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An Architectural Approach to Managing Knowledge Stocks and Flows: Implications for Reinventing the HR Function

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Abstract
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Keywords
approach, knowledge stock, flow, HR, function, competitive advantage, manage, firm, archetypes

Comments

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Abstract

Sustainable competitive advantage is increasingly dependent upon a firm's ability to manage both its knowledge stocks and flows. We examine how different employees' knowledge stocks are managed within a firm and how—through their recombination and renewal—those stocks can create sustainable competitive advantage. To do this, we first establish an architectural framework for managing human resources and review how the framework provides a foundation for studying alternative employment arrangements used by firms in allocating knowledge stocks. Next, we extend the architecture by examining how knowledge stocks (human capital) can be both recombined and renewed through cooperative and entrepreneurial archetypes. We then position two HR configurations to focus on facilitating these two archetypes. By identifying and managing different forms of social capital across employee groups within the architecture, HR practices can facilitate the flow of knowledge within the firm, which ultimately leads to sustainable competitive advantage.

Introduction

Strategy tends to increasingly focus on how firms configure knowledge-based resources to create value. This is largely due to firms competing less on stable products and markets, and more on competencies, dynamic capabilities, new ideas, and innovation. Thus, scholars and executives alike are interested in how firms can enhance and exploit the knowledge embedded in their people and other forms of intellectual capital. Such knowledge (often referred to as *knowledge stocks*) helps firms create competitive advantage through the effective use, manipulation, and transformation of various organizational resources required to perform a task (Nonaka, 1994; Kogut & Zander, 1992; Grant, 1996).

In addition to the importance of knowledge stocks, Dierickx and Cool (1989) noted that *knowledge flows* are vital for strategic renewal of new knowledge, as well as recombination of existing knowledge. In dynamic environments especially, the flow of knowledge both within and across firms is essential for innovation and continuous adaptation—leading to a more sustainable competitive position (Grant, 1996; Kogut & Zander 1992; Nonaka & Takeuchi, 1995, Spender, 1996). Viewed this way, it is the configuration of knowledge stocks that provides a foundation for competitive advantage (Grant, 1996), but the renewal and recombination of those stocks that allows a firm to sustain that advantage (Grant, 1996; Teece, Pisano, & Shuen, 1997). This distinction can be important because, as Leonard-Barton (1995) pointed out, without continual knowledge flows to enhance and renew their strategic value, knowledge stocks can sometimes become the cause of rigidity rather than advantage.

These points at once highlight the importance of knowledge management for competitive advantage and make the boundary between strategic management and human resource management almost indistinguishable. Unfortunately, while HR is often on the “front line” in developing the knowledge base in organizations, it is almost never in a leadership role when it comes to creating competitive advantage. However in today’s environment, the assumption of

people-embedded knowledge requires that we reexamine our approaches to HRM (Snell, Shadur, & Wright, 2002).

In this chapter, our intent is to examine how different employees' knowledge stocks are managed within a firm and how—through their recombination and renewal—those stocks can create sustainable competitive advantage. To do this, we organize the chapter as follows: First, we discuss the notion of an architecture for managing human resources and review how the framework provides a foundation for studying alternative employment arrangements used by firms in allocating work. We review both the theoretical and empirical work done in this area and discuss how the HR architecture allows us to draw inferences about the form and function of an entire employment system within firms (cf., Becker & Gerhart, 1996; Nadler, Gerstein, & Shaw, 1992). Second, we extend the architecture by examining how knowledge stocks (human capital) can be both recombined and renewed through the management of social capital. By identifying and managing different forms of social capital across employee groups within the architecture, HR practices can facilitate the flow of knowledge within the firm, which ultimately leads to sustainable competitive advantage. Finally, we discuss the relationships among HR practices designed to manage the human capital (knowledge stocks) relative to the HR practices designed to manage the social capital (knowledge flows).

An Architectural Perspective on Knowledge Stocks

Research dealing with strategic issues in HR has helped shift our attention toward firm-level issues related to managing people's knowledge stocks. Instead of focusing on particular HR practices that are used independently or in isolation, strategic human resource management (SHRM) typically looks more broadly at bundles of HR practices that are implemented in combination. For instance, many SHRM researchers (e.g., Arthur, 1992, 1994; Koch & McGrath, 1996; Kochan & Osterman, 1994; Lawler, 1992; Levine, 1995; Pfeffer, 1994) have

supported high commitment and other types of high-involvement work systems that focus on making large investments in knowledge stocks to foster sustainable competitive advantage.

While more macro perspectives such as these help to draw the linkage to strategy, they do not offer much insight into how different knowledge stocks might contribute to firm advantage. As firms depend more upon employees who contribute in different ways based on differences in their knowledge (Grant, 1996), it is increasingly important to do two things: First, firms must recognize how they can best manage those differences. And second, they must recognize how they can best combine those differences. Generally speaking, these requirements reflect the dual imperatives of systems differentiation and integration (cf., Lawrence & Lorsch, 1967; March & Simon, 1958; Thompson, 1967).

Researchers have noted differences in employees' knowledge stocks and how employment sub-systems exist as a result (e.g., Baron, Davis-Blake, & Bielby, 1986; Pinfield & Berner, 1994). For instance, Mangum, Mayall, and Nelson (1985), Doeringer and Piore, (1971) and Cohen and Pfeffer (1986) all noted that many firms heavily invest in a core group of employees (often called knowledge workers), while also maintaining a peripheral group of employees from whom they prefer to remain relatively detached. In fact, Osterman (1987) identified four patterns or types of subsystems based on the firm's decision-making process. These categories helped identify the different employment arrangements or modes that might exist within one firm.

Building on this research, Rousseau (1995) as well as Tsui, Pearce, Porter, and Hite (1995) argued that not only do employment arrangements or subsystems differ, but also that the employment relationships or psychological contracts may differ as well. In general, firms might emphasize either a long-term, relational approach or a short-term, transactional approach for internal and external workers. Related, research also exists that shows not only how employment arrangements and relationships might differ according to employees' knowledge stocks, but also how the actual HR practices might differ across these groups. Miles and Snow

(1984), for example, were among the first to note that while companies may have HR practices that are standardized across the firm, many may very well be customized to fit the individual knowledge and skills of different employee groups. These ideas were later made more explicit in a framework by Lepak and Snell (1999, 2002) to show how HR practices might differ across employment groups based on their human capital.

The Conceptual Foundation of the Architecture

An architectural perspective helps to link these differences and create an overall picture of how an organization's portfolio of knowledge stocks is managed. The architectural perspective, as purported by scholars such as Lepak and Snell (1999), Hitt, Bierman, Shimizu, and Kochhar (2001), and Tsui, et al. (1995) provides a framework for examining how differences in human capital are likely to be accompanied by differences in employment as well as by variations in HR practices. Lepak and Snell identified two over-arching dimensions of the architecture based on the characteristics of employee human capital: value and uniqueness.

The first dimension in the framework, human capital value, is determined by the accumulated knowledge and skills of employees that enable a firm to enact strategies that improve efficiency and effectiveness, exploit market opportunities, and/or neutralize potential threats (Barney, 1991; Porter, 1985; Ulrich & Lake, 1991; Wright & McMahan, 1992). Accordingly, value is derived from the ability of these knowledge stocks to increase the ratio of benefits to customers relative to their associated costs (i.e., value = benefits/costs). The second dimension, human capital uniqueness, refers to the extent to which knowledge and skills are specialized or firm-specific (e.g., Coase, 1937; Williamson, 1975). Unique human capital may consist of tacit knowledge or deep experience and understanding that cannot be found in an open labor market (Perrow, 1967). Accordingly, Becker (1976) mentioned that firms are more likely to make investments in firm-specific human capital that cannot be transferred to other firms.

By juxtaposing these two dimensions—value and uniqueness—it is possible to derive a matrix of four types of human capital: core, compulsory, ancillary, and idiosyncratic (Snell, Lepak, & Youndt, 1998). Each cell in the matrix differs in terms of employment modes and employment relationships (See Figure 1). Based on these different employment modes and relationships, the HR practice configurations are also likely to vary across each cell. Figure 2 summarizes four configurations of HR practices that are aligned with each type of employment found in a firm.

FIGURE 1

Architectural Perspective

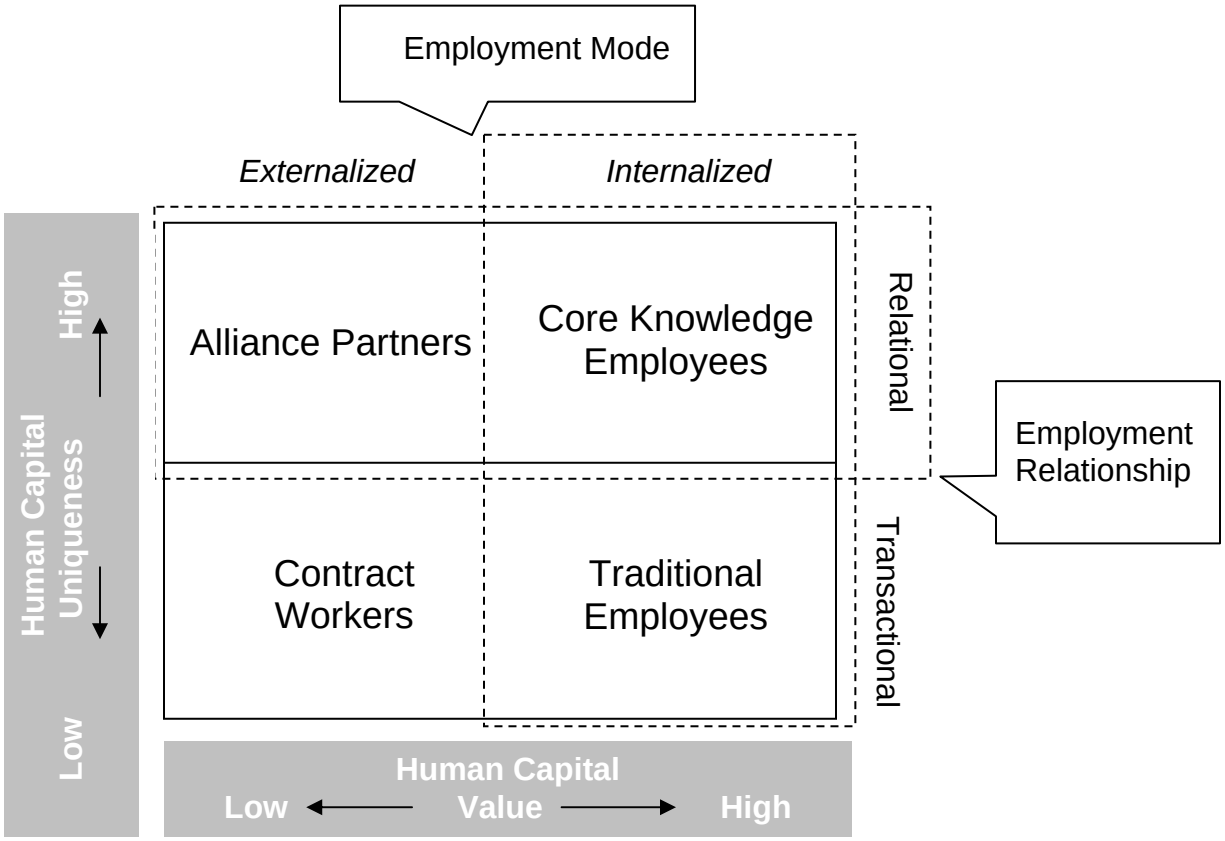


Figure 2
HR Practices from an Architectural Perspective

Human Capital Uniqueness: High ↑ / ↓ Low

Alliance Partners **HR Configuration: Collaboration**	Core Employees **HR Configuration: Commitment**
Work Structure: -cross-functional teams -skill-based job design Incentives: -relationship-based rewards -group incentives Skill Improvement: -team-building practices -developmental relationships	Work Structure: -flexible job description -Empowerment Incentives: -multiple sources for incentives -extensive benefits -knowledge-based pay programs Skill Improvement -hiring based on potential to learn -internal promotion -continuous training
Contract Workers **HR Configuration: Compliance**	**Traditional Employees** **HR Configuration: Productivity**
Work Structure: -contractual agreement -standardized jobs Incentives: -task-related -outsourced Skill Improvement: -output-based feedback -outsourced	Work Structure: -standardized jobs Incentives: -results-based incentives -individual incentives Skill Improvement: -short-term orientation -various recruiting sources -selective hiring

Human Capital Value: Low ← → High

Core Human Capital. Based on their highly unique and valuable human capital, these employees tend to be employed internally and managed as core knowledge workers. Their employment relationships tend to be long-term and focused on fostering organizational commitment and trust. The HR practices found among core employees are most likely to be associated with high-performance work systems (e.g., Huselid, 1995; Lawler, Mohrman, & Ledford, 1995) that empower employees, encourage participation in decision making and discretion on the job. Likewise, many different long-term incentives (e.g., stock ownership, extensive benefits, or knowledge-based pay systems may be offered to ensure that core employees receive continued and useful feedback and adopt a long term orientation (Snell & Dean, 1992; Delany & Huselid, 1996). Such practices are designed to help firms maintain unique knowledge that leads to strategic advantage (Becker, 1976).

Compulsory Human Capital. Similar to core human capital, compulsory human capital is important for value creation and strategic advantage. For that reason, employment tends to be internalized. However, because this form of human capital is not unique (i.e., more transferable to other firms), organizations tend to de-emphasize development, and the employment relationship tends to adhere to a more traditional job-based orientation focused on immediate performance. As a result, managers are likely to rely more on a productivity-based HR configuration that focuses on standardized jobs and selecting people from the external labor market who can contribute immediately (cf., Koch & McGrath, 1996; Snell & Dean, 1992; Tsui et al., 1995). Incentives for these employees tend to focus on efficiency and productivity through a results-based approach (Mahoney, 1989). Consistent with a productivity orientation firms are also less likely to expend money and time on long-term developmental performance appraisals but more likely to emphasize a short-term, results oriented component (Snell, 1992; Snell & Youndt, 1995).

Idiosyncratic Human Capital. Because their knowledge is not as central to value creation and strategy, employees with this type of human capital tend to be externalized.

However, these external partners have specialized knowledge that is not easy to find in the market. As a consequence, long-term partnerships are likely to be fostered that preserve continuity over time, ensure trust among partners, and engender reciprocity and collaboration (Dyer, 1996). Thus, while there tends not to be investment in the human capital itself, there is substantial investment in the relationship with these individuals. Given the need for ongoing exchange, alliance partners are more likely to be managed by a collaborative HR configuration characterized by group incentives, cross functional teams, and the like. Such practices ensure greater integration and stronger relationships with the firm and the partner employees (cf., Mathieu, Tannenbaum, & Salas, 1992).

Ancillary Human Capital. In cases where human capital is of less strategic value and not unique to the firm, employment is increasingly externalized (e.g., outsourced). Contract workers are similar to traditional workers in that they have a more transactional relationship with the firm (Rousseau & Parks, 1993), and in this case the scope of work tends to be limited and well defined. To manage these employees, firms are likely to implement HR practices that focus on worker compliance with preset rules, regulations, and/or procedures. For example, job descriptions are likely to be standardized and training and performance management, if conducted, is likely to be limited to ensuring that company policies, systems, and procedures are carried out (cf., Mahoney, 1989; Rousseau & Parks, 1993). In addition, compensation schemes for these employees are likely to be based on an hourly wage and the accomplishment of specific tasks or goals (Lepak & Snell, 2002).

Empirical Evidence of the Architecture

Based on theoretical implications of an architectural perspective, studies have been conducted to test the model empirically. For example, in a study of 206 cases from 148 publicly traded companies with over 200 employees, Lepak and Snell (2002) provided support for the notion that different types of employment are associated with variations in human capital value and uniqueness. Consistent with the strategy and economics literatures (Barney, 1991;

Becker, 1976; Quinn, 1992; Williamson, 1975), these findings showed how workers with high degrees of strategic value tended to be internalized. Likewise, alliance partners and core employees were found to have more unique knowledge stocks than the other two cells, which was theorized based on Matusik and Hill's (1998) suggestion that firms invest more long-term (in terms of employment relationship and employment mode) in external and internal workers that are key in providing private or complex knowledge. The HR configurations found within each of these employment groups also vary. For example, commitment-based HR configurations were found to occur more often in core groups than any other employee group. Similarly, the compliance-based HR configuration was found to be significantly more prevalent in the contract employee group.

Lepak and Snell (2002) also noted several related points when looking at the HR function. First, typical job descriptions do not offer clear indicators of how employees are managed and their relationship to the firm. Specifically, a group of engineers in one firm might be called upon to utilize their general occupational training while the same type of engineer in another firm may be asked to develop and utilize firm specific competencies. The skills underlying the nature of these employees' contributions, rather than their job descriptions, would likely place them in different employment groups suggesting that job descriptions do not neatly capture differences in employee contributions. Such findings argue for the importance of HR research to focus more on the characteristics of employees' human capital in determining how they are managed (cf., Ulrich & Lake, 1991; Stewart, 1997; Lepak & Snell, 1999), rather than relying exclusively on traditional HR systems focused on tasks and jobs. One of the broader implications of this research is that different employees are clearly managed in different ways. Lepak and Snell (2002) provide evidence that there is no one approach to HRM that tends to be used for all employees, nor perhaps should there be. However, simply showing differences across employees does not reveal much of an *architecture* in the sense of integrated design and function. Indeed, a fundamental premise of organizations is that individuals pool their

talents and energies to achieve collective outcomes. To address this issue, Lepak, Takeuchi, and Snell (2003) examined the various combinations of the four types of employment (core, traditional, alliance, and contract) and firm performance. Using an accounting-based performance indicator (return on equity, ROE) and a market-based performance indicator (market-to-book), they measured the relationships among the use of different employment modes and firm performance. Focusing on archival performance data, they were able to identify top-level executives to comment on their firm's overall use of each employment mode. The results of their study showed that firms that rely on both core employment and contract labor display higher performance than firms that rely on only one or neither of these employment modes. This finding supports arguments made by researchers such as Baron, Davis-Blake, and Bielby (1986), Davis-Blake and Uzzi (1993), Lepak and Snell (1999), Matusik and Hill (1998), and Pinfield and Berner (1994), in that firms might benefit from the simultaneous use of both external and internal employment modes.

Conceptually, the underlying rationale for this benefit is that different employment modes afford firms different types of flexibility (Wright & Snell, 1998). With regard to internal employees, knowledge workers provide organizations with a greater degree of resource flexibility—the ability to perform a wide assortment of tasks—compared to traditional employees. With regard to external or contingent workers, contract arrangements provide organizations with more coordination flexibility—the ability to adjust the number and types of skills in use—as compared to more long-term alliances. The benefits of these forms of flexibility are enhanced when knowledge workers are used in conjunction with contract workers. At the same time, however, the combined use of alliances and traditional employment minimizes the benefits of flexibility and, as a result, was negatively associated with firm performance. In short, their findings indicate that there are multiple ways to improve performance via the use of knowledge-workers as well as contract labor due to the realization of different types of organizational flexibility.

Interestingly, Lepak et al (2003) found that, while traditional employees are the most widely used form of employment in firms, their effectiveness is dependent on the level of technological intensity as well as whether they are used in conjunction with core or contract employees. Thus, the benefits of traditional employment may be limited to when it is used in firms within more stable environments such as firms low in technological intensity and when it is used in conjunction with knowledge based or contract employees that provide enhanced organizational flexibility to offset their limited flexibility (Lepak et al., 2003). Viewed in combination, these results provide support for Tsui, Pearce, Porter, and Hite's (1995) argument that there is no single best way to deploy employees to enhance firm performance, and more broadly it shows the importance of examining employment systems through an architectural framework.

Implications for HRM

The aforementioned studies offer insight to how different knowledge stocks—or human capital—are managed and how they might affect firm performance. They also provide a model for managing the HR configurations in a way that is consistent with the uniqueness and value of employee knowledge and skills, employment mode, and employment relationship. In that regard, the architectural perspective offers a framework to understand how employees are managed in a firm based on their strategic contributions.

However, while focusing on knowledge stocks provides a foundation for understanding the role of human capital as a potential source of a firm's core competencies (Grant, 1996), knowledge flows are necessary for creating a firm's dynamic capabilities to renew and integrate knowledge (Teece, Pisano, & Shuen, 1997). Managing current knowledge and human capital is certainly an important component for an architectural model of HRM. However, managing the creation of new knowledge and shared knowledge may be equally important, and perhaps more important to understand how to leverage existing knowledge for competitive success (Kang, Morris, & Snell, 2003). In the remainder of this chapter, we extend the architectural perspective

to incorporate social capital as a critical component to managing the flow of knowledge between employees to serve as a source of competitive advantage.

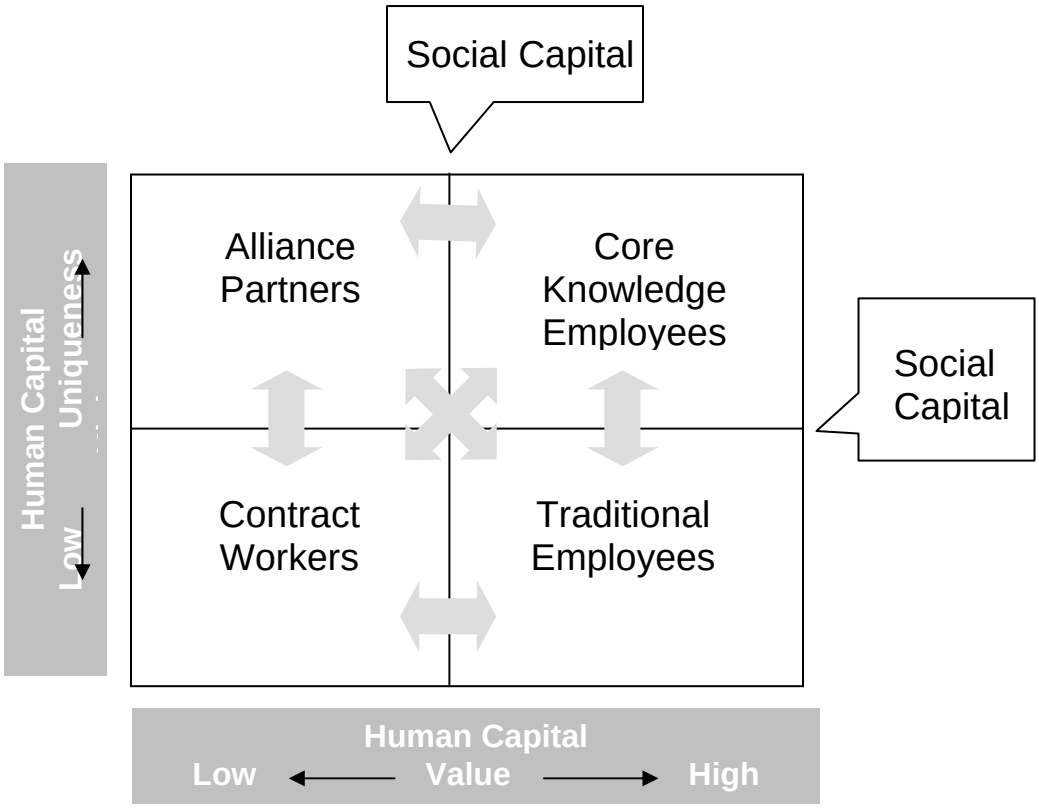
An Architectural Perspective on Knowledge Flows

Understanding how different knowledge stocks are configured and managed within a firm is a potentially important first step in understanding how configurations of peoples' human capital (knowledge stocks) can be a source of competitive advantage for firms. However, these points alone do not reveal much about how employee knowledge can be managed to combine and move knowledge across the organization as a whole to leverage knowledge as a source of future value creation and competitive advantage.

From the standpoint of organizational learning and innovation, the architectural framework needs to be augmented to reflect how knowledge flows across employees within firms (see Figure 3). Just as different employees are characterized as having different knowledge stocks, they are also likely to be characterized by different knowledge flows across employee groups. To date, there has been very little work that addresses how HR practices can facilitate the accumulation and integration of knowledge within as well as across firms (Leana & Van Buren, 1999). Yet as we discuss below, the implications for strategic management in this capacity are very clear.

Figure 3

The Architecture of Knowledge Exchange Relationships



Managing Knowledge Flows Through Social Capital

Scholars from a variety of perspectives have argued that social capital may play an important role in knowledge flows by providing a mechanism to share and combine the distributed knowledge among organizational members (e.g., Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998; Adler & Kwon, 2002; Tsai, 2002). These scholars posit three significant dimensions of social capital that facilitate knowledge flow—structural, affective, cognitive. The *structural* dimension refers to the pattern of interpersonal networks as well as the strength of ties among related parties. Through social interactions, employees may gain access to other employees' knowledge that allows them to transcend structural boundaries within an organization as well as outside an organization to find what they need (Kanter, 1983). Second, the *affective* dimension refers to elements of trust and reciprocity. Simply stated, when there is

trust in social interactions among employees, they may be more willing to share knowledge without worrying that they will be exploited (Bradach & Eccles, 1989). Third, the *cognitive* dimension of social capital refers to the shared understanding and mental models of how parties interact with one another, thus influencing the clarity and economy of communications among employees (Tsai & Ghoshal, 1998).

These three dimensions of social capital (structural, affective, and cognitive) are conceptually linked with parallel components of the architectural perspective (employment mode, employment relationship, and human capital). We discuss these below in order to reveal how social capital might facilitate knowledge flow within an architectural perspective (cf., Kang, Morris, & Snell, 2003).

Employment modes and the structural dimension. In addition to influencing the HRM practices used by organizations to acquire, build, and/or retain their human capital, employment modes also influence the opportunities and patterns of interactions among the four employee groups. For example, decisions regarding which employees are internalized versus externalized are likely to be directly related to the extent to which these different groups of employees are able, and likely, to interact. External employees have different organizational memberships so there may be relatively few formal mechanisms (e.g., shared organizational identity or shared geographic location) for frequent and dense interaction with internal employees. In contrast, internal employees (i.e., core and traditional) share membership in the same organization and are more likely to be co-located; thus, providing greater opportunity for frequent and redundant interactions than with external employee groups. This said, it is conceivable that while structural interactions among internal employees and various external groups may be developed over time, without strategic interventions they are likely to remain comparatively sparse and fail to fully develop as much as among employees within the same firm. Indeed, Dyer and Nobeoka (2000) found that strong and dense knowledge sharing

networks were developed between internal employment groups at Toyota and their suppliers through strategic interventions supporting these types of relationships.

Employment relationships and the affective dimension. Beyond the structure of employment arrangements, employment relationships also affect the affective component among employees themselves (Rousseau, 1995). This establishes a direct link between employment relationships and the affective elements underlying social relations (cf., Kang, et al., 2003). For example, Lepak and Snell (1999) noted that when core employees and alliance partners collaborate in the utilization of their knowledge stocks, a synergistic value might be realized for both. Accordingly, external parties may develop dyadic trust (trust between individuals based on past interaction) to facilitate knowledge sharing and simultaneously suppress opportunistic behavior to withhold knowledge from one another (Kale, Singh, & Perlmutter, 2000).

While dyadic trust may be found among internal employee groups, the type of trust most prevalent among internal employees is a more generalized trust (trust between individuals based on reciprocity expectations derived from shared norms or organizational identity). Whether traditional or core, Rousseau (1995) noted that most employment relationships that are internalized carry with them an expectation of conformity to norms. In these instances, individuals are more likely to accord respect and discretion to fellow employees based upon shared norms and identity. This means that there is less of a need for dyadic trust, which requires commitment and investment between the interacting parties. Furthermore, if the interacting employee groups represent different departments, functions, or business units of the firm, they may have a greater need for a more generalized trust that does not require large investments in the individual relationship and that allows for maintaining a denser network than what might be found between internal and external employees. Thus, there are two main types of trust that might exist across employee groups, and each may depend on the relationships those employees have with the organization.

Human capital and the cognitive dimension. Not only is it important for employees to interact and develop relationships, they also need to understand one another in order share and apply each other's knowledge. As employees interact, they often develop a shared language of expertise, codes, and the like as well as how to communicate and exchange knowledge. One form of this shared cognitive dimension is referred to as common "component knowledge" (Matusik & Hill, 1998), which allows people to understand one another's domain knowledge deep enough to transfer, assimilate, and apply it. For example, alliance partners tend to have specialized knowledge that, while perhaps not directly related, is complementary to a firm's core employees (Lepak & Snell, 1999). They jointly work with core knowledge workers to conduct particular tasks or projects. Those common task experiences are likely to facilitate the development of common component knowledge between alliance partners and core knowledge employees over time (Cicourel, 1973; Brown & Duguid, 1991, 2001). The other shared cognitive dimension that can exist is known as common "architectural knowledge", which allows people of different specializations to understand how the different components fit together (Matusik & Hill, 1998). An example would be the interaction of knowledge workers and traditional employees who are likely to share common architectural knowledge, which is most likely due to the fact that they both understand the processes and coordination mechanisms in the firm.

Thus, common component knowledge might be found or be more appropriate across certain employee groups, while common architectural knowledge is more likely found in other situations. In other words, both forms of shared cognition among employees contribute in different ways to the flow of knowledge.

Knowledge Exchange Relationships in an Architectural Perspective

Because social capital is not one-dimensional, it is important to understand the patterns among structural, affective, and cognitive elements as they relate to facilitating knowledge flows. The challenge for HRM is to understand how these social capital dimensions should be related

and managed to facilitate knowledge creation. Knowledge creation can be broken down into two separate categories: (1) the pursuit of new knowledge, which is often referred to as exploratory learning; and (2) the recombination or deepening of existing knowledge, or exploitative learning (March, 1991). Both types of knowledge creation are considered necessary, but require two separate forms of learning by the firm—thus, creating a need for unique HR systems to manage each. Researchers focusing on knowledge creation have suggested that these two forms of learning may stem from two different types of activities: (1) entrepreneurial activities among employees that result in the creation of new knowledge and (2) cooperative activities among employees that involves the refining and recombining of existing knowledge in new ways (cf., Schumpeter, 1934; March, 1991). While the notion of entrepreneurial and cooperative activities is fairly straightforward, the manner by which HRM may foster these two types of activities is less well understood. Kang, Morris, and Snell (2003) suggested that there are two dominant and distinct relational HR archetypes that facilitate or build upon the realization of entrepreneurial and cooperative activities among employees (see Figure 4).

At one extreme, a *cooperative archetype* is designed to refine and recombine in new ways the existing knowledge stocks that are dispersed across different employee groups within a HR architecture. Essentially, a cooperative archetype focuses on linking and leveraging different sources of existing knowledge in ways that may stimulate new knowledge. These knowledge flow activities may be facilitated through specific, interrelated aspects of the social capital dimensions. With regard to the structural dimension of social capital, frequent interactions with numerous people in other employment groups may facilitate the exchange of knowledge necessary to stimulate new and creative ideas. With regard to the affective dimension of social capital, employee groups that share generalized trust—trust based on norms of reciprocity—are more likely to share personal knowledge, regardless of a direct personal relationship. Doing so enables the recombination and refinement of employee

knowledge already in existence in or outside of the firm. With regard to the cognitive dimension of social capital, when employees share an architectural understanding of how things fit together, they are more likely to exploit and tweak existing knowledge or ways of doing things. This is because their focus is more on the big picture that allows them to look at minor improvements in terms of efficiency or more surface level changes that affect the interconnection of all the components.

Figure 4
Knowledge Exchange Relationships

Structural	**Weak / Sparse Interactions** (Granovetter, 1973; Burt, 1992)	**Strong / Dense Interactions** (Coleman, 1988; Krackhardt, 1992; Uzzi, 1997)
Affective	**Resilient Dyadic Trust** (Putnam, 1993; Leana & Van Buren, 1999)	**Generalized Trust** (Sheppard & Tuchinsky, 1996; Jones & George, 1998; Lean & Van Buren, 1999)
Cognitive	**Common Component Knowledge** (Cohen & Levinthal, 1990; Grant, 1996; Matusik & Hill, 1998; Szulanski, 1995)	**Common Architectural Knowledge** (Nonaka, 1991; Weick & Roberts, 1993; Matusik & Hill, 1998)
	Entrepreneurial Archetype	Cooperative Archetype

Looking at the pattern among these three characteristics of social capital, it reinforces the notion of cooperative activities among employees. Thus, cooperative dimensions of social capital are logically consistent with the efforts of employees to refine and recombine existing knowledge among closely affiliated employee groups.

At the other extreme, the *entrepreneurial archetype* is designed to create knowledge through the exchange and combination of new knowledge from different employee groups. Whereas cooperative archetypes are utilized to realize the extension of existing knowledge into new possibilities, an entrepreneurial archetype is oriented toward the creation of new knowledge from disparate, and previously unrelated knowledge sources. Like the cooperative archetype, there are also specific aspects of social capital that facilitate this type of knowledge flow. First, the structural dimension of social interactions is based not on ongoing and frequent interactions but by sparse and non-redundant networks of employees where they are in a greater position to identify new and creative ways of linking these different sources of knowledge. Second, the social connections are based on dyadic trust among some of the parties rather than generalized trust over the whole unit. This means that people with dyadic trust relationships are able to share unique and new knowledge that might not normally be found in generalized trust relationships found through common employers. And finally, relationships among group members in this instance are more likely to have common component knowledge that allows them to combine deeper and more radically new knowledge. This more loosely connected system is consistent with the entrepreneurial requirements of an organization's efforts to share and develop novel and diverse knowledge stocks in new or unfamiliar domains.

The two archetypes discussed above are typically found within the HR architecture. Kang et al. (2003), for example, suggested that relationships among internal partners within an organization most likely reflect the characteristics of a cooperative archetype while external partnerships more likely reflect the entrepreneurial archetype. More specifically, they argue that internal partnerships tend to be more structurally redundant, based on generalized trust and

organization norms, connected and integrated not by common expertise, but by the architectural knowledge of organizational coordination. In contrast, connections with external partners typically are more sparsely populated and loosely connected networks, based on dyadic trust born through personal experience, and connected via common areas of expertise.

Human Resource Implications for Knowledge Flows

If we recognize that relational archetypes (social capital) play a fundamental role in facilitating knowledge flow, and that these two alternative archetypes involve fundamentally different employee behaviors, then it is likely that different HR practices will be appropriate for each (cf., Kogut & Zander, 1992; Kang, et al., 2003) (see Figure 5).

The theoretical development of alternative HR configurations takes into account several premises. First, HR practices typically focus on managing human capital (i.e., ways to develop and utilize individual skills and competencies that will enable the employee to optimally contribute to the firm) (e.g., Snell & Dean, 1992), while recent research shows the importance of managing the exchange relationship (social capital) between employees (Nahapiet & Ghoshal, 1998; Leana & Van Buren, 1999; Dyer & Nobeoka, 2000; Takeishi, 2001). Taking this into account, HRM researchers have discussed and identified various HR practices that are focused more on helping employees develop and utilize social relationships with each other rather than developing or utilizing their own skills (e.g., Batt & Moynihan, 2002; Gant, Ichniowski, & Shaw, 2002; Gittell, 2000). In other words, while most HR practices might influence the way employees interact with on another, certain practices might be designed for and directly encourage employees to interact with others in a certain way. For example, HR practices applied to core employees may encourage them to develop more cooperative exchange relationships with employees in other groups.

Figure 5
Extended HR Practices for Knowledge Flow

HR Practices for Knowledge				HR Practices for Knowledge Flows		
Commitment	Productivity	Collaborative	Contractual	Cooperative	Entrepreneurial	
Work Structure: -flexible job description -Empowerment	**Work Structure:** -standardized jobs	**Work Structure:** -cross-functional teams -skill-based job design	**Work Structure:** -contractual agreement -standardized jobs	**Work Structure:** -team-based production -job rotations -expanded staffing patterns	**Work Structure:** -flexible work design -temporary project teams -cross-functional teams	**Structural**
Incentives: -multiple sources for incentives -extensive benefits -knowledge-based pay programs	**Incentives:** -results-based incentives -individual incentives	**Incentives:** -relationship-based rewards -group incentives	**Incentives:** -task-related -outsourced	**Incentives:** -clan-fostering activities -communities of practice -multi-rater feedback -participative goal setting -rights of redress	**Incentives:** -individual incentives -pay-for-knowledge -pay-for-relationships	**Affective**
Skill Improvement: -hiring based on potential to learn -internal promotion -continuous training	**Skill Improvement:** -short-term orientation -various recruiting sources -selective hiring	**Skill Improvement:** -team-building practices -developmental relationships	**Skill Improvement:** -output-based feedback -outsourced	**Skill Improvement:** -long-term employment -extensive orientation and socialization -mentoring -on-the-job training -group training	**Skill Improvement:** -multiple career development -cross-training -know-how reports	**Cognitive**

Second, the configurational approach implies that HR practices reinforce and complement each other as a coherent system to improve organizational performance (Wright & Snell, 1991; Snell & Youndt, 1995; Huselid, 1995; Delery & Doty, 1996; Delaney & Huselid, 1996; Ichniowski, Shaw, & Prennushi, 1997; Becker & Huselid, 1998; Gutheire, 2001). This means that there likely exists a group of practices that support one another in building exchange relationships that support both exploratory and exploitative learning.

Third, we argue that there are two distinct configurations of HR practices that are applicable to almost all possible exchange relationships within an architectural perspective and focus on managing across employee groups rather than managing all employees within a particular employee group. While certain exchange relationships across different employee groups might already exist within an organization's architecture, the two HR configurations we discuss may be strategically applied in conjunction with existing practices to create or enhance cooperative-type knowledge recombination or entrepreneurial-type knowledge renewal.

Related, HR practices supporting relational archetypes (social capital) are complementary to—or supplemental to—HR practices designed to support human capital. In other words, these configurations of practices can usually be applied over the existing practices used to manage each employee group. Where applicable, by adding such practices to different employee groups a firm may be able to facilitate greater knowledge flow. Specifically, for a certain knowledge exchange relationship to be encouraged, the corresponding HR practices need to be applied to only one of the interacting groups. For example, a firm might apply cooperative HR practices to a certain group of core employees to encourage them to develop stronger relationships with their external alliance partners.

HR Practices for the Cooperative Archetype. Researchers have proposed a wide array of HR configurations that are comprised of reinforcing HR practices that may lead to organizational performance. Despite their differences, a common theme is that an effective HR system must simultaneously focus on developing the skills of employees, motivating employees

to use their skills via incentive systems, and provide a work environment that allows them to do so (MacDuffie, 1995). HR configurations geared toward the facilitation of cooperative knowledge exchange relationships also consist of HR practices directly focused on work structure, incentive, and skill improvement practices consistent with the three dimensions of social capital.

Work structure. The structural dimension of frequent and dense connections found in cooperative exchange relationships may be developed and maintained by interdependent work structures. For example, team-based production that requires reciprocal interdependence among employee cohorts can help to enhance their interactions, which leads to mutual adjustment and close coordination (Delaney & Huselid, 1996; Gittell, 2000). Similarly, job rotations across employee groups can strengthen the ties and facilitate knowledge transfer. Dyer & Nobeoka (2000), for example, discussed how rotational schemes used by Toyota with their external suppliers encouraged knowledge sharing and strengthened their network ties (cf., Nonaka & Takeuchi, 1995; Gant et al., 2002). Another example of how interdependent work structures might influence dense connections is found in the expansion of staffing patterns to include external partners (Pennings, Lee, & van Witteloostuijn, 1998).

Incentives. Generalized trust found in the affective dimension may be enhanced through clan-fostering activities that strengthen shared goals and values (Goold & Quinn, 1990; Snell, 1992). For example, selecting partners based on organizational fit or alignment with organization values helps to ensure that there are common motives and expectations across employee groups. Snell (1992) and Snell and Youndt (1995) found that this is especially important in those situations where behavioral protocols cannot be spelled out in advance. To support this, socialization programs and efforts to build communities of practice reinforce the idea that partners stand to gain more by working together than they do operating in isolation.

Generalized trust may also be reinforced through performance management systems that emphasize collective achievements (Leana & Van Buren, 1999). For example, team-based

appraisal systems and multi-rater (360 degree) feedback have been shown to strengthen the sense of contextual performance and mutual reliance (Day, Winfred, & Gettman, 2001). Similarly, participative goal-setting, rights of redress, formal grievance procedures, and the like are all ways to more broadly enhance organizational support that encourages generalized trust (Gittell, 2000; Orlikowski, 2002; Wayne, Shore, & Liden, 1997).

Skill improvement. The cognitive aspect of cooperative exchange relationships may be developed through staffing practices that encourage different employee groups to focus on broader organizational issues. For example, long-term employment contracts, which not only increase commitment and loyalty, may also prevent premature endings to valuable learning networks (Dyer & Nobeoka, 2000).

Training and development practices also provide effective mechanisms to build broader architectural knowledge among different employee groups. Extensive orientation and socialization programs are typical development practices that help employees understand and internalize unique values, goals, history, and culture of the firm and share tacit knowledge including cognitive schema (Feldman, 1989; Nonaka & Takeuchi, 1995). Similarly, mentoring and on-the-job training enable them to build strong social and cognitive connections (Mullen & Noe, 1999; Gittell, 2000; Orlikowski, 2002). Other organizational development techniques such as group training can help to expand and integrate the mental models of different employee groups (cf., Wright & Snell, 1991; Nonaka, 1994).

HR Practices for the Entrepreneurial Archetype. In contrast to the cooperative archetype, HR practices supporting entrepreneurial exchange relationships are geared toward creating an infrastructure that not only provides the flexibility needed for knowledge exchange relationship creation, but the mechanisms that encourage and reinforce its development. Those HR practices include work structures that might facilitate structural aspects of social capital, incentives for affective dimensions, and skill development focusing on cognitive aspects of social capital.

Work structure. Certain work structures are likely to affect the structural aspects of entrepreneurial exchange relationships. For example, the design of flexible work structures and temporary project teams may help to engender diverse and transitory connections between different employee groups. In cases where jobs are broadly defined and allow for discretion and self-direction, employees are likely to build exchange relationships with a variety of partners in order to address problems and opportunities (Lepak & Snell, 1999; Gant, Inchiniowsk, & Shaw, 2002). Also, cross-functional teams provide employees with opportunities to interact with colleagues in different functions and practices and thus to access various knowledge domains and expertise within the firm (Clark, Amundson, & Cardy, 2002).

Incentives. Dyadic trust might be strongly influenced by the focus of incentive systems. For example, individual incentives may stimulate individuals' motives to build varied relationships of trust for exploratory learning (Edmondson, 1999). Accordingly, Leana and Van Buren (1999) noted that individual incentive systems might discourage social loafing or the free-rider effect (a problem inherent in group-based incentives). The potential advantages of individual incentives may be best leveraged when incentives are accompanied with the acquisition of knowledge or new ideas (e.g., pay-for-knowledge or pay-for-reputation), which may motivate core employees to acquire a broad set of knowledge and skills by various social connections within firms (Youndt, Snell, Dean, & Lepak, 1996; Hargadon & Sutton, 1997; Gant et al, 2002). These types of incentives may institutionalize an organizational culture emphasizing "creative abrasion" (Leonard-Barton, 1995), which stimulates conflicting ideas in order to productively link them to performance (Nonaka & Konno, 1998).

Skill improvement. Common component knowledge is a cognitive aspect of social relationships that might be developed through skill improvement practices. For example, multiple-career development practices (e.g., generalist or boundaryless careers) are often used to develop trans-specialist or multi-skill knowledge by helping employees experience various job opportunities beyond the boundaries of a single expertise (Defillippi & Arthur, 1994). Such

knowledge may also be enhanced through group training (Moreland & Myaskovsky, 2000) and cross-training or job rotations (Hargadon & Sutton, 1997). Such practices might encourage employees to develop a common area of interest or know-how with various other employee groups in order to share more complex knowledge outside of their traditional knowledge domains. Another example of how firms develop greater common component knowledge is through the development of archival-based mechanisms such as know-how reports and electronic databases to retain component-specific knowledge that improves transactive memory (i.e., shared knowledge of each other' expertise) (Takeishi, 2002).

By looking at how HR configuration might facilitate relational archetypes we can better understand the potential role HR plays in different knowledge creation activities. Such practices might prove useful in developing or redirecting existing archetypes found within a firm.

Discussion

The primary objective of this chapter was to create an integrative framework that brings together current thinking about knowledge stocks and flows and how they can be managed from an architectural perspective. Using the characteristics of human capital (value and uniqueness), we reviewed how employee knowledge stocks are identified and managed differently in the firm. Combining that with social capital theory, we extend the architectural perspective to show how knowledge stocks might be recombined and renewed through two distinct types of knowledge exchange relationships. We also discussed two HR configurations that might specifically be applied to the development of these relationships.

This paper also addressed the ongoing question of how the tensions of exploratory and exploitative learning might be balanced in a firm through HR practices. Part of this tension comes from the fact that management researchers have identified very few mechanisms (incentives, structures, etc.) to avoid what Levinthal and March (1993) describe as the "myopia of learning" where organizations feel that they can focus only on one or the other forms of knowledge exchange activities. We presented a potential solution for future empirical research

by arguing that firms might simultaneously apply cooperative HR practices to one group of employees while simultaneously applying entrepreneurial HR practices geared toward another group of employees under the same organizational umbrella.

We believe that the framework offered in this chapter provides several avenues for future research. Obviously, the ideas presented in this chapter are conceptual and research is needed to determine the salience of the different social capital dimensions and how they correspond with the architectural dimensions of human capital, employment mode, and employment relationships. Related, while we anticipate that distinct HR systems are more appropriate for each type of knowledge exchange relationship (cooperative and entrepreneurial), we do not know if differences in how firms structure their HR systems for each archetype translates into differences in employee and organizational performance. Moreover, when the focus is on managing knowledge flows in addition to knowledge stocks, there may be implications for different types of performance for each knowledge exchange relationship. It may be the case that cooperative relationships are strongly related to some indicators of performance (e.g., product extensions, new market penetration), while entrepreneurial relationships are more strongly related to other performance metrics such as new markets and new products/services. Moreover, the relative level of performance may be enhanced (or diminished) based on the extent to which firms align their HR systems to realize cooperative or entrepreneurial archetypes These two exchange relationships, and their associated HR systems, are distinctly focused on different types of value creation and research is needed that examines how these configurations are uniquely related to important organizational outcomes.

Second, future research might also help understand whether the archetypes are exclusive to internal or external relationships. For instance, can one group of employees have both cooperative and entrepreneurial relationships? Based on social capital theory, we assume that more cooperative relationships will be found internally and more entrepreneurial types found with outside partners. Yet, other research has suggested that the opposite can actually

happen. Dyer and Nobeoka (2000), for instance, found that relationships of cooperation, strong ties, and generalized trust were developed between Toyota core groups and their suppliers. Similarly, Uzzi (1997) showed how strong cooperative knowledge exchange relationships between external business partners developed in the New York City garment industry. Thus, what is more common and what is more effective become two pertinent questions.

Third, as we assumed in this paper that these practices might be applied simultaneously with existing practices, future research might address how these relationship-based HR practices might actually be implemented with existing practices and the possible effects of these overlaps. For example, do some of these relationship-based HR practices send conflicting messages to employees on what type of relations to value? Also, how cost effective is it to implement multiple HR practices within the firm? Likewise, are there compromises that need to be made in terms of taking out or adding in certain HR practices?

In conclusion, as firms turn more toward people and their knowledge stocks to create a competitive advantage, it is important to remember that the sustainability of these advantages may be dependent upon how they renew these stocks. Many avenues emerge when we view the dynamics of knowledge in a firm. The architectural perspective provides a focus and clarity to how both knowledge stocks and flows should be viewed and researched. Hopefully this focus will offer greater understanding of the importance of people in today's organizations.

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