate our multi-item scales, we performed confirmatory factor analysis using maximum likelihood extraction (Jöreskog & Lawley, 1968). Separate factor analyses were performed for each HR area (i.e., staffing, training, performance appraisal, and compensation) in order to maintain appropriate sample-size-to-factor ratios (Nunnally, 1978). Following the procedures recommended by Gorsuch (1983), we used a series of chi-square tests to confirm the a priori factor structure of our measures (staffing, $\chi^2 = 370.78$, $p < .01$; training, $\chi^2 = 415.97$, $p < .01$; appraisal, $\chi^2 = 451.02$, $p < .01$; compensation, $\chi^2 = 267.83$, $p < .01$). This analysis as well as scree tests (Cattell, 1966) of eigenvalues plotted against factors confirmed our proposed factor structure. Each factor's eigenvalue and Cronbach alpha exceeded 1.00 and .70, respectively.

Next, we followed the procedures used by MacDuffie (1995), Osterman (1994), and Arthur (1992, 1994) to combine the HR practices into two aggregate indexes reflecting (1) the administrative HR system and (2) the human-capital-enhancing HR system. Such an additive approach to combining HR practices into an index suggests that firms can improve performance either by increasing the number of practices they employ within the system or by using the practices in an HR system in a more comprehensive and widespread manner. This approach is conceptually and empirically better than a multiplicative approach to creating HR systems because it does not reduce the index value to zero if a single HR practice is absent from a system. Instead, the absence of a practice only weakens the net effect of the system (MacDuffie, 1995; Osterman, 1994).

Specifically, the index for the administrative HR system included the following scales: selection for manual and physical skills, policies and procedures training, results-based performance appraisal, individual equity, individual incentives, and hourly pay. The index for the human-capital-enhancing HR system consisted of the following: selective staffing, selection for technical and problem-solving skills, comprehensive training, training for technical and problem-solving skills, developmental and behavior-based performance appraisal, external equity, group incentives, skill-based pay, and salaried compensation. As noted earlier, these groupings are based on normative theory derived from previous studies on the strategic management of human resources (e.g., Arthur, 1992, 1994; Huselid, 1995; MacDuffie, 1995; Pfeffer, 1994). Cronbach alphas for the administrative HR system and the human-capital-enhancing system were .61 and .68, respectively.

Manufacturing strategy. Manufacturing strategy was measured by 31 items that operationally defined potential competitive priorities in manufacturing, including cost, quality, and flexibility. As there are minor differences in the sets of manufacturing strategies used by various authors, we used principal components factor analysis with varimax rotation to determine the underlying dimensionality of our manufacturing strategy measures. Again, a two-stage rule was used to assign items to factors (cf. Nunnally, 1978).

This analysis produced four stable factors representing quality, delivery flexibility, scope flexibility, and cost, each of which had a eigenvalue above 1.00 and a Cronbach alpha greater than .70. The first factor, *quality,* was comprised of virtually every quality-related item on our list (e.g., dependability, product performance). Two additional quality-related items, solving customer problems immediately and meeting customer expectations, loaded both on quality and a second factor and thus were not included in this scale. The second strategy dimension, *delivery flexibility,* involved releasing new products and making deliveries on time, scaling production up or down quickly, and generally being flexible. Interestingly, the high productivity item also loaded on this factor, perhaps indicating the cost advantages of doing things quickly (cf. Stalk & Hout, 1990). The third dimension, *scope flexibility* (Parthasarthy & Sethi, 1992), contained items related to adjusting product mix, handling nonstandard orders, and making products to order in small lots. The final dimension, *cost,* was made up of items dealing with low labor, material, and unit costs. This categorization of manufacturing strategies parallels those in the literature (e.g., Leong et al., 1990; Marucheck, Pannesi, & Anderson, 1990; Schroeder et al., 1986; Skinner, 1969; Upton, 1995; Wheelwright, 1981). As flexibility is a somewhat vague and developing construct (Upton, 1995), it is not surprising that we found two distinct dimensions of flexibility.

Organizational size. Since large organizations may be more likely than small ones to have well-developed HR practices, we controlled for any extraneous effects of organizational *size.* Following Kimberly (1976), size was measured as the natural logarithmic transformation of the number of full-

time employees, which was obtained from Standard & Poor's *Directory of Corporate Affiliations.*

Industry environment. We included three additional variables in the study in order to eliminate their extraneous effects prior to examining our hypotheses. The first was *munificence.* Following Keats and Hitt (1988), we assessed growth in each industry by regressing the natural logarithm of sales against time. The antilog of the regression slope was used as an index of munificence. For *dynamism,* we used the antilog of the standard error term from each regression equation described above to assess the degree of change in industry sales. For *complexity,* the MINL formula (Schmalensee, 1977) of sales concentration was used as a surrogate for the H-index of complexity. Sources for this data were the *Commerce Department's Survey of Manufactures* and *Moody's Industrials.*

RESULTS

Table 3 shows the means, standard deviations, interrater agreements, and correlation matrix for all variables.

Hypothesis Testing

To test our specific hypotheses, we used moderated hierarchical regression analysis in order to isolate the main effects of the HR systems on performance and to independently assess how each manufacturing strategy moderated the relationship between HR and performance. Our overall procedure for each dependent performance variable (i.e., customer alignment, employee productivity, and equipment efficiency) was the same. In step 1, the three environmental variables (i.e., munificence, complexity, and dynamism) and firm size were added as a set. We added these variables first to control for any extraneous effects across industries and organizations. In step 2, the set of manufacturing strategies (i.e., cost, quality, delivery flexibility, and scope flexibility) were entered in order to control for any effects strategy might have on HR systems, operational performance, or their relationship. Significant effects here would indicate a direct relationship between manufacturing strategy and performance. In step 3, the two HR systems (i.e., administrative HR and human-capital-enhancing HR) were entered as a set to test the universal approach to HR. A significant effect here between a human-capital-enhancing HR system and operational performance would provide support for Hypothesis 1. In addition, this procedure eliminated the main effects of HR systems prior to examining potential HR-strategy interaction effects (cf. Stone & Hollenbeck, 1989). Finally, in step 4, the cross products of each of the manufacturing strategies and the HR systems (e.g., cost by administrative HR, cost by human-capital-enhancing HR, quality by administrative HR, quality by human-capital-enhancing HR) were entered as a set. Entering the eight interaction terms simultaneously controlled for possible multicollinearity among the variables. Evidence of moderation exists when the set of interaction terms accounts for significant residual variance in the dependent variable. Significant effects here would indicate that manufacturing strategy

TABLE 3
Descriptive Statistics[a]

Variables	Mean	s.d.	IRA[b]	1	2	3	4	5	6	7	8	9	10	11	12
1. Munificence	1.08	0.06													
2. Complexity	7.24	11.23		−.25											
3. Dynamism	1.02	0.02		.85	−.14										
4. Size	7.28	2.21		.02	.02	.08									
5. Customer alignment	3.65	0.51	.87	.16	.13	.07	−.05								
6. Employee productivity	3.32	0.59	.91	.03	.03	.03	.01	.39							
7. Machine efficiency	3.17	0.53	.92	.17	−.04	.15	.18	.33	.31						
8. Quality strategy	5.62	0.71	.94	.07	.07	.03	−.18	.46	.17	.27					
9. Delivery flexibility strategy	4.91	0.73	.94	.04	−.04	.01	−.06	.39	.42	.10	.49				
10. Scope flexibility strategy	4.80	0.88	.88	−.14	−.09	−.11	−.17	.04	.22	−.07	.17	.44			
11. Cost strategy	4.75	0.83	.81	.08	−.09	.02	.07	.15	.12	−.02	.02	.26	−.13		
12. Administrative HR	3.28	0.68	.83	.08	−.04	.11	.07	.26	.27	.14	.08	−.02	.02	.05	
13. Human-capital-enhancing HR	2.80	0.59	.86	−.03	.12	−.02	.11	.32	.38	.27	.27	.00	−.09	−.03	.56

[a] $N = 97$. Correlations greater than .20 are significant at $p < .05$; correlations greater than .27 are significant at $p < .01$.
[b] IRA = interrater agreement.

moderated the relationship between HR systems and performance, thereby providing support for Hypothesis 2. We used individual interaction terms (e.g., cost by administrative HR) to test our specific moderation hypotheses (2a, 2b, and 2c). Support for these hypotheses would exist if the individual interaction terms accounted for significant residual variance in operational performance. Tables 4–6 show the results of our moderated hierarchical regression analyses.

Main effects/universal approach. With industry environment, firm size, and manufacturing strategy controlled, the HR systems as a set were significantly related to customer alignment ($\Delta R^2 = .07$, $F = 4.60$, $p < .01$) and employee productivity ($\Delta R^2 = .14$, $F = 8.68$, $p < .01$). Specifically, the human-capital-enhancing index had a significant main effect on employee productivity ($b = 0.36$, $p < .01$) and was marginally associated with customer alignment ($b = 0.18$, $p < .10$) and equipment efficiency ($b = 0.20$, $p < .10$). Overall, these findings provide preliminary support for Hypothesis 1 and suggest that, other things being equal, an HR system focused on enhancing human capital is a valuable approach for strengthening operational performance in manufacturing.

Moderating effects/contingency approach. Beyond the direct relationships between human-capital-enhancing HR and performance, we also found support for the contingency approach to HR. As a set, the manufacturing strategy–HR interaction terms accounted for significant incremental variance in customer alignment ($\Delta R^2 = .12$, $F = 2.20$, $p < .05$). This result indicates that manufacturing strategy does in fact moderate the HR-performance relationship, thereby providing support for Hypothesis 2, the basic moderation hypothesis. In testing the more specific moderation hypotheses, we found that a cost strategy interacts with an administrative HR system to predict equipment efficiency ($b = 0.81$, $p < .05$), thereby providing some support for Hypothesis 2a. Additionally, a quality strategy interacted with the human-capital-enhancing HR system to predict customer alignment ($b = 2.70$, $p < .05$), employee productivity ($b = 2.42$, $p < .05$), and equipment efficiency ($b = 2.90$, $p < .05$), thereby providing consistent support for Hypothesis 2b. Finally, delivery flexibility interacted with an administrative HR system to predict customer alignment ($b = 1.41$, $p < .05$). This result was counter to our anticipated results and therefore provides no support for Hypothesis 2c. Overall, however, the moderation results provide strong evidence that manufacturing strategy influences the HR-performance relationship with a quality strategy interacting with human-capital-enhancing HR to predict performance and delivery flexibility and cost strategies interacting with administrative HR to predict performance. In short, maximizing performance appears to depend on properly aligning HR systems with manufacturing strategy.

As we stated earlier, main effects become conditional in the presence of significant interactions (Aiken & West, 1991; Jaccard et al., 1990). Accordingly, we went back and revisited the universal findings for human-capital-enhancing HR. Plotting the interactions of human-capital-enhancing HR and a quality strategy showed clearly that although human-capital-enhancing HR

TABLE 4
Results of Regression Analysis for HR Systems, Manufacturing Strategy, and Customer Alignment[a]

Variables	Step 1	Step 2	Step 3	Step 4
Control				
Size	−0.04	0.02	−0.02	−0.08
Munificence	0.48*	0.35*	0.36*	0.43*
Complexity	0.22*	0.18*	0.17*	0.21*
Dynamism	−0.29	−0.22	−0.24	−0.30†
Manufacturing strategies				
Cost strategy		0.07	0.05	0.04
Quality strategy		0.34**	0.25*	−0.72
Delivery flexibility strategy		0.23*	0.27*	−0.23
Scope flexibility strategy		−0.06	−0.06	0.25
Human resource management systems				
Administrative HR			0.14	−0.13
Human-capital-enhancing HR			0.18†	−1.61†[b]
Strategy/HR interactions				
Cost × administrative HR				0.21
Cost × human-capital-enhancing HR				−0.18
Quality × administrative HR				−0.42
Quality × human-capital-enhancing HR				2.70*
Delivery × administrative HR				1.41*
Delivery × human-capital-enhancing HR				−0.63
Scope × administrative HR				−0.85*
Scope × human-capital-enhancing HR				0.35
ΔR^2		0.22	0.07	0.12
R^2	0.09	0.31	0.38	0.50
ΔF		7.55**	4.60**	2.20*
F	2.24†	5.21**	5.42**	4.32**

[a] $N = 97$. Standardized regression coefficients are shown.

[b] The main effects in step 4 of our regression equations are simply the effect of human-capital-enhancing HR on performance when manufacturing strategy is zero. This fact creates interpretation problems since our interval scales do not include a zero value. Theoretically, it may be useful to think of a world in which manufacturing strategy equals zero but, as Tate (1984) and other have suggested, it only makes practical and statistical sense to examine conditional main effects over the range of one's data. Accordingly, we transformed our data and performed some exploratory analysis calculating human-capital-enhancing HR coefficients in the full regression model across the relevant range of strategy levels present in our sample. This analysis yielded all positive coefficients for human-capital-enhancing HR, thereby indicating that the conditional main effect of such HR practices on performance is positive across the applicable levels of manufacturing strategy in our sample.

† $p < .10$
* $p < .05$
** $p < .01$

has a slight positive main effect, the results are primarily due to the large performance impact of linking human-capital-enhancing HR with a quality manufacturing strategy (see Figure 2). These findings imply that it is misleading to suggest that human-capital-enhancing HR has a general main effect on performance.

TABLE 5
Results of Regression Analysis for HR Systems, Manufacturing Strategy, and Employee Productivity

Variables	Step 1	Step 2	Step 3	Step 4
Control				
Size	−0.04	−0.01	−0.07	−0.12
Munificence	0.25	0.18	0.20	0.16
Complexity	0.13	0.13	0.11	0.10
Dynamism	−0.15	−0.09	−0.10	−0.10
Manufacturing strategies				
Cost strategy		0.11	0.12	−0.17
Quality strategy		0.13	−0.02	−0.89
Delivery flexibility strategy		0.21†	0.28*	0.12
Scope flexibility strategy		0.02	0.04	−0.04
Human resource management systems				
Administrative HR			0.08	0.32
Human-capital-enhancing HR			0.36**	−2.16*
Strategy/HR interactions				
Cost × administrative HR				0.41
Cost × human-capital-enhancing HR				0.09
Quality × administrative HR				−0.41
Quality × human-capital-enhancing HR				2.42*
Delivery × administrative HR				−0.09†
Delivery × human-capital-enhancing HR				0.39
Scope × administrative HR				−0.18
Scope × human-capital-enhancing HR				0.23
ΔR^2		0.12	0.14	0.07
R^2	0.03	0.15	0.29	0.36
ΔF		3.14*	8.68**	1.13
F	0.71	1.96†	3.57**	2.52**

[a] $N = 97$. Standardized regression coefficients are shown.
† $p < .10$
* $p < .05$
** $p < .01$

Additional Analyses

In addition to the above hypothesis-testing procedures, two additional analyses were conducted to supplement our findings. First, recognizing that manufacturing strategies are used in combination rather than in isolation, we performed cluster analysis on the four manufacturing strategies orientations. This analysis yielded five clusters that we labeled (1) quality emphasis, (2) cost and quality emphasis, (3) cost, quality, delivery flexibility, and scope flexibility emphasis, (4) quality and delivery flexibility emphasis, and (5) no strategic emphasis. We repeated our regression analyses procedures substituting these strategy clusters for the individual strategy variables. These regressions provided no evidence that the strategy clusters directly impacted manufacturing performance or interacted with HR practices to predict performance.

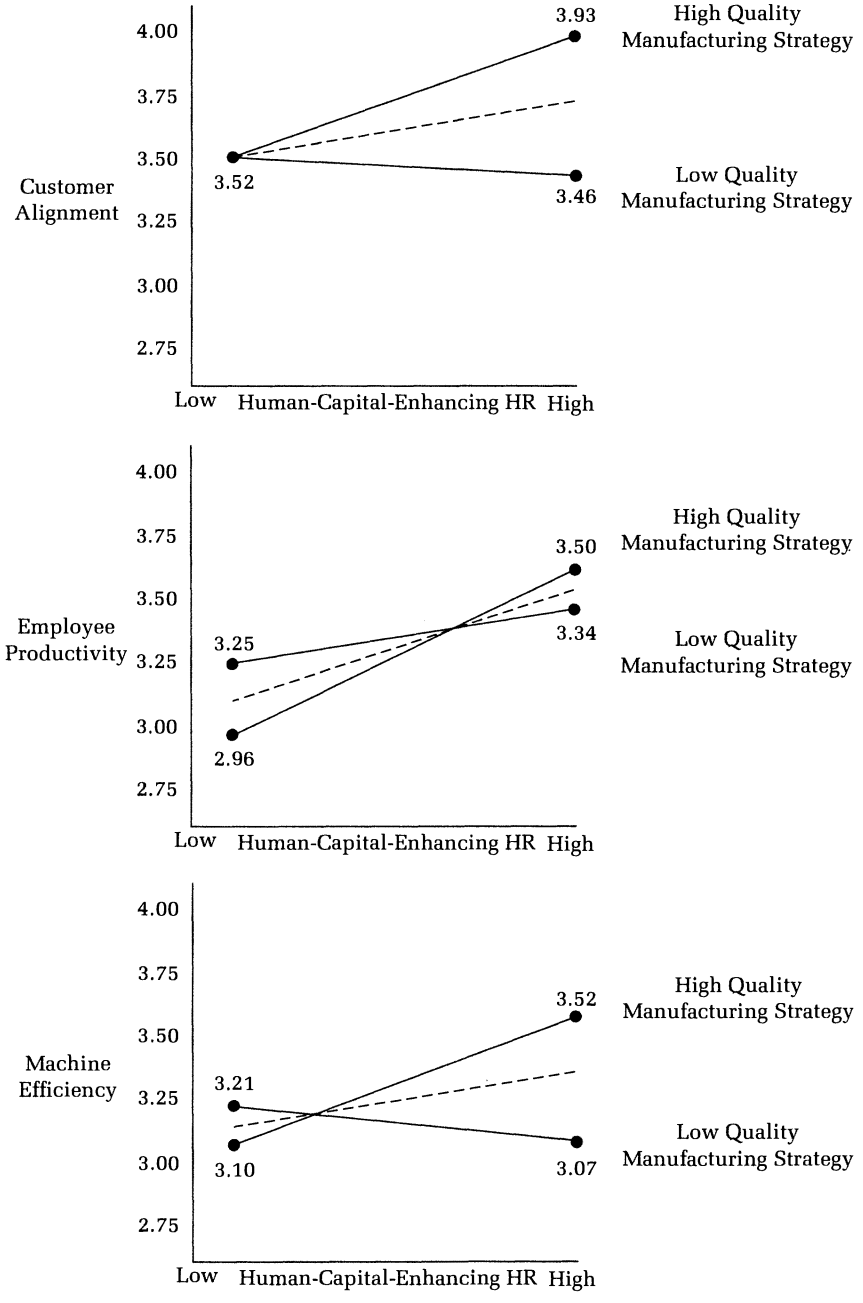
TABLE 6
Results of Regression Analysis for HR Systems, Manufacturing Strategy, and Equipment Efficiency

Variables	Step 1	Step 2	Step 3	Step 4
Control				
Size	0.18†	0.23*	0.20*	0.14
Munificence	0.19	0.13	0.14	0.11
Complexity	0.00	−0.04	−0.06	−0.07
Dynamism	−0.03	−0.01	−0.00	0.02
Manufacturing strategies				
Cost strategy		−0.06	−0.06	−0.27
Quality strategy		0.33**	0.25*	−0.75
Delivery flexibility strategy		0.01	0.02	0.40
Scope flexibility strategy		−0.09	−0.07	−0.01
Human resource management systems				
Administrative HR			−0.01	0.09
Human-capital-enhancing HR			0.20†	−1.47
Strategy/HR interactions				
Cost × administrative HR				0.81*
Cost × human-capital-enhancing HR				−0.40
Quality × administrative HR				−0.67
Quality × human-capital-enhancing HR				2.90*
Delivery × administrative HR				−0.65
Delivery × human-capital-enhancing HR				0.12
Scope × administrative HR				0.54
Scope × human-capital-enhancing HR				−0.66
ΔR^2		0.10	0.03	0.09
R^2	0.06	0.16	0.19	0.28
ΔF		2.69*	1.63	1.15
F	1.55	2.18*	2.09*	1.70*

[a] $N = 97$. Standardized regression coefficients are shown.
† $p < .10$
* $p < .05$
** $p < .01$

Second, we wanted to assess the extent to which particular HR systems and manufacturing strategies were actually used in conjunction with one another across the entire sample of participating firms. Accordingly, we regressed each HR system on the four manufacturing strategies, again controlling for industry environment and firm size. The strategies as a set were predicitive of the human-capital-enhancing HR system ($\Delta R^2 = .11$, $F = 2.97$, $p < .05$), with the quality strategy ($b = 0.39$, $p < .05$) being positively associated with the human-capital-enhancing HR system. However, the manufacturing strategies as a set were not predictive of the administrative HR system ($\Delta R^2 = .02$, $F = 0.56$, n.s.). These results suggested that, with the exception of those employing a quality strategy, firms were not making a consistent connection between the manufacturing strategies they pursued and the HR systems they employed. This finding is somewhat surprising

FIGURE 2
Human-Capital-Enhancing HR and Quality Manufacturing Strategy Interactions



given the strong relationships among HR, manufacturing strategy, and performance.

DISCUSSION

Overview and Implications of Findings

The purpose of this study was to examine both the universal and contingency approaches to HR and performance in a manufacturing environment. At the outset, we stated that theoretically and empirically these two approaches—in and of themselves—are not necessarily incompatible. It is possible to have both main effects supporting the universal perspective and contingency effects supporting the contingency perspective. This argument not withstanding, our analysis shows that the apparent main effect of human-capital-enhancing HR on performance is predominately a function of the performance enhancements obtained when firms link human-capital-enhancing HR systems with a quality manufacturing strategy. Accordingly, it is not accurate to conclude from our study that there are strong universal or best practices approaches to human resource management. Instead, our findings provide much more support for the contingency perspective. In the next section, we discuss the specific contingency findings uncovered in the current study.

Contingency approach to HR. Given the consistent interactions between a quality manufacturing strategy and the human-capital-enhancing HR system as they relate to customer alignment, employee productivity, and equipment efficiency, we would argue that systematic efforts to enhance the skill levels of employees are especially important to firms trying to compete on quality. Although this idea has been well articulated in the total quality literature (e.g., Crosby, 1979; Deming, 1986), our results add clarity to the specific aspects of operational performance affected by human-capital-enhancing HR systems. It appears that in such production environments, human-capital-enhancing HR systems designed to develop talented and team-oriented workers improve employee productivity, machine efficiency, and customer satisfaction.

These findings parallel anecdotal evidence from companies such as Motorola, Nucor Steel, and Southwest Airlines that have used selective staffing, comprehensive training, and other skill development efforts as centerpieces in their quests to improve performance through total quality management initiatives (cf. Pfeffer, 1994). Moreover, the results suggest HR practices designed to professionalize employees and create an egalitarian work environment positively influence operational performance when matched with quality manufacturing strategies. Such findings coincide with the arguments of scholars (e.g., Lawler, Mohrman, & Ledford, 1992; Majchrzak, 1988) who promote the use of salaried compensation and increased employee problem solving as a means to foster egalitarianism. They also lend credence to the employee skill development and professionalization efforts of quality-focused companies, such as Saturn and Chaparral Steel, which promote

increased employee problem solving, incorporate group incentives into their reward systems, and use salaried compensation on their plant floors (Armstrong, 1990; Dumaine, 1992).

In addition to the quality strategy and human-capital-enhancing HR system link, our findings indicate that an administrative HR system interacts with a cost manufacturing strategy to enhance employee productivity and also works in conjunction with a delivery flexibility strategy to improve customer alignment. These findings suggest that administrative HR systems are still very appropriate in strategic contexts that emphasize reducing costs and eliminating uncontrollable behavior. Although we hypothesized that flexibility strategies would require upskilled employees, it may in fact be the case that a delivery flexibility strategy can be based on flexible machines rather than flexible jobs (cf. Jaikumar, 1986). Such an environment likely necessitates standardized and routine behaviors and is therefore very consistent with a cost strategy. As Klein pointed out, such an approach to manufacturing "can turn workers into extensions of a system no less demanding than a busy assembly line" (1991: 61). In short, our findings suggest that administrative HR systems can be used in standarized production contexts to increase productivity and customer alignment.

There was only one instance in our contingency analysis in which a manufacturing strategy–HR combination was associated with diminished performance. Specifically, a scope flexibility strategy interacted negatively with an administrative HR system to affect customer alignment. Unlike *delivery* flexibility (which showed a positive interaction with the administrative HR system), *scope* flexibility involves adapting to changes in product mixes and handling difficult and nonstandard orders. From our findings, it appears that this strategy requires an HR system that allows for more employee discretion and requires high employee skill levels (Upton, 1995). Although only a minor trend in our results, this particular finding highlights the importance of separating different aspects of a flexibility strategy. Scope and delivery flexibility are different conceptually, and they seem to demand very different approaches to HR management.

Descriptive analysis. Since our analyses revealed that combining HR and manufacturing strategy could either enhance or hinder performance, we wanted to determine—from a purely descriptive standpoint—whether the actual practices of all manufacturers reflected these findings. In practice, the only HR-manufacturing strategy link we found across the entire sample was between the human-capital-enhancing HR system and a quality strategy. This finding indicates that manufacturers are capitalizing on the opportunity to improve performance by combining human capital enhancement with a quality strategy but are missing out on the benefits gained by linking administrative HR systems with manufacturing strategies emphasizing cost containment and delivery flexibility.

Several explanations may account for these findings. On the one hand, both practitioners and academics have spent considerable time trying to understand how firms can successfully implement quality strategies and

have overwhelmingly concluded that quality initiatives tend to fail unless they are combined with employee skill-building efforts (e.g., Blackburn & Rosen, 1993; Crosby, 1979; Deming, 1986). On the other hand, there still remains much debate about how to effectively manage people in production environments pursuing cost containment through the introduction of technology. For example, some studies (e.g., Helfgott, 1988; Kern & Schumann, 1990; Spenner, 1983) encourage the use of human-capital-enhancing HR systems that facilitate teamwork and upgrade the technical and problem-solving skills of employees, and others (e.g., Butera & Thurman, 1984; Gerwin & Tarondeau, 1982; Shaiken, 1984) suggest a more traditional administrative approach to HR. Anecdotal observations (e.g., Walton & Susman, 1987) seem to indicate that many of today's manufacturers are moving toward the former view. Our results, however, indicate that administrative HR systems focused on standardized procedures, results-based performance appraisal, individual incentives, and the like may still be very appropriate for manufacturers pursuing cost containment.

The lack of a connection between delivery flexibility and an administrative HR system is not particularly surprising. A good deal of ambiguity currently surrounds the general concept of flexibility in both the academic literature and manufacturing organizations. And although numerous studies (Gupta & Somers, 1992; Sethi & Sethi, 1990) have attempted to outline the differing dimensions of manufacturing flexibility, there still remains a high degree of uncertainty about how to manage people to promote flexibility (Upton, 1995). Furthermore, as this study indicates, it appears that different types of flexibility require different people management systems, making the task of connecting flexibility strategies and human resources all the more difficult.

Limitations and Suggestions for Future Research

The limitations of this study constrain our interpretation of the findings and point to several issues for future research. First, this study only examined cross-sectional differences among manufacturing firms. Gaining a clearer understanding of the relationships between HR systems, strategy, and performance will require longitudinal analysis. Though we examined these relationships in terms of HR systems adapting to the strategic requirements of firms, the opposite is possible as well. Indeed, researchers have suggested that firms may wish to adapt their strategies to complement their human infrastructures (Snow & Snell, 1993; Wright et al., 1995). Likewise, though we have suggested that HR systems and their match with strategy lead to performance, it is reasonable to contend that HR has a lagged effect. That is, successful firms possess the slack resources required to invest in the best HR practices. Future research might look at HR, strategy, and performance over time to examine the sequential and reciprocal relationship among these aspects of organizations.

Second, this study explicitly examined manufacturing strategy, a functional strategy, as opposed to business- or corporation-level strategy. There

are many appropriate levels of analysis for this type of research, but we chose to focus on manufacturing strategy because of its more direct relationship to what managers and first-line employees do daily. We thus viewed manufacturing strategy as most likely to reveal a relationship between HR systems and operational performance at the plant level. Nevertheless, future SHRM research should be directed at clarifying and mapping out the distinctive HR, strategy, and performance relationships at differing levels of analysis. Further, although manufacturing strategy has been discussed in the literature for years, it remains a somewhat elusive concept. Research is needed to more fully understand the specific dimensions of manufacturing strategy and how they work together.

A related point is that although we used multiple respondents to ensure agreement about strategy within each plant, there still remains an issue of whether managers presented us with intended or realized strategies (Mintzberg, 1978). We believe that managers in this study were realistic in their responses to our survey, but future research might corroborate our self-report measures with more objective indicators of strategic posture (cf. Glick, Huber, Miller, Doty, & Sutcliffe, 1990).

Third, our study focused on operational performance as opposed to financial performance or some other index of firm effectiveness. This focus was a conscious decision; however, we recommend that future research distill the performance consequences of HR activities at differing organizational levels. For example, Huselid's (1995) recent study of high performance work practices focuses on turnover and productivity as well as corporate financial performance. This is an excellent example of how HR systems establish a set of linked performance consequences within firms.

Fourth, the notions of internal and external fit suggest that there may be synergistic effects among and between both HR practices and strategy. In this study, we used bundles, or systems, of HR practices that were, strictly speaking, combined in an additive rather than multiplicative manner. In the future, more detailed work is needed on internal fit to ascertain whether HR systems are collections of distinct HR practices or whether there is a latent construct that subsumes the individual practices. And although we examined the interactions between HR systems and strategy, additional research that identifies configurations of HR practices and strategies is needed to reveal the potential synergistic effects among and between both HR practices and strategy (e.g., Doty, Glick, & Huber, 1993; Meyer, Tsui, & Hinings, 1993).

Finally, this study only looked at the moderating effects of manufacturing strategy on the HR-performance relationship. It is quite possible that other organizational characteristics, such as structure and technology, affect this relationship as well. The value of contingency research is that it allows researchers to look deeper into the HR-performance relationship. Accordingly, future contingency studies using other organizational characteristics as moderators are needed in order to gain further insights into the HR-performance relationship.

In today's manufacturing organizations, the performance management of human resources is receiving a good deal of emphasis. The intent of this study was to examine two alternative forms—*universal* and *contingency*—of the HR-performance relationship. Our findings show that HR systems can substantially influence performance when aligned with appropriate manufacturing strategies, thereby supporting a contingency view of HR. Establishing such a link is only one step of the many needed to gain a deeper understanding of how firms can manage human capital to improve competitiveness. So rather than dismissing one perspective or another, we would argue that more research is needed on how the two approaches may or may not converge. Certainly as manufacturers search for ways to enhance their productive potential for the future, this type of information would provide them with a richer understanding of how they can develop and manage human capital.

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