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Human Resource Configurations, Intellectual Capital, and Organizational Performance

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Throughout the past fifteen years researchers have examined the link between human resource (HR) activities and organizational-level performance. Many of the early studies in this area simply looked at the performance impacts of individual HR practices such as staffing, training, and compensation in isolation. More recent HR studies have tended to take a more holistic approach to HR by focusing on the performance impacts of systems or configurations of multiple HR activities (e.g., Huselid, 1995; MacDuffie, 1995; Youndt *et al.*, 1996). While both of these lines of research have demonstrated that HR activities can have a positive influence on organizational value creation and performance, neither approach has given us a very clear understanding as to *how* this value-creating process actually occurs. As Becker and his colleagues noted, "To date there is very little research that . . . describes the processes through which HRM systems influence the principal intermediate variables that ultimately affect firm performance" (1997: 40-41). In short, we know very little about the black box between a firm's HR activities and its bottom line.

Accordingly, the purpose of this study is to introduce intellectual capital as a mediating construct between HR configurations and organizational performance, thereby combining research streams in HR and strategic management. Although, academic and business strategists have acknowledged that HR plays a role in developing and managing strategic resources and core competencies, theoretical development and empirical research have been slow to follow. By introducing intellectual capital as a mediating construct, we hope to better frame *how* HR systems drive organizational performance. In essence, this article suggests HR activi-

ties do not directly increase organizational-level performance; rather they help increase employees' knowledge and skills (i.e., human capital), facilitate group interaction and knowledge sharing (i.e., social capital), and enable organizations to store knowledge in systems, routines, processes, and cultures (i.e., organizational capital), which, in turn, drive organizational performance.

In what follows, we begin by outlining a conceptualization of the various aspects on intellectual capital. Next, we examine how different HR configurations might facilitate the development of these various aspects of intellectual capital and how intellectual capital might enhance organizational performance. Then, we test the mediating role of intellectual capital between HR configurations and organizational performance. To conclude, we discuss the implications of our findings and briefly outline several limitations of the present study as well as suggest potential future research directions.

THEORETICAL FRAMEWORK AND HYPOTHESES

Spender and Grant noted in their introduction to *Strategic Management Journal's* special issue on knowledge and the firm that strategy researchers are facing a "growing realization that the variables which are most theoretically interesting are those which are least identifiable and measurable" (1997: 8). Intellectual capital is one such variable. Several writers have presented frameworks, however, to help us conceptualize the construct and make it easier to operationalize for research. Edvinsson and Malone (1997), for example, view intellectual capital as being comprised of two primary components: *human capital* (i.e., the knowledge skills and experience of employees) and *structural capital* (i.e., the embodiment, empowerment, and supportive infrastructure of human capital). The authors then sub-divide structural capital into two smaller components: *organizational capital* (i.e., the systems, tools, and operating philosophy that speed the flow of knowledge through the organization) and *customer capital* (i.e., relationships a company has with its customers).

Stewart (1997) similarly conceives of intellectual capital as composed of human capital and structural capital, but places customer capital on equal footing with structural capital (rather than as a subcategory). He also subsumes organizational capital into structural capital. Bontis (1996), on the other hand, introduces the notion of *relational capital* as an expanded version of customer capital that includes the value of all relationships, including those of customers. Bontis' concept of relational capital is virtually identical to what sociologists and organization theorists refer to as *social capital* (Adler and Kwon, 2002).

Synthesizing the above discussions, we conceptualize intellectual capital as three distinct categories: human, social, and organizational. Whereas *human capital* simply refers to individual employee's knowledge, skills, and expertise, *organizational capital* represents institutionalized knowledge and codified experience stored in databases, routines, patents, manuals, structures, and the like. While some may be apt to refer to this latter knowledge as structural capital (Stewart, 1997), we would argue organizational capital is more fitting because this is capital the organization actually *owns* (human capital can only be

rented/borrowed). The third type of intellectual capital, *social capital*, resides neither at the individual nor the organizational level. Rather, social capital is an intermediary form of intellectual capital consisting of knowledge resources embedded within, available through, and derived from networks of relationships (Adler and Kwon, 2002; Nahapiet and Ghoshal, 1998).

HR Configurations and Intellectual Capital

There is a good deal of consensus in the strategic HR literature that combinations, or configurations, of HR practices are more likely to lead organizational-level outcomes such as productivity, profitability, and market value than individual practices used in isolation (e.g., Youndt *et al.*, 1996). More controversial is whether a single set of "best practices" leads to higher performance or whether the appropriateness of HR configurations is contingent on strategy, technology, and the like (Pfeffer, 1994). In this study, we adopt a contingent configurational perspective and hypothesize that the performance impact of HR configurations depends on whether the mediating variable is human, social, or organizational capital. As the dimensions of intellectual capital (and their connections to performance) are conceptually distinct, we believe it is reasonable to suspect that HR configurations will vary accordingly.

HR and Human Capital. As human capital refers to individual employee's knowledge, skills, and expertise, the concept is paramount in any discussion of intellectual capital. The literature on organizational learning, for example, points out organizations, in and of themselves, do not create knowledge, people do (Argyris and Schon, 1978). As individuals learn (i.e., increase their human capital), they create knowledge that potentially forms a foundation for organizational-level learning and knowledge accumulation. Human capital theorists have typically argued that organizations can increase their human capital by internally developing the knowledge and skills of their current employees and/or by attracting individuals with high knowledge and skill levels from the external labor market. That is, organizations can try to *make* and/or *buy* human capital.

Buying Human Capital: Acquisition HR Configuration. Selective staffing practices are often championed as the foundation of an HR strategy focused on acquiring human capital. Operationally, selective staffing can be thought of as two distinct search processes: extensive search and intensive search. *Extensive search* expands the applicant pool by using a wide variety of recruiting sources (e.g., employee referrals, search firms, universities, employment agencies) and increasing the number of candidates screened per hire. *Intensive search*, on the other hand, increases the amount of information gathered about each applicant (via interviews, tests, biographical information, etc.). As Koch and McGrath reason, "assuming a sufficiently well-populated labor market from which to choose, firms that take more care in their search, by increasing information at both the extensive and intensive margins, are more likely to be able to access high-quality new employees" (1996: 339).

Although an acquisition configuration primarily builds on staffing practices, it is likely to be complemented by compensation and reward

systems. To attract the best candidates, companies frequently pay high wages relative to competitors in order to ensure that they meet or exceed market equity. In addition, stock ownership is also espoused to help attract and retain the best and brightest workers. Stewart (1997), for example, pointed out that employee stock ownership programs appear to be increasing in popularity, especially in knowledge-intensive companies. Many of these go public not to raise money for capital expenditures, but rather to share ownership with their most valuable assets—employees.

> ***Hypothesis 1****: An acquisition HR configuration (comprised of selective staffing, external pay equity, and employee ownership) will be positively related to an organization's level of human capital.*

Making Human Capital: Developmental HR Configuration. As an alternative to (or in conjunction with) an acquisition configuration, organizations can enhance their human capital pool through a developmental configuration based on training and education. Training and education have long been the primary focus of human capital theory. More recently, researchers have noted the central role of comprehensive training in firms attempting to transform their workforces from touch labor to knowledge work (Snell and Dean, 1992). Training comprehensiveness encompasses both intensity and scope. Training *intensity* focuses on the depth of intervention, the duration of the programs, and the degree to which they are continuously updated. In contrast, training *scope* focuses on the breadth of training, the different types of training opportunities offered to employees, the utilization of cross-training, and the like.

While training tends to be a focal point in discussions concerning the development of human capital, Becker (1964) originally pointed out that under norms of rationality organizations would prefer programs that produce firm-specific skills that are non-transferable to other companies. In order to capitalize on such training investments, as well as encourage employees to develop firm-specific skills, many theorists suggest that organizations should utilize promotion-from-within, or internal labor markets. In Koch and McGrath's words, "A firm that pays for training and that subsequently fails to promote from within is arguably failing to capitalize on its investment" (1996: 340).

Broadening this HR configuration further, supportive performance feedback is also espoused to facilitate employee development. Although performance appraisal can focus on administrative as well as development functions, it is the developmental aspect that is most expected to influence learning and skill enhancement. Compensation systems, particularly those associated with skill/knowledge-based pay, are also likely to play a significant role in motivating employees to increase their human capital. When companies link pay to the knowledge, skills, and abilities of their workers, they hope to direct the attention of their employees to developmental opportunities and to encourage skill-seeking behavior (Murray and Gerhart, 1998).

> ***Hypothesis 2***: A developmental HR configuration (comprised of comprehensive training practices, promotion-from-within, developmental performance appraisal processes, and skill-based pay) will be positively related to an organization's level of human capital.

HR and Social Capital. The importance of human capital notwithstanding, discussions of intellectual capital and performance transcend knowledge contained within individual employees. From a competitive standpoint, theorists are quick to point out that organizations do not own human capital, employees do. And since those employees are free, within limits, to leave the firm, there is significant risk organizations may incur a capital loss unless individual knowledge is transferred, shared, transformed, and institutionalized. This highlights the need for social (and organizational) capital to protect the investments of organizations in knowledge-based sources of advantage.

There is a growing consensus among researchers that building social capital requires a collaborative organizational environment in which knowledge and information can flow freely. However, there are natural barriers to knowledge exchange, most of which center around power relationships. Szulanski (1996), for example, found that one of the biggest obstacles to the transfer of best practices in organizations is due to poor relationships between the source and recipient of information. Breaking down these vertical (i.e., hierarchical) and horizontal (i.e., cross-functional) barriers requires the cultivation of an open and trusting culture.

Eliminating Vertical Barriers to Social Capital: Egalitarian HR Configuration. In its purist form, an egalitarian organization is a classless organization with minimal power distances between employees. And while no organization can truly function in a purely classless manner, numerous HR activities may help move organizations in this direction. Such HR activities broadly fall into five categories: eliminating status symbols, creating flatter organizations, minimizing job classifications, empowering employees, and utilizing flat pay structures (Pfeffer, 1994).

Status symbols such as executive dining rooms, reserved parking spaces, and corner offices create physical barriers to communication as well as social subdivisions. Accordingly, eliminating status symbols should promote cross-level interactions by breaking down barriers between people. In a like manner, many hierarchical levels can also foster an environment of great power distances which create communication barriers. Therefore, flatter organizational structures (i.e., ones with fewer levels of hierarchy) should increase an organization's capacity to quickly share and leverage knowledge.

The minimization of job classifications, sometimes referred to as broadbanding, should also create a more egalitarian environment where people move about and communicate much more freely. Likewise, flat pay structures de-emphasize pay in organizations and should facilitate quality information exchanges by reducing interpersonal competition and politics. Lastly, by giving employees autonomy and decision-making authority, organizations increase employee involvement in organizational activities which, in turn, should lead to a greater willingness to share and transfer knowledge and information.

> ***Hypothesis 3***: An egalitarian HR configuration (focused on eliminating status symbols, reducing hierarchical levels, minimizing job classifications, flattening wages, and empowering employees) will be positively related to an organization's level of social capital.

Eliminating Horizontal Barriers to Social Capital: Collaborative HR Configu-

ration. McGill and Slocum (1994) argue that work structures in knowledge-based organizations need to be characterized by permeability and network intimacy. That is, the lines between functional departments, between employees and customers, and between the company and its vendors need to be blurred (permeability), and employees need to be kept close together and close to key business processes (network intimacy). Perhaps one of the best ways to bring permeability and network intimacy to life is through organizing around teams and networks, especially cross-functional and joint employee-customer problem-solving ones. To develop the capacity for teamwork and collaboration, organizations may begin by reorienting staffing criteria to focus more on interpersonal skills, and complement this with team training and other cross-functional interactions that facilitate broader knowledge networks. In addition, performance feedback from peers, customers, team members, and even subordinates is likely to facilitate knowledge sharing.

Each of these initiatives is likely to increase the capacity and opportunity for knowledge exchange and combination, but does not guarantee that motivation to do so. Major changes in incentives and culture may be required to motivate knowledge exchange. In many organizations, sharing knowledge dilutes an individual's power base; as such, strong incentives need to be put in place to engender collective exchange. Even in the best of circumstances, a "market for knowledge" exists and there are cost-benefit trade-offs in any person's decision to participate in that market. Group incentives such as bonuses, profit sharing, and gainsharing may help ensure that employees interact and exchange ideas with others as their compensation depends on the performance of one another.

> ***Hypothesis 4***: A collaborative HR configuration (focused on permeable and network intimate work structures, team development, and group incentives) will be positively related to an organization's level of social capital.

HR and Organizational Capital. While human capital embodies the knowledge in individuals and social capital describes the collective exchange of knowledge among people (and systems), organizational capital refers to institutionalized knowledge and codified experience stored in systems, processes, databases, routines, patents, manuals, structures, and the like. Organizational capital is extremely important to organizations, as it is the only type of intellectual capital the organization actually *owns.*

HR's primary responsibilities in developing organizational capital center on creating and/or filling knowledge storage devices or bins. Storage bins can take many forms. For example, an organization's physical assets, such as information systems and internal libraries, can hold vast amounts of knowledge in the form of patents, databases, manuals, etc. Organizational capital is also embedded in standard operating procedures, business processes, rules, routines, and informal "ways of doing business." As Davenport and Prusak noted:

> Any manufacturing process, whether automated or formalized in a set of procedures, is constructed from what was once the knowledge of individuals. In theory, this embedded knowledge is independent of those who developed it and therefore has some organizational stability—an individual

expert can disappear without bringing the process to a halt or reducing the company's stock of embedded knowledge (1998: 83).

Institutionalizing Organizational Capital: Documentation HR Configuration. Institutionalizing knowledge in databases, manuals, and standard operating procedures most likely requires HR's involvement in knowledge codification. For example, encouraging employees to write "lessons learned" reports after learning experiences (e.g., sabbaticals, employee exchange programs, projects) should facilitate the development of organizational capital. Likewise, encouraging employees to continuously update electronic resumes, knowledge "yellow pages," and other knowledge-mapping devices, as well as supporting the formal documentation of customer suggestions, complaints, preferences, etc., are also likely to help build better organizational capital.

Beyond these methods for codifying explicit knowledge, HR systems can also play a role in helping to institutionalize *tacit* knowledge that is more informal and difficult to articulate. For example, empowering employees to initiate the redesign of their work may be a useful method for capturing organizational capital. As employees redesign work systems and structures, their knowledge can become institutionalized in organizational routines, procedures, and the like. Similarly, employee suggestion systems may help expose the entire organization to what was previously individual knowledge.

Hypothesis 5: A documentation HR configuration (focused on knowledge documentation, employee work redesign, and employee suggestion systems) will be positively related to a firm's level of organizational capital.

Interfacing with Organizational Capital: Information Technology HR Configuration. It is very difficult to develop high levels of organizational capital without creating or providing an underlying infrastructure that supports knowledge management and codification. In today's world, such an infrastructure inevitably revolves around information technology. Simply put, information technology has now become the cornerstone of knowledge documentation and codification processes in many of our most successful organizations. As Stewart noted, the emergence of these technologies has spawned "ambitious attempts to pull scattered information and wisdom together to convert it into organizational knowledge. Cheap and powerful information technology has given new impetus to the dream of creating what amount to living libraries containing an entire stock of corporate knowledge" (1997:113).

Such information systems tend to be catalysts for developing organizational capital because they are easily accessible, provide a user-friendly interface, and bring together what were once disparate knowledge repositories into an integrated whole. An organization can encourage employees to document their knowledge, skills, and expertise, but unless they use information technology to make the process somewhat effortless and seamless, knowledge documentation initiatives will most likely have limited success.

Hypothesis 6: An information technology HR configuration (focused on accessible, user-friendly, and integrated information systems) will be positively related to a firm's level of organizational capital.

Having discussed how differing HR systems facilitate the development of

human, social, and organizational capital, we now turn to examining the intellectual capital-performance linkage.

Intellectual Capital and Organizational Performance

Varied literatures and perspectives (e.g., human capital theory, organizational learning theory, information processing theory, resource-based theory) suggest intellectual capital can create value and enhance organizational performance by lowering costs, increasing customer benefits, or doing some combination of the two.

Human Capital and Performance. As stated at the outset, people, or human capital, form the basis of competitive advantage in many of today's organizations and industries. Smarter workers (i.e., ones with more human capital) possess the ability to potentially improve organizational performance by both increasing customer benefits and decreasing production and service delivery costs in a myriad of ways. For example, human capital can help lower production/service delivery costs by developing new process innovations that eliminate costly steps, reduce inputs, increase utilization, and so on. Likewise, better human capital should also lead to better planning, troubleshooting, problem solving, etc., all of which most likely increase production and service delivery efficiencies and, thereby, reduce organizational costs.

Human capital may also be instrumental in improving customer benefits. Total quality management theorists (e.g., Deming, 1986) have argued for years that people form the foundation of quality improvement strategies. When knowledgeable workers improve production and service delivery processes, they not only reduce costs, but they also increase product reliability and customer satisfaction. Similarly, people, as opposed to machines, tend to allow organizations to be more flexible (Upton, 1995). Such flexibility increases customer benefits by quickly providing an array of different products and services when and where customers want them. Lastly, creative people are the heart and soul behind product and service innovations that may increase customer value by better meeting their needs.

> ***Hypothesis 7***: An organization's level of human capital will be positively related to organizational performance.

Social Capital and Performance. Social capital may reduce organizational costs in many of the same ways human capital does. Similar to human capital, the knowledge tied up in relationships among employees, customers, suppliers, alliance partners, and the like may lead to process innovations, better problem solving, and so on, each of which tends to increase production and service delivery efficiencies. Additionally, however, social capital should reduce organizational costs by increasing an organization's information processing capacity. As Galbraith noted (1973), the creation of lateral relations such as task forces and teams (i.e., social capital) facilitates information flows among participants in interdependent departments, thereby eliminating or reducing costly information flows up and down hierarchical channels. Furthermore, the transfer of knowledge through social capital allows organizations to coordinate diverse production skills and integrate multiple

streams of technology as well as leverage knowledge from one part of the organization to another. All of these activities enable organizations to more efficiently utilize their knowledge-base by leveraging it across the entire organization. Stated differently, social capital should help reduce redundancies and effort duplication in multiple parts of organizations.

Again, social capital's improvement of customer benefits parallels many of the notions discussed with regard to human capital and customer benefits above. Just like human capital, social capital most likely drives customer benefits by helping to increase quality, reliability, and flexibility through production and service delivery process innovations. However, we would anticipate that social capital may even have more of an impact on customer benefits than human capital as teams and networks of people should have increased problem-solving capabilities. Likewise, teams and networks of employees, customers, suppliers, and the like should be able to better identify as well as satisfy customer needs. That is, social capital between organizations and their customers aids in identifying idiosyncratic customer needs as well as facilitates the development of novel solutions to address those needs.

> ***Hypothesis 8***: An organization's level of social capital will be positively related to organizational performance.

Organizational Capital and Performance. Organizational capital can play a significant role in reducing organizational costs as well. According to Dixon (1992), these cost reductions result from three primary forces. First, when failure leads to learning it can be the ultimate teacher. Thus, institutionalized experience and knowledge (i.e., organizational capital) can prevent organizations from repeating mistakes, thereby reducing their operating costs. Second, organizational capital can be retrieved and brought to bear on new situations. Whether this institutionalized knowledge is used "wholesale" in its current form, or transformed to meet existing needs, it should help reduce costs by eliminating the need to "reinvent the wheel." Lastly, organizational capital embedded in routines, procedures, information systems, and the like can help filter information as well as direct and simplify information processing and organizational sensemaking, all of which should diminish organizational costs.

The three forces (i.e., minimizing repeat mistakes, increasing knowledge utilization, and facilitating better information processing/sensemaking) that enable organizational capital to reduce organizational costs most likely also help organizations extend customer benefits. For example, minimizing mistakes helps organizations increase their speed to market with new products and services. Likewise, when stored knowledge can be accessed by those organizational members directly in contact with customers, they can use their entire company's knowledge-base to quickly and accurately address customer issues. Additionally, storing important customer information in organizational memory devices enables companies to better keep track of their customers' preferences, needs, behaviors, etc., thereby increasing customer alignment and, hopefully, customer benefits and satisfaction. Many service organizations such as Jiffy Lube, for example, keep detailed customer

records which allow them to quickly service your car with the exact products you favor. In short, organizational capital can assist organizations in giving customers what they want, when they want it, and how they want it.

Hypothesis 9: An organization's level of organizational capital will be positively related to organizational performance.

The Mediating Role of Intellectual Capital Between HR and Performance

As stated at the onset, there has been very little empirical research examining intermediating variables through which HR systems may ultimately affect firm performance. Recently, however, scholars (Becker *et al.*, 1997) have suggested that intellectual capital may play a key mediating role in the HR-performance relationship. That is, HR systems may drive human, social, and organizational capital, which, in turn, may drive organizational performance. And while the underlying relationships have been detailed in Hypotheses 1-9, Hypotheses 10-12 integrate the above arguments to formally test intellectual capital's mediating role in the HR-performance linkage.

Hypothesis 10: Human capital will mediate the relationships between the acquisition and development HR configurations and organizational performance.

Hypothesis 11: Social capital will mediate the relationships between the egalitarian and collaborative HR configurations and organizational performance.

Hypothesis 12: Organizational capital will mediate the relationships between the documentation and information systems HR configurations and organizational performance.

METHODS

Sample

A broad group of organizations and industries was included in the study to maximize variation of the independent variables as well as to increase the generalizability of the findings. However, only public, single business unit organizations with more than one hundred employees were included in the study for the following reasons. First, the study required comprehensive organizational-level performance data. Second, as HR practices and competitive strategies may differ across autonomous business units, we decided to exclude multidivisional organizations. Lastly, only organizations with more than one hundred full-time employees were selected in an effort to increase the likelihood that participating organizations utilized a somewhat formalized HR system. We selected the 919 organizations meeting these criteria from the *Directory of Corporate Affiliations.*

Data Collection Procedures and Variables

A cover letter and questionnaire were mailed directly to the two highest ranking executives (usually the CEO and president) as well as the vice-president of HR in each of the 919 organizations. Executives from 208 of the organizations returned usable questionnaires, representing an organizational response rate of 23 percent. The 208 organizations represented 134 different four-digit SIC codes, had an average of 4,019 full-time employees, and had mean annual revenues of $771 million. Of the 208 participating firms, 71 had two or three respondents. For these 71 firms

we calculated interrater agreements for each of our HR indices and intellectual capital constructs according to the R_{wg} procedures prescribed by James, Demaree, and Wolf (1993). The resulting R_{wg}s for each of the variables ranged from .87 to .94. These results support the aggregation of data to the firm level (i.e., we can average the responses of multiple respondents from one firm for our analysis). Additionally, by indicating that multiple top-level executives from the same firm provided very similar responses, there is evidence to suggest that whether we had responses from one or numerous executives from each firm our results would be similar. Thus, the potential problem of using a single respondent for some of our firms is diminished.

Intellectual Capital. As few published empirical research efforts exist pertaining to intellectual capital, we reviewed theoretical discussions surrounding human capital, intangible assets, organizational learning, and the like to develop multi-item scales of the three subcategories of intellectual capital. Additionally, as our study spanned more than 100 industries, it required the use of generalizable metrics and wording in crafting the specific human, social, and organizational capital items. The five items assessing *human capital* (alpha = .81) were based on original discussions surrounding human capital (Becker, 1964; Schultz, 1961), as well as contemporary strategic human resource management studies (e.g., Snell and Dean, 1992), and reflect the overall skill, expertise, and knowledge levels of an organization's employees. Likewise, *organizational capital* (alpha = .62) was measured by a four-item scale assessing an organization's ability to appropriate and store knowledge in physical organizational-level repositories such as databases, manuals, and patents (Davenport and Prusak, 1998; Edvinsson and Malone, 1997) as well as in less tangible routines, processes, cultures, and ways of doing business (Stewart, 1997; Walsh and Ungson, 1991). Lastly, the five items measuring *social capital* (alpha = .88) draw upon the core ideas of the social structure literature (Adler and Kwon, 2002; Nahapiet and Goshal, 1998), as well as the more specific knowledge management literature (Nonaka, 1994), and assess an organization's overall ability to share and leverage knowledge among and between networks of employees, customers, suppliers, alliance partners, and the like.

To test the convergent and discriminant validity of the multiple-item scales of human, social, and organizational capital, we performed confirmatory maximum likelihood factor analysis. The intellectual capital model confirmed the three distinct aspects of intellectual capital (human, social, and organizational) by replicating their designed scales. The resulting three factors explained 51% of the total variance, had eigenvalues of 1.77, 4.96, and 1.54, and had average communality of .67. Additionally, no item cross-loaded on another dimension at a level higher than .33. See Appendix A for the results of the intellectual capital factor analysis and a detailed listing of all the intellectual capital items.

Human Resource Configurations. The study utilized six distinct HR configurations focused on building intellectual capital: 1) Acquisition configuration, 2) Developmental configuration, 3) Egalitarian configuration, 4) Collaborative configuration, 5) Documentation configuration, and 6) Infor-

mation Technology configuration. The items for the Acquisition and Development HR configurations were based on the prior empirical studies of Snell and Dean (1992) and Youndt *et al.* (1996). As no published, empirical scales or indices existed for our other four HR configurations, items for these indices were derived from theoretical discussions surrounding the development of the various forms of intellectual capital. Specifically, we drew upon Pfeffer's (1994) work on how organizations gain competitive advantage through people and McGill and Slocum's (1994) discussions on building "smarter organizations" in developing our Egalitarian and Collaborative HR configurations, while our Documentation and Information Systems configurations were based on Stewart (1997) and Davenport and Prusak's (1998) discussions surrounding how certain employee practices and information systems aid in the codification and storage of knowledge.

Following the procedures used by Koch and McGrath (1996), MacDuffie (1995), and Youndt *et al.* (1996), each configuration was operationalized as an additive index of multiple HR activities outlined in our theory and hypotheses section. Such an additive approach to combining HR activities implies organizations can improve their effectiveness either by using individual practices in a more comprehensive manner or by increasing the number of practices they employ within the system. This approach is better conceptually and empirically 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 the system. Instead, the absence of a practice only weakens the net effect of the system (MacDuffie, 1995). See Appendix B for detailed descriptions of the HR configurations.

Organizational Performance. An assessment of an organization's performance should include multiple measures (Venkatraman and Ramanujam, 1986). Accordingly, we utilized a composite performance metric consisting of both asset- (ROA) and equity-based (ROE) performance measures. Specifically, *organizational performance* was calculated by averaging each organization's 2000 and 2001 ROA and ROE. We utilized a two-year average to help guard against random fluctuations and anomalies in the data (Venkatraman and Ramanujam, 1986). Additionally, we used 2000 and 2001 performance data to lag our dependent variable two to three years from the data collection of our independent variables in an effort to minimize the potential effect of successful organizations possessing more slack resources to invest in HR activities and intellectual capital development. All performance data were obtained through *Disclosure* and *Research Insight.*

Control Variables. Since numerous studies have shown that large organizations exhibit better performance than smaller ones, we controlled for any potential extraneous effects of organizational size. Similar to other HR studies, o*rganizational size* was operationalized as the number of employees and was obtained from the *Directory of Corporate Affiliations.* We also controlled for *R&D intensity* (R&D/sales) due to its potential influence on intellectual capital development. Data for R&D intensity were obtained from *Disclosure, Research Insight,* and *Bloomberg.* Additionally, as organizations' HR activities, intellectual capi-

tal investments, and performance outcomes may systematically differ across industries, we controlled for three industry dimensions (munificence, dynamism, and complexity), as suggested by Dess, Ireland, and Hitt (1990). Following Boyd (1990), industry *munificence,* or resource abundance, was measured as the regression slope coefficient divided by mean sales value when regressing time against industry sales for the past five years. *Dynamism,* or volatility, was assessed using the same regression model and was measured as the standard error of the regression slope coefficient divided by the mean sales value. Lastly, *complexity,* or heterogeneity in the environment, was assessed using the MINL formula of sales concentration (Schmalensee, 1977). Data for the industry measures were obtained from *U.S. Industrial Outlook, StatUSA, Census of Manufacturers,* and *Moody's.*

RESULTS

All of the variables used in the study exhibited normal distributions, and we found no evidence of restriction of range in any of the response scales. For more details surrounding the variables' properties, see Table 1 which highlights the variables' means, standard deviations, alphas, R_{wg}s, and correlations.

HR Configurations and Intellectual Capital (Hypotheses 1 - 6)

To test the notion that the different HR configurations would be related to human, social, and organizational capital, we used multiple regression analysis controlling for size, industry effects, and R&D intensity. These results appear in Table 2. As predicted in Hypotheses 1 and 2, the acquisition (Beta = .164, $p < .05$) and developmental (Beta = .235, $p < .01$) HR configurations were significantly related to an organization's level of human capital. With regard to social capital, the egalitarian HR configuration was not significantly related to an organization's level of social capital. Thus, we found no support for Hypothesis 3. As anticipated in Hypothesis 4, however, the collaborative HR configuration (Beta = .215, $p < .05$) was significantly related to social capital. Lastly, both the documentation (Beta = .227, $p < .01$) and information systems (Beta = .271, $p < .01$) HR configurations were significantly related to an organization's level of organizational capital, supporting Hypotheses 5 and 6. Although not hypothesized, the egalitarian HR configuration was significantly related to human capital (Beta = .185, $p < .05$), and the acquisition HR configuration was significantly related to organizational capital (Beta = .248, $p < .01$).

Intellectual Capital and Organizational Performance (Hypotheses 7, 8, and 9)

To test the notion that human, social, and organizational capital would be positively related to performance, we once again used multiple regression analysis controlling for size, industry effects, and R&D intensity. These results appear in Equation 2 in Table 3. Human capital (Beta = .211, $p < .05$), social capital (b = .396, $p < .01$), and organizational capital (b = .189, $p < .05$) were all significantly related to organizational performance, providing strong support for Hypotheses 7-9 and the contention that intellectual capital plays a signif-

Table 1
Descriptive Statistics

	Variables	Mean	std	alpha	R_{wg}	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Size	7.10	1.50	na	na	1													
2	Complexity	.31	.16	na	na	-.02	1												
3	Dynamism	.02	.01	na	na	-.13	.15	1											
4	Munificence	.05	.05	na	na	.05	-.08	-.09	1										
5	R&D Intensity	.05	.13	na	na	-.07	.03	-.04	.15	1									
6	Acquisition HR	3.52	.57	na	.88	.03	.09	.00	-.01	-.03	1								
7	Developmental HR	3.38	.61	na	.91	.01	.09	-.05	.04	.01	.48	1							
8	Egalitarian HR	3.28	.62	na	.94	-.05	.19	.09	.13	-.07	.27	.38	1						
9	Collaborative HR	3.23	.67	na	.87	.01	.15	.10	.03	-.01	.23	.26	.39	1					
10	Documentation HR	2.67	.62	na	.88	.03	.16	-.05	.06	.11	.20	.24	.16	.31	1				
11	Info. Systems HR	3.20	.88	na	.89	.03	-.01	-.05	.05	.17	.18	.15	.13	.27	.43	1			
12	Human Capital	3.63	.82	.81	.91	.01	.13	.02	.16	.33	.34	.37	.24	.15	.20	.13	1		
13	Social Capital	3.69	.86	.88	.93	.07	.05	.05	.07	.01	.27	.18	.21	.39	.25	.20	.44	1	
14	Organizational Capital	2.85	.72	.62	.87	.10	.14	.09	.12	.27	.34	.18	.18	.19	.48	.39	.23	.11	1
15	Performance	.05	.08	na	na	-.01	.07	.07	.12	.06	.22	.32	.20	.28	.05	.12	.35	.45	.31

N = 208
Correlations > .20 significant at $p < .05$

Table 2
Results of Regression Analysis for
HR Configurations and Intellectual Capital

	Human Capital Standardized Beta	Social Capital Standardized Beta	Organizational Capital Standardized Beta
Size	.062	.076	-.054
Complexity	.035	.005	.030
Dynamism	.053	.061	.168*
Munificence	.085	.087	.114
R&D Intensity	.229**	-.012	.201**
Acquisition HR	.164*	.096	.248**
Developmental HR	.235**	-.013	-.062
Egalitarian HR	.185*	.133	-.071
Collaborative HR	-.030	.215*	.064
Documentation HR	.148	.159	.227**
Information Systems HR	-.054	.045	.271**
R^2	.340	.280	.428
F	6.320***	4.830**	9.191***

*p < .05, **p < .01, ***p < .001

icant role in determining firm performance. Additionally, the intellectual capital-performance relationships are not only statistically significant, but practically meaningful as well. For example, a one standard deviation increase in organizational capital increases performance (ROA and ROE) by 35%.

The Mediating Role of Intellectual Capital (Hypotheses 10, 11, and 12)

A comparison of numerous regression equations was required to test the notion that intellectual capital mediates the relationship between HR configurations and organizational performance. In Table 3 the first equation shows the effects of the HR configurations on performance and, as pointed out above, the second equation shows the effects of intellectual capital on performance. Without significant effects here for HR and intellectual capital on performance, there is no possibility of mediation. As the results in the table indicate, the acquisition (Beta = .174, $p < .05$), developmental (Beta = .222, $p < .01$), egalitarian (Beta = .178, $p < .05$), and collaborative (Beta = .241, $p < .01$) HR configurations are significantly related to performance and, as highlighted in the previous section, all three intellectual capital variables are also significantly related to performance. Since we found no significant relationships between the documentation and information systems HR configurations and performance, we can eliminate the possibility of organizational capital mediating any relationships between these vari-

Table 3
Results of HR, Intellectual Capital, and Performance Mediation Regression Analysis

	Equation 1 Standardized Beta	Equation 2 Standardized Beta	Equation 3 Standardized Beta	Equation 4 Standardized Beta	Equation 5 Standardized Beta
Size	.046	.022	.034	.020	.020
Complexity	-.017	.021	-.024	-.018	-.021
Dynamism	.120	.069	.109	.099	.088
Munificence	.096	.048	.079	.066	.057
R&D Intensity	.069	.035	.023	.073	.052
Acquisition HR	.174*		.113	.161*	.092
Developmental HR	.222**		.165	.227**	.163
Egalitarian HR	.178*		.167*	.146	.141
Collaborative HR	.241**		.248**	.173*	.170*
Documentation HR	-.050		-.080	-.106	-.125
Info. Systems HR	.110		.121	.094	.086
Human Capital		.211*	.222**		.171*
Social Capital		.396***		.354***	.339***
Organizational Capital		.189*			.139
R^2	.431	.391	.458	.533	.547
F	9.285***	6.53***	9.422***	12.767***	10.915***

*p < .05, **p < .01, *** p < .001

ables and performance (Hypothesis 12).

In the third equation, we again examined the HR configurations' effects on performance, but this time we also added human capital to the equation. Evidence of mediation exists when a significant Beta for the acquisition and developmental HR configurations in the first equation diminishes substantially (perhaps to nonsignificance) in the third equation after human capital has been accounted for. As the results indicate, both the acquisition and developmental Betas dropped to nonsignificance. Thus, we have strong support for Hypothesis 10 and can conclude that most of these HR configurations' effects on performance are derived through their ability to build human capital, which, in turn, drives performance.

We tested social capital's mediating role (Hypothesis 11) in the fourth equation. As the egalitarian HR configuration was not significantly related to social capital, social capital's potential mediating role was limited to the collaborative HR and performance linkage. In comparing the Betas for collaborative HR in equations 1 and 4, we see a substantial decrease (from Beta = .241, $p < .01$ to Beta = .173, $p < .05$). Thus, we can conclude that social capital mediates the relationship between collaborative HR and performance and have partial support for Hypothesis 11.

In Equation 5 we tested an overall model incorporating the six HR configurations and three intellectual capital variables to assess the relative importance of all the variables as well as to determine to what degree the various HR configurations' effects on performance were operating through some combination of the three intellectual capital measures. The results in this equation point out that most of the HR configurations' effects on performance are operating through the intellectual capital variables and that human and social capital are the primary drivers of performance.

DISCUSSION

This study provides consistent support for the notion that HR systems are fundamental in the development of intellectual capital. Not surprisingly, investments made to attract and select the best and brightest workers were shown to correspond to an organization's human capital. Likewise, comprehensive training and development efforts were also shown related to an organization's human capital. These results validate the arguments of human capital theorists who suggest organizations have the option of either buying or making human capital. When only looking at the level of human capital (as opposed to specific skills and knowledge), it appears selection and training may act as substitutes for one another. Accordingly, companies that do not possess the resources to engage in both comprehensive training and selection activities may be wise to primarily focus their resources on one or the other.

Moving on to social capital, the reduction of vertical organizational barriers through the use of egalitarian work practices that minimize status differences was not related to an organization's social capital; however, the reduction of horizontal barriers through the use of collaborative HR activities was related to an organization's knowledge sharing and transfer. This finding echoes the convictions of executives such as Jack Welch

(Ex-CEO of General Electric) who have vocally supported the boundaryless organization as a means to promote teamwork and group problem solving and decision making. Simply put, it appears one of the quickest and best ways to build a trusting and open culture where people freely share and seek information is to eliminate as many horizontal organizational barriers as possible. As functional, divisional, and other barriers break down and ultimately disappear, social capital can prosper and grow because people have much greater access to one another as well as the motivation and incentive to utilize this newly developing knowledge network.

With regard to organizational capital, the utilization of user-friendly and easily accessible information systems and the use of HR activities that encourage knowledge documentation (e.g., employee work redesign programs, employee suggestion systems, lessons learned reports) both appear to help organizations institutionalize knowledge. Thus, organizations seeking to transfer knowledge from people into organizational structures and systems should invest in "hard" information infrastructures as well as "softer" management systems that motivate employees to share and record their expertise. These latter management systems appear to be very important because, without the proper incentives, employees may be reluctant to document their unique knowledge for fear of losing their expert power and essential roles.

The study also found each of the three types of intellectual capital to be associated with increased organizational performance in the intellectual capital-performance regression model (Equation 2). In the overall model containing the intellectual capital variables and the HR configurations (Equation 5), however, only human capital and social capital exhibited strong relationships with performance. The human capital-performance linkage lends support to the widespread anecdotal evidence suggesting that talented people are a critical, and maybe even *the* critical, ingredient in developing and delivering superior products and services that generate high consumer demand. Scholars and practitioners have argued for quite some time that many of the fastest growing companies over the past several decades (e.g., Southwest Airlines, Tyson Foods, Wal-Mart) achieved their phenomenal growth and competitive advantage through their talented people (Pfeffer, 1994).

Social capital was by far the strongest predictor of performance in the study. Thus, it is not surprising that there has been a recent surge in interest and research surrounding social capital (e.g., Adler and Kwon, 2002; Kostova and Roth, 2003). Such a strong linkage between social capital and performance supports those whose contend that knowledge tied up in relationships among employees, customers, suppliers, alliance partners, and the like tends to lead to process and product innovations, better problem solving, and so on, all of which increase production and service delivery efficiencies as well as customer satisfaction. Also, social capital may enable organizations to more efficiently utilize their knowledge-base by leveraging it across the entire organization and thereby reduce redundancies, effort duplication, and ultimately organizational costs.

One could argue that the reason the relationship between organizational capital and performance becomes statistically non-significant when adding all the HR configurations into the performance regression model might be due to its strong correlation with Acquisition HR. Organizational learning theorists (e.g., Argyris and Schon, 1978; Nonaka, 1991) have pointed out for years that organizations—in and of themselves—do not create knowledge, people do. That is, individuals (i.e., human capital) form the foundation for organizational-level learning and knowledge accumulation (i.e., organizational capital). Thus, it seems logical that Acquisition HR enables organizations to attract more talented employees who, in turn, are the driving force behind knowledge development. Further, it seems reasonable to assume that some of this individual-level knowledge ultimately turns into organizational capital in the form of patents, databases, routines, systems, etc. Hence, there is a connection between Acquisition HR and organizational capital that creates multicollinearity among these variables in our overall performance regression model.

As hypothesized, most of HR's performance effects were mediated by the intellectual capital variables. Collaborative HR, however, was still a predictor of performance after including the intellectual capital measures in our performance regression model. This suggests that organizational efforts to encourage collaboration not only support the development of social capital, but also aid in other organizational activities and outcomes that directly or indirectly influence organizational performance. For example, Adler and Kwon (2002) point out that social networks and collaboration create value for organizations by building cohesiveness, trust, and a strong organizational culture among employees. Thus, managers should take note of the widespread performance benefits resulting from the utilization of HR activities that support collaboration.

With regard to intellectual capital's mediating role in the HR-performance linkage, this study provides both managers and academics with a more fine-grained analysis of how to target HR investments that build human and social capital, which, in turn, drive performance. Instead of simply investing in HR with the hope that a trickle-down effect on performance will occur, we now have a clearer understanding as to what happens in the large black box between micro HR activities at the one end and macro performance measures at the other.

Limitations and Future Directions

In interpreting the results of this study, several limitations should be kept in mind. First, although we developed our theoretical arguments in terms of HR activities facilitating the development of intellectual capital, which, in turn, drives organizational performance, other sequences are certainly possible. For example, it is reasonable to contend that firms with high levels of intellectual capital and/or performance may possess the knowledge and slack resources required to invest in HR activities (which is why we lagged our performance variable two years). Future research might look at HR investments, intellectual capital, and performance over time to replicate our findings or determine if other sequential and re-

ciprocal relationships exist among these variables.

Second, we synthesized previous work surrounding the various aspects of intellectual capital into a unified typology consisting of human, social, and organizational capital. However, it may also be appropriate to approach intellectual capital from other levels of analysis. For example, while recognizing the importance of these three distinct aspects of intellectual capital, it may prove beneficial to move beyond the independent analysis of each to examine the effects of their coexistence. Conversely, researchers (e.g., Adler and Kwon, 2002; Kostova and Roth, 2003; Nahapiet and Ghoshal, 1998) have also indicated that human capital, social capital, and organizational capital may have multiple dimensions. Thus, we need more research to clarify the make-up of these variables as well as determine their relative independence.

Third, we encompassed a significant portion of the organizational performance domain by using both equity and asset-based measures (ROE and ROA) to assess the relationships between HR, intellectual capital, and performance. Nonetheless, all performance measures have their limitations. Asset-based performance measures such as ROA, for example, tend to overstate the performance impacts of intangible assets such as intellectual capital because they understate organizations' capital bases. Sales-based metrics may also overstate the performance benefits of intellectual capital because they do not take into account the costs of developing and utilizing such capital. Thus, future intellectual capital research should employ a host of organizational performance metrics such as economic value added (EVA) to gain a more complete understanding of the performance outcomes of intellectual capital.

Fourth, the HR configurations explained only twenty-eight percent of the variance in social capital, the most important predictor of organizational performance. In order to better understand how organizations can facilitate the development of this important construct, future empirical studies should examine other variables such as boundary spanning activities, market relations, hierarchical relations, symbols, and values that recent theoretical discussions suggest might be instrumental in social capital formation (e.g., Adler and Kwon, 2002; Kostova and Roth, 2003). Similarly, it would be helpful if future research moved beyond HR activities to explore other variables (e.g., organizational design and R&D investments) prescribed to build human and organizational capital.

In conclusion, all the recent hype surrounding intellectual capital appears warranted. Intellectual capital does play a significant role in determining organizational performance and, consequently, we need to better understand how to build, manage, and leverage it. While this study has focused on HR's role in developing intellectual capital, a host of other organizational activities most likely play a very important role as well.

Appendix A
Factor Analysis for Intellectual Capital

	1	2	3
Human Capital			
Our employees are highly skilled.	.17	**.66**	.11
Our employees are widely considered the best in our industry.	.18	**.52**	-.01
Our employees are creative and bright.	.16	**.63**	.14
Our employees are experts in their particular jobs and functions.	.17	**.65**	.07
Our employees develop new ideas and knowledge.	.23	**.76**	.19
Social Capital			
Our employees are skilled at collaborating with each other to diagnose and solve problems.	**.77**	.21	-.01
Our employees share information and learn from one another.	**.85**	.28	.06
Our employees interact and exchange ideas with people from different areas of the company.	**.81**	.15	.08
Our employees partner with customers, suppliers, alliance partners, etc., to develop solutions.	**.54**	.33	.04
Our employees apply knowledge from one area of the company to problems and opportunities that arise in another.	**.71**	.23	.11
Organizational Capital			
Our organization uses patents and licenses as a way to store knowledge.	-.11	.19	**.40**
Much of our organization's knowledge is contained in manuals, databases, etc.	.15	-.04	**.98**
Our organization's culture (stories, rituals) contains valuable ideas, ways of doing business, etc.	.16	.27	**.46**
Our organization embeds much of its knowledge and information in structures, systems, and processes.	.12	.11	**.50**
eigenvalue	4.96	1.77	1.54
percent of variance	21.74%	18.31%	10.58%

Appendix B
HR Configurations

Acquisition:
- Our hiring process is thorough and comprehensive.
- We screen many applicants to fill job openings.
- We use many different recruiting sources.
- We pay higher wages than our competitors.

Developmental:
- Our training and development activities are comprehensive.
- We spend more money per employee on training than our competitors.
- Our employees spend more hours a year training than our competitors.
- We provide continuous developmental opportunities for our employees.
- We offer many different types of training programs.
- Our performance appraisal process tolerates mistakes that are non-repetitive.
- Our employees receive a lot of developmental feedback.
- We try to promote from within.
- Our employees are rewarded for their knowledge/skill development.

Egalitarian:
- We try to eliminate and minimize status symbols.
- Our organizational structure minimizes the number of hierarchical levels.
- Our jobs encourage empowerment and participation.
- We have few job classifications.
- We have a narrow range of pay grades.

Collaborative:
- We select job candidates based on their interpersonal skills.
- We select job candidates based on their ability to collaborate and work in teams.
- Our training and development programs incorporate team building.
- Our performance appraisal system uses multiple inputs (peers, customers, subordinates, etc.).
- We utilize group-based incentives (gainsharing, group bonuses, etc.).
- Our jobs involve a lot of teamwork.
- We utilize cross-functional teams and networks.
- We have joint employee-customer teams and networks.

Documentation:
- We encourage employees to write "lessons learned" reports after learning experiences (employee exchange programs, projects, etc.).
- Our employees help redesign work systems.
- We encourage our employees to continuously update our company's knowledge databases.
- We have a successful employee suggestion program.

Information Systems:
- Our information systems are user-friendly.
- Our information systems are accessible to all employees.
- Our information systems are integrated with each other.
- We utilize groupware, email, etc.

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