

The Knowledge-Based Approach to Sustainable Competitive Advantage

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In the twenty-first-century landscape, firms must compete in a complex and challenging context that is being transformed by many factors, from globalization, technological development, and increasingly rapid diffusion of new technology, to the development and use of knowledge (Hitt, Keats, & DeMarie, 1998). This new landscape requires firms to do things differently in order to survive and prosper. Specifically, they must look to new sources of competitive advantage and engage in new forms of competition. This, in turn, requires a clear understanding of the nature of competition and competitive dynamics.

One popular approach to understanding competitive dynamics is the resource-based view of the firm. According to this view, the explanation for why some firms ultimately succeed and others fail can be found in understanding their resources and capabilities. A firm's resources and capabilities influence both the strategic choices that managers make and the implementation of those chosen strategies. (The recent debate over this model suggests there are challenges involved in applying it; see Priem & Butler, 2001; Barney, 2001.)

To understand why certain competitive strategies are more effective than others, one must consider the distribution of resources in competing firms. Although a given firm may possess more or less of any particular resource, only those resources that are rare, valuable, and difficult to imitate provide a sustainable competitive advantage (Amit & Schoemaker, 1993; Barney, 1991; Schoenecker & Cooper, 1998). When the strategies employed are successful in leveraging the firm's rare, valuable, and difficult-to-imitate resources, that firm is likely to gain an advantage over its competitors in the marketplace and thus earn higher returns (Hitt, Nixon, Clifford, & Coyne, 1999). Competitive advantages that are sustained over time lead to higher performance (Peteraf, 1993).

These arguments are somewhat clear when we consider tangible resources such as buildings, machinery, or access to capital. And in the more traditional competitive landscape, these tangible resources were the most important potential sources of competitive advantage. Thus, if a firm could modernize its plant, or develop a more efficient distribution process, or access cheaper credit, it could compete successfully and prosper. But firms employ both tangible and intangible resources in the development and implementation of strategies, and as the nature of work and competition changes, intangible resources are becoming more important. Examples of intangible resources are reputation, brand equity, and—for our purposes the most important of these—human capital. In fact, in any competitive landscape it has been argued that intangible resources are more likely to produce a competitive advantage because they often are truly rare and can be more difficult for competitors to imitate (see Black & Boal, 1994; Itami, 1987; Rao, 1994).

Among a firm's intangible resources, human capital may be the most important and critical for competitive advantage because it is the most difficult to imitate. For example, Miller and Shamsie (1996) discussed the role of stars, or "talent," in the success of the Hollywood studios in their heyday, the 1930s and 1940s. The stars were developed so that each had a unique reputation or image that was difficult for a rival studio to imitate. Yet as Miller and Shamsie note, rival studios often *did* try to develop their own versions of other studios' stars by trying to imitate their "image"—for exam-

ple, Warner Brothers developed Tyrone Power to compete with MGM's Clark Gable. But this approach was generally unsuccessful because it focused on the star alone.

In the competitive environment of the motion picture industry at that time, imitating only the star was rarely enough to create similar value. This was because the star's value to the studio was enhanced through integration with other studio resources. Thus, having a great musical talent was an important resource for a studio. But in order for the studio to turn that talent into a competitive advantage, it also needed people who could successfully write musicals, someone to direct them, and still others who could costume a star in a musical, design the right makeup, and film the movie in the best way. In other words, the star's value was partly a function of the others at the studio with whom he or she worked. Therefore, social complexity and ambiguity is created, making the integration of these resources difficult to imitate.

A firm's access to such bundles of integrated resources and the difficulty of imitating them are the ultimate source of competitive advantage. Any organization that seeks a competitive advantage through human resources thus must both acquire the "right" resources and take the steps required to leverage them.

Generally speaking, human capital is more mobile than other intangible resources (see Teece, Pisano, & Shuen, 1997). Therefore, it may seem an unlikely source of sustained competitive advantage. The Hollywood studios sought to reduce the mobility of human capital by signing their stars to long-term exclusive contracts. Such contracts are no longer feasible in the movie industry, nor are they usually feasible elsewhere. Yet the mobility of human capital is less a threat to competitive advantage than it would first seem to be. Once an organization integrates human capital with other complementary resources (as explained earlier) and uses this integration to create organizational capabilities (that is, leverages them), losing one or a few individuals may not lead to a loss of competitive advantage. Instead, a competitor would have to gain access to all of the resources and the system in place to leverage those resources. Thus, returning to the studio example, a rival studio would have had to lure away the star, the writer, the director, the costume designer, and the cameraperson in order to gain a sustainable

advantage—an extremely difficult task. As a result, despite the mobility of talented employees, human capital is now seen as one of the most important sources of competitive advantage.

Human Capital as a Strategic Resource

Human capital is a general term that refers to all of the resources that individuals directly contribute to an organization: physical, knowledge, social, and reputational. However, we need to understand what it is about human capital resources that helps individuals contribute to gaining and sustaining a competitive advantage. During the industrial age, human capital was valued because of physical resources such as strength, endurance, and dexterity—these were the aspects of human capital that were most likely to lead to competitive advantage. But as new machinery and technology were introduced, these characteristics became less important. In the current economic landscape, human capital is more likely to be valued for intellect, social skills, and reputation.

For example, Miller and Shamsie (1996) noted that the studios' reliance on long-term contracts with well-developed stars (or "properties," as they called them) was successful only as long as the competitive environment was predictable and stable. When the studios lost their movie theaters, the stars gained more power, and the television grew as an entertainment alternative for the general public, this approach to gaining competitive advantage was no longer successful. In the more dynamic environment, managing knowledge-based resources, or intellectual resources, became the key. In today's competitive environment, where there is even more uncertainty and dynamism, these knowledge-based resources are even more important than they were in the past.

The term *knowledge-based resources* refers to skills, abilities, and learning capacity. People can develop these through experience and formal training. *Social resources* (now sometimes referred to as *social capital*) include the personal relationships that bind together members of an organization as well as relationships that link organizational members to other external sources of human capital. Through social capital, individuals can gain access both to other human resources (the physical and intellectual capital, for example) and to other forms of capital (financial, for example). *Repu-*

tational capital is less personal. Often it accrues through associations with prestigious organizations. For example, people with degrees from the more respected educational institutions have greater access to valued resources simply because of the reputation of their alma maters.

We must emphasize again, however, that it is not enough to acquire individuals who have such attributes. It is also necessary to develop structures, systems, and strategies that allow the organization to exploit the resources and gain competitive advantage. For example, a football team that acquires a strong passing quarterback only gains a competitive advantage when it shifts its offensive strategy to focus on passing. Professional baseball teams often have groundskeepers cut the grass closer (or not) depending on whether the team currently includes players who tend to hit ground balls into the infield. In these ways, the teams leverage their resources to gain an advantage.

Professional service firms leverage their human capital by forming project teams led by senior experienced professionals, often partners in the firm. The other members of the project teams usually are younger, less experienced associates. In this way, they leverage their most valuable human capital to complete projects for clients. Working together on the project also allows the associates to gain some of the tacit knowledge possessed by the more senior partners; they learn by doing (Hitt, Bierman, Shimizu, & Kochhar, 2001).

Of course, some scholars and practitioners have always understood the role of human capital in creating an organization's success. Carly Fiorina, CEO of Hewlett-Packard, emphasized the role of human capital in an address she made to MIT graduates: "The most magical and tangible and ultimately the most important ingredient in the transformed landscape is people. The greatest strategy . . . , the greatest financial plan . . . , the greatest turnaround . . . , is only going to be temporary if it is not grounded in people" (Fiorina, 2000). The field of I/O psychology has also recognized the important role human capital plays in organizational effectiveness and performance, and has long suggested better ways to select and develop employees.

Nevertheless, I/O psychology has traditionally been concerned only with the acquisition and development of these resources.

There has been little concern with how to integrate them into an overall strategy that would enable a firm to leverage the resources it acquires or develops. Furthermore, I/O psychologists have been primarily concerned with improving individual performance, and more recently, work group performance. They assume that improving performance at these levels will lead to improvement at the organizational level, but this assumption is seldom tested. For example, psychologists have recommended hiring “better” employees, which often means employees with greater intellectual or knowledge resources, but mostly because these employees could be expected to perform their jobs with greater proficiency. The assessment of performance has been almost exclusively at the level of the individual or the team, and little attention has been paid to the processes or structures by which individual or team-level performance could be translated to organizational-level performance or competitive advantage (for example, DeNisi, 2000).

Utility analysis (see Boudreau, 1991; Cascio, 1987) has allowed the fields of I/O psychology and human resource management to demonstrate further how these increases in performance can be expressed in real dollars. Usually, work in this area (for example, Huselid, 1995) calculates the value of human resource practices rather than the value of the human resources themselves. Research in other areas, however, has demonstrated how human resources can produce higher organizational performance (Wright, Smart, & McMahon, 1995; Pennings, Lee, & van Witteloostuijn, 1998), especially when these resources are used explicitly in the implementation of a firm’s strategies (Hitt, Bierman et al., 2001).

This brings us to one of the primary purposes of this volume: to encourage I/O psychologists to think more about the implications of their work for firm performance and competitive advantage. Some I/O scholars *have* begun to think about their work in these broader terms, but it is still the exception rather than the rule (for example, Jackson & Schuler, 2001; Klein, Dansereau, & Hall, 1994; Klein & Kozlowski, 2000; Schuler & Jackson, 1987; Schweiger & DeNisi, 1991). We hope to change that. We also want to focus attention on a specific but very important subset of human capital resources: knowledge-based resources. As noted earlier, in the new competitive landscape knowledge-based resources are the most critical for gaining sustained competitive advantage.

We also believe it is important for I/O psychologists to appreciate that organizations do not achieve and sustain a competitive advantage simply by possessing knowledge-based (or any other unique) resources. The firm must effectively manage those resources in ways that allow it to leverage and exploit them. *Capabilities* refer to a firm's ability to integrate and deploy its resources to achieve a desired goal (Hitt, Ireland, & Hoskisson, 2001). Thus, we also have created this volume to help I/O psychologists understand how they can work with organizations and assist them in developing the strategic capabilities they need to gain and sustain a competitive advantage. We begin by discussing in more detail exactly what we mean by knowledge-based resources.

Knowledge-Based Resources

Knowledge-based resources include all the intellectual abilities and knowledge possessed by employees, as well as their capacity to learn and acquire more knowledge. Thus, knowledge-based resources include what employees have mastered as well as their potential for adapting and acquiring new information. For several reasons, these resources are seen as being extremely important for sustaining competitive advantage in today's environment.

First, the nature of work has been changing over the past several decades, so that many jobs require people to think, plan, or make decisions, rather than to lift, assemble, or build. This kind of work requires both tacit and explicit knowledge (see the following section) and the ability to apply that knowledge to work. I/O psychologists have traditionally been capable of determining the levels of knowledge possessed by job applicants and helping organizations select people based on their knowledge. Psychologists and HR specialists have also been successful in identifying an individual's potential to learn specific material through the use of aptitude tests. Furthermore, these groups have been adept at designing training programs that provide employees with the knowledge they presently lack (assuming they have the aptitude to learn).

But work continues to change, and in unpredictable ways. It is often difficult to state exactly what kinds of knowledge a person needs to succeed on the job, and it is almost impossible to predict what types of knowledge he or she will need in the future. Change

and unpredictability in organizations mean that knowledge-based resources such as the ability to learn and personality traits such as adaptability are extremely important, and some organizations have begun rewarding employees financially when they demonstrate an ability to acquire and master new knowledge (see, for example, Jenkins & Gupta, 1985; Gerhart, 2000; Lawler, Chapter Ten, this volume).

Still, it is not enough to select employees who have knowledge resources, or even to help them to acquire such resources by providing training or offering rewards for increasing their knowledge. Organizations must also find new ways to leverage these resources to gain competitive advantage. For example, the literature includes a fair amount of work describing the resources that must be available to teams in order for them to be successful. Some studies have examined the resources that should be possessed by the team as a whole, such as expertise, collectivism, and flexibility (for example, Campion, Medsker, & Higgs, 1993) whereas others have focused on individual resources, such as general mental ability and conscientiousness (for example, Barrick, Stewart, Neubert, & Mount, 1998). An organization might select highly conscientious individuals or train a team to develop more collectivist values, but neither of these routes would lead to sustained competitive advantage. Competitive advantage is gained only when the organization selects or develops these resources *and* structures work tasks and the reward system in ways that motivate the team to perform well and thereby contribute to organizational effectiveness (see, for example, Guzzo & Shea, 1992). Team effectiveness may be enhanced through selection and training, but competitive advantage comes only when the organization structures rewards and work to leverage those effective teams to improve organizational performance (see, for example, Jackson & Schuler, 2002).

Many knowledge (and other) resources may be acquired by hiring new individuals, and these resources may improve performance of a job or even the performance of a team or work unit. In order to become sources of competitive advantage, however, such individual resources must increase performance at the organizational level. We shall return to a discussion of ways in which individual resources can be used to improve organizational performance later. First, though, we consider alternative methods for acquiring valued knowledge resources.

Acquiring Knowledge-Based Resources

Although selection and training (or development) are reasonable means by which to acquire knowledge-based resources, they are time consuming and may be inefficient. For example, to select a number of highly intelligent employees an organization would have to convince a large number of such employees to apply for available jobs. Assuming the organization could then identify the “most” intelligent among the applicants and make offers to these individuals, it would then be necessary to convince them to accept these jobs.

Developing needed competencies may not be simple either. The development of some specific knowledge-based competencies may actually require that employees possess other abilities or characteristics (for example, aptitudes) that are absent in a firm’s current workforce. Fortunately, there are other ways for a firm to acquire valuable resources, such as with mergers, acquisitions, and strategic alliances.

Firms frequently acquire or merge with other firms in order to gain access to new products or other specialized knowledge (for example, Hitt, Hoskisson, Johnson, & Moesel, 1996; Barkema & Vermeulen, 1998). Merger and acquisition (M&A) targets are often chosen because of their complementary resources and knowledge bases.

Alternatively, a firm may decide that a permanent relationship with the target firm is not desirable. For example, there may be a special project that requires knowledge resources not available to the firm but that are available elsewhere. Although it might be possible to acquire or merge with the other firm, the project, and therefore the need for those resources, may have a limited time horizon. In such cases, instead of forming an entirely new entity or acquiring the new firm, a firm may decide simply to form a strategic alliance, such as some type of joint venture. In either case, however, the goal is to acquire (even if temporarily) the valued resources of the other firm; partners are chosen in much the same ways as targets for mergers and acquisitions (Hitt, Dacin, Levitas, Arregle, & Borza, 2000; Kogut & Zander, 1992, 1996).

Acquiring knowledge from external sources and internalizing it can be difficult. Internalizing new knowledge requires adequate *absorptive capacity*, or the ability to identify, assimilate, and use additional

knowledge (Cohen & Levinthal, 1990). Normally, individuals or groups cannot “absorb” additional knowledge that is too different from their current knowledge base (Grant, 1996) because they cannot identify or understand it. Thus, firms that engage in M&A activity can benefit by developing their capability for assessing the extent to which the other firm’s knowledge base is similar or complementary to their own. They can also benefit from developing routines to integrate new knowledge (Levitt & March, 1988). For example, some firms have special units that identify new valuable knowledge in the organization and then find ways to diffuse (communicate) it throughout the organization. As is true for any method of acquiring knowledge resources, this method has its own challenges. Issues of culture clash and the inability of employees to adapt to new ways of doing things are serious threats to the effectiveness of this approach to acquiring knowledge-based resources (Schuler, Jackson, & Luo, 2003).

Aggregating Knowledge-Based Resources

Whatever resources are acquired, no matter the manner in which they are acquired, they need to be aggregated to the highest level of use or application. That is, if a firm acquires individual-level knowledge resources through selection or training, it must find a way to “leverage up” those resources to the team level and eventually to the organizational level. Even if a firm acquires a special expertise through a merger, it is necessary to diffuse that expertise throughout the entire organization. Otherwise, the effects of these knowledge-based resources on competitiveness will be limited.

This problem is the same one facing scholars interested in relating human resource practices to firm performance. For example, if hiring “better” people results in higher productivity, how exactly does the selection of individuals translate into improved organizational performance? The performance improvements that come with each new person hired do not simply add up to greater productivity and competitiveness. Several scholars have proposed models to explain how individual performance is transformed into team and eventually firm performance (see, for example, Ostroff & Bowen, 2000), but there is little empirical documentation on the validity of these models.

Empirical work on the processes through which firms aggregate and leverage the knowledge-based resources of individuals to create a competitive advantage also is scarce. Nevertheless, it seems reasonable to assert that leveraging individuals' knowledge requires an organization to develop systems and processes by which individuals who have the critical knowledge transmit this information to others in the organization who can use it (see, for example, Iles, Yolles, & Altman, 2001, for a model of how this might be accomplished).

In addition to implementing structures for effective communications, organizations must encourage employees to try new ideas. A recent study (Edmondson, 1999) demonstrated the importance of a supportive climate for increasing creativity and innovation in organizations. Employees are not likely to disseminate their knowledge and try to leverage it if they are afraid of failing. Organizations must make employees feel that it is safe to fail before effective knowledge transfer and innovation will occur. Cultures and climates that clearly signal the value of knowledge sharing and communication contribute to a firm's ability to leverage its knowledge-based resources. Indeed, Pfeffer and Sutton (2001) view this as one of the most important aspects of leadership, noting that a leader's task "is to help build systems of practice that produce a more reliable transformation of knowledge into action" (p. 261). These authors also suggest that successful companies have management practices that create an environment and culture "valuing the building and transfer of knowledge" (p. 261). When a firm combines its knowledge resources with management practices such as these, it creates the knowledge-based capabilities it needs to compete successfully in a knowledge-intensive economy.

Knowledge-Based Capabilities

Strategic capabilities refer to those systems or processes that an organization creates to leverage its resources to produce a competitive advantage. In the context of knowledge-based resources we have discussed issues relating to the acquisition or development of these resources and ways in which we can carry these resources up to higher levels of analysis. Increasingly, knowledge-based capabilities are recognized as among the most strategically important capabilities for creating a sustainable competitive advantage (Grant,

1996; Marsh & Ranft, 1999; Nonaka, 1994; Simonin, 1999). Proponents of a knowledge-based approach to competitive advantage argue that the primary purpose of a firm is to create and apply knowledge (DeCarolis & Deeds, 1999).

Two important types of knowledge are tacit knowledge and explicit knowledge. *Tacit knowledge* is grounded in experience and difficult to express through mere verbal instruction; individuals know it but cannot articulate it. Because tacit knowledge is difficult to codify, it is passed along to others through direct experience (Polanyi, 1973; Reed & DeFillippi, 1990). Therefore, it is sometimes termed *subjective knowledge*, *personal knowledge*, or *procedural knowledge*.

Explicit knowledge, in contrast, can be formalized, codified, and communicated. Explicit knowledge has also been referred to as *objective knowledge* and *declarative knowledge* (Kogut & Zander, 1992). Explicit knowledge is often gained through formal education and training programs, but it can also be gained through experience on the job. Indeed, an important objective of many electronic information-sharing systems is to ensure that the organization captures the explicit knowledge that employees gain through their experience on the job. However, it must be emphasized that some of the experience may entail explicit knowledge that can be transferred in this way, but other experience produces tacit knowledge that cannot be transferred in this way.

Designing and effectively implementing an electronic information system for storing and distributing knowledge is one of the more familiar approaches to developing a capability for managing knowledge, but there are many others. Electronic knowledge management systems focus mostly on information storage and distribution. Other approaches focus more on knowledge creation (for example, through research and development) and continuous change that reflects new knowledge (for example, organizational learning).

Research and Development

World-class research and development activities (R&D) represent a knowledge-based capability that serves as a competitive advantage for firms pursuing innovation. The primary intent of R&D is to develop new ideas about products, processes, or services. Both

knowledge and social capital contribute to the success of R&D efforts. Innovations often build on cutting-edge knowledge. To convert such knowledge into important innovations usually requires individuals in the organization to combine the knowledge with an understanding of the market, collectively use the results of the research to build a new product, and then work to commercialize it (Hitt, Hoskisson, & Nixon, 1993; Hitt, Nixon, Hoskisson, & Kochhar, 1999). Thus, the ability to combine existing knowledge to generate new applications and exploit the unrealized potential of existing knowledge is another knowledge capability that can contribute to a firm's ability to achieve sustainable competitive advantage.

Organizational Learning

Miller (1996) defined organizational learning as the acquisition of knowledge by individuals and groups who are willing to apply it in their jobs in making decisions and influencing others to accomplish tasks important for the organization. Whereas a single instance of organizational learning (that is, a single change event) may be relatively easy for other organizations to imitate, *continuous* organizational learning has cumulative effects that are much more difficult to imitate. Thus, continuous learning is an important capability that can serve as a source of sustainable competitive advantage. As a result, many highly competitive organizations now invest in developing the capability for continuous organizational learning.

Training and development programs are commonly used to promote organizational learning. Such programs seek to increase the knowledge capital, and to a lesser extent, the social capital of employees. Most training and development programs focus on ensuring that employees have the most up-to-date, explicit knowledge in their respective areas of specialization. Because explicit knowledge is well known, programs for its dissemination can be easily imitated. Although it is necessary to maintain competitive parity, explicit knowledge usually cannot serve as the basis for a sustainable competitive advantage.

But tacit knowledge is not easily disseminated. Tacit knowledge must be learned by using it, and this often requires extended periods of social interaction. Because tacit knowledge is learned by

experience, the transfer of such knowledge is generally a slow and complex process (Teece et al., 1997). Thus, management practices aimed at leveraging tacit knowledge are more difficult for outsiders to understand and imitate successfully. A strategic alliance such as a joint venture can be useful for transferring tacit knowledge because it allows partners' employees to get close enough to transfer tacit knowledge (Lane & Lubatkin, 1998). Another approach to transferring tacit knowledge is to assign more experienced professionals to lead a team of less experienced professionals (Baron & Kreps, 1999; Sherer, 1995). Over time, the less experienced professionals learn the more experienced professionals' tacit skills (Hitt, Bierman et al., 2001). Organizations with significant learning capabilities understand the importance of both tacit and explicit knowledge and are able to ensure that both types of knowledge are used to promote learning.

Knowledge-Based Competition and I/O Psychology

We believe that competing on the basis of knowledge will be critical for organizational success in the coming years. Although many of the activities that organizations can use to enhance and leverage their knowledge resources occur at the level of individuals and work teams, organizational effectiveness also requires developing organizational capabilities for leveraging and exploiting knowledge. I/O psychologists can help firms achieve a knowledge-based competitive advantage in several ways. First, many programs initiated at the strategic level are designed to affect individuals. I/O psychologists can contribute, then, by providing models and theories of how these programs are likely to influence the behavior of individuals and groups. Second, I/O psychologists can examine how traditional I/O interventions may be used to increase the knowledge resources of the organization. Third, I/O psychologists can help design organizational programs and systems that help firms leverage and exploit the knowledge they hold.

A merger or acquisition is a strategic action that is not likely to succeed unless it is implemented in a manner that ensures individual employees behave as anticipated. As noted earlier, mergers and acquisitions do not guarantee that a firm's knowledge will in-

crease. Although the knowledge of the acquired firm becomes the property of the acquirer, knowledge resides primarily in individuals, making it quite mobile. Often there is substantial turnover of key professionals and top-level executives (Schweiger & DeNisi, 1991; Walsh, 1988, 1989). If key employees in the acquired firm leave before the firms are successfully combined (or even shortly thereafter), important human capital (and knowledge) is lost. Thus, controlling turnover can be critical for successful knowledge acquisition and future learning. Even if all the human capital is retained, problems of integrating the acquired firm into the acquiring firm also can create barriers to learning (Hitt, Harrison, & Ireland, 2001). For example, different compensation systems for managers in the two original firms can lead to jealousy and hinder cooperation between managers of the two firms. Thus, expertise about how to design compensation systems that encourage collaboration can also be useful to firms that need to retain knowledge resources after a merger or acquisition.

Human capital may be important in firm expansion strategies. For example, firms that desire to expand their operations into new geographic locations can use the social capital of key employees through their relationships with customers and suppliers. Professional service firms may open offices in new cities where their current customers have operations. In so doing they can more effectively serve their current customers, but they can also use their current customers to identify and serve new customers. They may use their current employees to manage the new office and social contacts to hire new professional employees to staff the new office. Finally, they expand the use of their top employees' knowledge in serving customers in the new geographic regions (Hitt, Bierman et al., 2001). Likewise, firms may learn from the new markets that they enter. For example, a firm may enter a new geographic region where a new technology has been developed and used. The firm entering this market may learn the new technical capabilities by hiring employees with this knowledge to staff the new operation (Zahra, Ireland, & Hitt, 2000).

Decisions about organizational design are another arena in which I/O psychologists should be (and sometimes are) actively involved in applying psychological models and theories to improve the ability of organizations to develop and manage new models of

employment effectively. For example, it is becoming increasingly common to use contract workers instead of permanent employees, in part because of the economic flexibility associated with this approach (see, for example, Pearce, 1993). Employing contract workers provides access to needed skills but does not commit a company to the costs and obligations associated with hiring permanent employees. But because contract workers only provide their knowledge to the firm for a limited time and often receive no incentives to help others learn their skills, usually very little organizational learning occurs. In fact, it may be to their disadvantage to help an organization learn the knowledge they hold unless they are given special incentives to do so. If the organization acquires their knowledge, it may have little need of their services in the future.

I/O psychologists can improve the learning occurring in organizations that rely heavily on contract workers by helping to design work settings and incentive structures that support knowledge sharing and learning. I/O psychologists know a fair amount about how to improve commitment (for example, Shore & Wayne, 1993) and how to translate commitment into extra-role behaviors (for example, Williams & Anderson, 1991). It may be premature to surmise that conclusions from past research, conducted mostly with permanent employees, generalize to contract workers. Nevertheless, this knowledge base provides a strong foundation for additional research that would position I/O psychologists to help organizations better leverage the knowledge resources of contract employees.

There are numerous ways in which I/O psychologists might contribute to a firm's capability to gain a sustainable competitive advantage by more effectively leveraging its human capital and developing its knowledge capabilities. In fact, there have been some attempts to describe, in general terms, how outcomes might result (see, for example, Jackson & Schuler, 2000, 2001). But there are many other possibilities as well. For example, performance appraisal and performance management systems can be designed to encourage employees to learn and share their knowledge with others. The organizational culture can be developed to encourage innovation and learning. Selection systems can be built to assess tacit knowledge and learning capacity effectively. The purpose of this volume is to stimulate additional thinking, new research efforts, and the sharing of practical experiences relevant to the intersec-

tion of knowledge-based competition and I/O psychology. Specifically, our primary goals in this volume are the following:

- To increase awareness among I/O psychologists of the dynamics of knowledge-based competition
- To increase awareness among I/O psychologists of the ways in which organizational-level variables and processes affect the development and use of knowledge in organizations
- To present some alternative ways for I/O psychologists to use their expertise to improve our understanding of and the implementation of knowledge-based strategies
- To encourage I/O psychologists to conduct research that can help firms more effectively compete in a knowledge-based economy

Secondarily, we also intend for this volume to increase awareness among scholars outside the I/O arena of the potential contributions that I/O psychologists can make to this field of study.

By adapting I/O psychology's models and approaches to achieve competitive advantage through knowledge, organizations and I/O psychologists will gain. We believe that I/O psychology research can become highly relevant to the problems and issues that top management in organizations is facing. We also believe that other management scholars can gain by learning more about the ways in which I/O research models and theories can contribute to the processes underlying knowledge-based competition. Certainly, organizations will gain from these I/O psychology contributions, because their competitiveness and overall performance should be enhanced. As the volume emphasizes, knowledge ultimately resides in individuals. It is therefore critical that scholars with the expertise in dealing with human phenomena focus on knowledge management. This expertise can help top management to understand better how to use their knowledge-based resources to gain competitive advantage.

Plan for This Volume

This book is composed of six main sections and fourteen chapters. The introductory and concluding chapters—which represent Parts One and Six, respectively, and were prepared by the editors—are

wrapped around the primary contributions of the book. Part Two is composed of three chapters that address the structuring of knowledge development and application in organizations. Part Three focuses on the human resource management architecture facilitating knowledge management and acquiring knowledge through hiring employees and contract workers. Part Four examines means of developing, diffusing, applying, and retaining knowledge through human resource management systems. Part Five discusses approaches to assessing culture, climate, and knowledge-based resources in organizations. Following are concise descriptions of the chapters' content.

Work and Organizational Designs for Knowledge-Based Competition

Chapter Two, authored by David Deeds, deals with macro strategies that firms use to acquire knowledge. The chapter is based on the proposition that firms that effectively acquire knowledge are able to create and sustain a competitive advantage. Deeds examines several means for acquiring knowledge from external sources, including strategic alliances, joint ventures, licensing, and mergers with or acquisitions of other firms. He also explores the importance of social relations across firm boundaries for acquiring knowledge (that is, transferring knowledge across firm boundaries). The biopharmaceutical industry is used as an example to illustrate the need for and means of transferring knowledge across company boundaries. Deeds also notes some of the risks involved in acquiring knowledge from external sources. In short, firms that open their knowledge to acquisition by other firms risk losing their competitive position to these firms in future competition. Therefore, he argues, the success of such transactions between firms depends on their ability to maintain a strong positive relationship.

Chapter Three, written by Marlene Fiol, highlights three important premises for knowledge-based competition. Fiol argues that knowledge exists at both individual and organizational levels in both explicit and tacit forms and that the competition for knowledge is universal. Finally, no single competitive advantage is sustainable in the current hypercompetitive environment. Knowledge must be continuously changed and new knowledge developed in order to survive and succeed. Fiol uses metaphors about pipelines

and rivers to explain the diffusion of knowledge in organizations. The pipeline view of knowledge transmission is based on the assumption that knowledge can be manipulated, stored, and disseminated like water in a pipeline. In contrast, the assumption that knowledge exists as a process among people suggests that it is more like a river. In other words, knowledge is embodied and only has meaning that is assigned to it by people, much like the boundaries of a river that are defined by the water running through it. Knowledge transmission in this form is more difficult to manage than in a pipeline. Changing the volume and direction of a river is challenging and must be well planned and implemented. Fiol discusses some of the means of managing knowledge (for example, information technology) along with their limitations. She suggests that a number of these knowledge management techniques are based on the assumption of knowledge flowing through a pipeline rather than a river. As an alternative to this approach, she recommends using technology to support work that requires knowledge creation, dissemination, and application. Furthermore, she recommends improved organizational structures (configurations of positions, job duties, and lines of authority) to facilitate knowledge management. Her discussion includes top-down management and flattened structures along with the role of trust in managing knowledge in organizations. Fiol's work is creative and thought-provoking.

The third and final chapter in this section (Chapter Four) was authored by Susan Mohrman. It examines designing work to manage knowledge better for a competitive advantage. Mohrman argues that new organizational forms and designs of work are necessary to manage knowledge effectively in current organizations. She describes an historical perspective on work design but especially emphasizes a framework for a knowledge-based work design. In particular, she argues for several principles to guide the design of knowledge-based work. First, she suggests the design of work for systemic performance. Essentially, she suggests that work be designed to connect elements of a system, thereby differentiating and clarifying accountability and responsibility for each of the parts. All employees share responsibility for their part of the system but also for the performance of the system as a whole. Second, she recommends creating dynamic work designs. She notes that because of the dynamic environment in which organizations exist, no work designs should be permanent. Rather, continuous evaluation and

revision may be necessary. Third, she suggests focusing on sequences of assignments rather than on jobs. In this scenario, individuals do not have stable jobs; instead, there are dynamic knowledge processes and tasks on which people with various skills and types and levels of knowledge are deployed. Fourth, she suggests that the distinction between managerial and knowledge work should be blurred. In fact, she argues that managerial and leadership work is simply one form of knowledge-based work. Fifth, she recommends the design of work to enable processes that cut across boundaries, such as disciplines, functions, geographic areas, and product and service groupings, as well as sets of customers, so that the design of work is independent of individuals' "home base" in the organization. Next, she recommends designing work to develop talent; development should not be seen as separate from work but rather as an integral part of it. Finally, she recommends emphasizing the employment relationship. The organization's expectations for employee performance and contribution should be related to the outcomes employees experience from their performance and contribution. Mohrman's chapter provides an interesting and forward-thinking view of designing work in a knowledge-based environment.

Staffing Organizations for Knowledge-Based Competition

Chapter Five, by David Lepak and Scott Snell, examines the management of human resource architecture to facilitate and enhance knowledge-based competition. Essentially, Lepak and Snell discuss how organizations acquire, allocate, and manage the human capital needed to be successful. Their architectural perspective views the firm as a portfolio of human capital; employees contribute to a firm's competitive advantage based on the knowledge they possess and the jobs they perform. Firms must understand the knowledge base of their employees and establish mechanisms whereby these employees can apply and share that knowledge. Lepak and Snell describe the types of knowledge that individual employees may hold and concerns about the mobility and retention of these employees (and thereby their knowledge). They suggest that the mobility of employees is directly related to the degree of transferability of their knowledge and skills to different organizational con-

texts. In addition, Lepak and Snell examine the management of knowledge with employees working as cohorts or groups. The strategic value and uniqueness of the knowledge held by both individuals and groups of employees create contingencies for how organizations manage this knowledge. Finally, they explore managing knowledge at the organizational level, focusing specifically on managing the portfolio of human capital competencies. In this discussion, they examine how knowledge can be leveraged across the human resource management architecture. Their goal is to enhance employee contributions to organizational performance.

Chapter Six, by Elaine Pulakos, David Dorsey, and Wally Borman, examines how firms can use staffing practices to acquire knowledge resources. The authors focus on the more traditional I/O psychology approach of recruiting and hiring individual talent to enhance human capital and the base of knowledge, and they discuss the competition for star performers and their recruitment to build the firm's competitive advantage. In particular, they recommend recruiting strategies that emphasize the person-organization fit because of the fluidity of jobs and the continual movement of key organization members from team to team and project to project. They assert that organizations can develop a competitive edge in attracting star performers by developing and communicating organizational images and reputations that are attractive to them. They recommend offering creative compensation packages (for example, luxury cars, club memberships, and so on). The authors also examine the sources of recruiting knowledge workers, professionals who have ties to their occupations. They recommend using channels such as professional associations and societies, conferences, and publications. They suggest using the Internet for advertising and recruiting because it increases reach to many of these individuals. The authors suggest careful examination of competitors' workforces to approach high-quality employees. The next phase in this process is to select the workers who will be the best performers and thereby contribute to a competitive advantage for the organization. Obviously, a first step is to determine what is required to perform effectively in the organization (for example, creative problem solving, learning new tasks and technologies, dealing with uncertainty and stress, demonstrating cultural adaptability, and so on). Then, candidates who have been recruited can be assessed for their skills and capabilities to meet the appropriate challenges and

requirements. One important requirement is their ability to help build and apply new knowledge, a critical element examined in this book. Another important element is sharing knowledge, diffusing it throughout the organization; thus, employees who have strong social skills and an ability to network may be important to support the sharing of knowledge. Two other important characteristics are relevant experience and domain-specific knowledge. The authors also examine more sophisticated selection tools such as biodata measures and high-fidelity job simulations. They conclude that firms can improve their competitive advantage by effective hiring practices.

The final chapter in this section is written by Alison Davis-Blake and Pamsy Hui. The authors explore the recent phenomenon of contract workers and their contribution to building and applying knowledge in organizations to increase their competitive capabilities. Davis-Blake and Hui describe research that shows that outsourcing has increased considerably in the last decade; contracting for knowledge-intensive activities also has grown at a rapid rate during this time. These trends create the need for human resource management systems that manage contract employees so that they contribute to organizational knowledge and performance. Davis-Blake and Hui note that firm-specific knowledge cannot be contracted for in the external labor market; this is a significant issue because of the contribution of firm-specific knowledge to competitive advantage. However, contract employees can hold and contribute valuable explicit and tacit knowledge to the accomplishment of important projects for the firm. The authors examine several human resource management activities relevant to managing contract employees, including selection, training, compensation, and retaining those who make important contributions. Finally, Davis-Blake and Hui offer a number of ideas for future research on contracting for talent.

Developing and Motivating Employees for Knowledge-Based Competition

The first chapter in this section (Chapter Eight) examines the process of developing intellectual and social capital in organizations to facilitate the management and transfer of knowledge. The authors, Ray Noe, Jason Colquitt, Marcia Simmering, and Sharon

Alvarez, discuss the development of intellectual and social capital at the individual, group, and firm levels. Specifically, they describe how social and intellectual capital are developed through knowledge management, teams, and entrepreneurial firms. Noe and his colleagues explore how knowledge management facilitates the development of intellectual capital in individuals. They also examine the types of behavior that foster the development of new knowledge, such as constructive controversy, creativity, and adaptation. They suggest that teams with moderate stability, high task interdependence, and high member openness are better able to develop intellectual capital. The firm-level focus in the chapter is on knowledge created through entrepreneurial activities. Noe and his colleagues also explore how training and development support the relationship between social capital and intellectual capital. In short, social capital facilitates the transfer of knowledge that is developed in training programs and thereby leads to the development of intellectual capital. Much like Mohrman, they recommend a dynamic approach to measuring and developing intellectual capital. They explore the processes of knowledge transfer and the potential effects of individual factors on the development of intellectual capital. Research questions on knowledge transfer, teams, and development of social and intellectual capital in organizations are offered to guide future empirical work.

Chapter Nine, by Greg Oldham, explores how organizations stimulate and support creativity. The development of new knowledge requires creativity. Oldham explores several mechanisms that facilitate the sharing of creative ideas in the organization. He presents and explains a theoretical framework that suggests how personal and contextual conditions influence creativity and the sharing of creative ideas. Oldham effectively explains that ideas must be made public and available to others in the organization if they are to contribute substantially to organizational knowledge and thereby to performance. He explores several potential contextual effects on the development and sharing of creative ideas, such as employee mood states (positive and negative), job complexity, performance goals and deadlines, supervisor and coworker support, along with the physical configuration of the workspace. He notes that individual differences can affect the development of creative ideas as well. Oldham suggests that a nonjudgmental climate and encouragement to share ideas can enhance the development

and sharing of creative ideas in organizations. Therefore, this chapter deals with a critical element in the knowledge management process.

In Chapter Ten, Ed Lawler explores how performance management affects knowledge management in organizations. Specifically, he focuses on the reward systems designed to promote knowledge development and use in organizations. Lawler argues that traditional organizations were not designed to manage knowledge but rather to emphasize efficiency in the management and control of products and services. In these more traditional organizations, employees were (and are) rewarded for the size of their job, the length of their service, and their individual performance. However, Lawler argues, effectively managing knowledge in organizations requires different organizational behavior. The newer organizations need reward systems that emphasize development of new knowledge, transmission of that knowledge, and use of that knowledge to develop and improve products and services. In short, Lawler suggests that the reward system needs to attract and retain individuals with the right knowledge, motivate individuals to learn what is critical for gaining a competitive advantage, and motivate individuals to develop and use knowledge that helps create that competitive advantage. He argues that job-based pay has several risks and suggests that skill-based pay is more effective in promoting knowledge management. He believes that skill-based pay is particularly effective in situations where multiple skills are needed but may not be used all the time. This is because it is important that the skills be available for use when needed and thus represent a critical asset for the organization. Furthermore, individuals with multiple skills often can work on multiple projects simultaneously. Therefore, Lawler concludes, reward systems can play an important role in the management of knowledge in organizations.

Chapter Eleven, by Steve Maurer, Tom Lee, and Terry Mitchell, examines the importance of retaining technical professionals in order to retain knowledge in organizations. Although it is important to retain knowledge workers in order to retain knowledge, these workers are likely to be more mobile than many other competitive resources. Maurer and his colleagues argue that the ability to retain the creators of technical knowledge is of critical importance to knowledge-based organizations, and their chapter

examines a variety of HR alternatives to help achieve this objective. They note that educational preparation, professional standards, and labor market factors affect technical professionals' decisions to stay or leave. The key issue is that firms must take positive actions to retain their technical professionals in order to retain the knowledge they hold. This is critical to managing knowledge in these organizations.

Measuring Knowledge-Based Resources

Chapter Twelve, by Lois Tetrick and Nancy Da Silva, examines the means by which organizations can evaluate their culture and climate in order to determine how well it supports organizational learning. Organizational learning is a critical component of knowledge management. An organization's culture and climate can have a significant effect on the amount and type of learning that occurs. Therefore, it is important to understand how cultures and climates affect organizational learning and how they can be assessed relative to learning. Given the assumption that generative learning or double-loop learning is more likely to lead to competitive advantage than adaptive or single-loop learning, Tetrick and Da Silva explore means by which the organizational culture and climate facilitate organizational learning. They examine knowledge development and acquisition through reinventive learning, adjustive learning, formative learning, and operative learning. They present a model that suggests several important issues in the measurement of these constructs, including level of analysis (individual, group, or organization), level of culture-climate (artifacts and behaviors, cognition and beliefs, and assumptions and values), and methods of data collection. They conclude that research is needed to understand better the mechanisms and context in which knowledge management and organizational learning affect individuals, groups, and organizations.

In the second and final chapter of this section (Chapter Thirteen), John Boudreau explores approaches to measuring knowledge. Whereas previous research has focused on measuring knowledge at the individual level (skills, abilities, and so on), Boudreau examines the measurement of knowledge at higher levels of aggregation, emphasizing the use of knowledge to create

value. Because of the importance of knowledge management, this chapter on the ability to measure knowledge accurately and to show its relationship to organizational success makes a critical contribution to this book and to the field. Boudreau's primary goal is to explain strategically appropriate measures of knowledge that access its role in the organization's value chain. In addition to aggregate measures of knowledge, Boudreau focuses on the role of knowledge of talent pools, with specific emphasis on pivotal roles—where performance differences between individuals have the greatest effect on the organization's achieving a competitive advantage. From a research standpoint, Boudreau examines knowledge measures as higher-level dependent variables and as moderator or mediator variables that explain the effects of human resource innovations on knowledge and thereby on organizational performance. Finally, Boudreau categorizes knowledge measures in terms of stocks (existing level of knowledge at a point in time), flows (movement of knowledge between individuals, units or organizations), and enablers (creating the capability for action).

Conclusion

The last chapter, written by the editors, emphasizes the critical contributions made by the chapters of this volume and the challenges to human resource professionals to build HR systems and processes to facilitate knowledge management in organizations. But in keeping with the overall goals of the SIOP Frontiers Series, the final chapter pays special attention to the research questions and issues that still need to be addressed before we can understand exactly how to build these systems. Thus, this final chapter attempts to summarize what we know about each area discussed in the volume and what we still need to learn. An integrative model of how organizations need to acquire, share, apply, and update knowledge is used to help generate research questions and issues at a higher level of analysis than is done in the individual chapters.

It is clear that organizations will need to acquire, develop, and use knowledge-based resources if they are to gain competitive advantage in the future. We believe that I/O psychology can help organizations accomplish these goals, but that the field has not yet paid enough attention to these issues. We hope that this volume

convincing some I/O psychologists to look beyond their typical dependent variables (that is, individual and team performance) and consider how their own knowledge-based resources can be used to help organizations improve effectiveness at the organizational level. We also hope this volume introduces I/O psychologists to some new and different ways of thinking about competencies and performance, showing them how some members of our scientific community have already begun to think about the larger implications of their work. The ultimate goal is help move the field of I/O psychology to the next level of analysis and to generate research programs that show how I/O psychology can help firms compete effectively in the knowledge age.

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