The evolution of organizations and the development of appropriate knowledge structures

Leyland M. Lucas

Leyland M. Lucas is an Associate Professor in the Department of Management and Business Administration, Morgan State University, Baltimore, Maryland, USA.

Abstract

Purpose – Beginning from the premise that organizations go through different stages of development and that different types of knowledge exist, this paper seeks to explore the extent to which organizations need to place greater emphasis on ensuring adequate and relevant access to knowledge, while protecting it from unwarranted dissemination.

Design/methodology/approach – Using a stage of development framework, a conceptual argument is presented. It is suggested that, while significant attention is paid to knowledge management in organizations, of even greater importance is the need to develop systems and structures to support access, while protecting it from unwarranted dissemination and possible loss of critical capabilities and competencies.

Findings – The paper suggests that there is no single knowledge structure that is appropriate. Instead, organizations must develop different knowledge structures depending on the stage of the organization's development and the type of knowledge under consideration. In so doing, all efforts must be made to facilitate access to knowledge by those who require it but also to recognize that systems must be employed to prevent unwarranted access. Such unwarranted access may erode competencies and capabilities critical to organizational success.

Originality/value – The ideas reinforce the need for organizations to better understand what knowledge they possess and the need to balance requirements for access and control.

Keywords Knowledge management, Organizations, Knowledge organizations

Paper type Conceptual paper

O ver the past two decades, there has been a significant increase in the amount of attention paid to issues surrounding organizational knowledge. As traditional sources of organizational success have become less durable, organizations have begun emphasizing human capital (Crossman and Bontis, 1998), reinforcing the idea that managing the organization's knowledge inventory is of vital importance (Barney, 1991; Nelson and Winter, 1982; Penrose, 1959; Teece *et al.*, 1997). It should also be noted that much of this attention has embraced a focus in such areas as managing the flow and exchange of information and the use of information technology in facilitating information storage and flow. However, while important, this emphasis has come at the expense of broader areas of concern such as understanding the challenges to knowledge processing; understanding how this knowledge can be shared; finding more effective ways to enhance employees' willingness to share knowledge; and developing the appropriate structures within organizations to better facilitate knowledge sharing while protecting it from unwarranted dissemination.

The increased focus on knowledge management in organizations raises an interesting question regarding its use and protection. Stated differently, what systems are established to support access to knowledge, while protecting it from unwarranted dissemination? This article focuses on the critical aspect of knowledge structures that must be developed to support access to knowledge, and protect it from dissemination outside the organization. Taking the approach that the organization goes through various stages of development from

entrepreneurial to maturity, it is argued that different types of knowledge structures must be used. Therefore, the organization's stage of development is a critical factor in determining what structure is appropriate to store that knowledge.

It is important to note that while some authors have argued for the need to distinguish between public and private knowledge, this article focuses exclusively on private knowledge. Public knowledge exists in the general domain and can be easily imitated. From our perspective, such knowledge cannot contribute to achieving the sustainable competitive advantage sought by organizations. Any advantages gained through access to public knowledge are transient and temporal in nature, resulting only in temporary gains to organizations. Private knowledge, because it exists in organizations and has a quality of uniqueness, affords opportunities for achieving a sustainable competitive advantage (Matusik and Hill, 1998). Accordingly, it is this private knowledge that organizations must focus on controlling its dissemination.

Perspectives on knowledge structures

A central issue to the study of knowledge structures is the ability of organizations to learn and acquire knowledge. Researchers accept that organizations are inanimate objects and cannot learn (Levitt and March, 1988; Levinthal and March, 1993). Yet, organizations are made up of employees with their mental faculties that allow them to learn and acquire knowledge to varying degrees. Organizations learn, and acquire knowledge, by bringing together these employees in a productive effort. When these employees are combined with other organizational assets, then production takes place, the organization learns, and knowledge is gained. Organizations must use methods of persuasion to convince employees that combining their efforts in an organization is more productive than pursuing individual objectives (Barnard, 1938; Simon, 1958).

Combining individual efforts in an organization over several individualized efforts is not to be confused with the debate surrounding markets and hierarchies. In contrast to the debate between internalizing transactions versus maintaining arms-length relationships (Conner and Prahalad, 1996; Williamson, 1975, 1985), this combining of individual effort into an organization merely relates to the pursuit of a unified goal rather than individual goals. Whether employees are part of an institution or maintain an arms-length relationship is irrelevant in this setting. What matters is that their combined activity leads to the realization of a single objective that also allows for the achievement of individual goals.

The distinction between individual and organizational knowledge also suggests that there are conceptual differences. On the one hand, individual knowledge is created based on differences in each person's cognitive abilities. What one individual learns is different from that of another because of differences in their respective cognitive skills. On the other hand, learning at the organizational level involves a social dimension. Learning occurs at the organizational level by:

- interaction between employees;
- sharing of ideas and information; and
- development of common schemas and language (Bechky, 1999; Matusik and Hill, 1998).

The knowledge in the organization represents a consensus or agreement on ideas and information (Daft and Weick, 1984). While employees may have their separate knowledge, what becomes part of the organization's knowledge is only what employees have shared and agreed upon. Thus, the knowledge that becomes part of the organization represents:

- ideas introduced;
- agreement on the ideas that reflect the combined individual experiences of these employees; and
- consensus on how these ideas are interrelated and affect each party's tasks and responsibilities (Lyles and Schwenk, 1992; Weick and Bougon, 1986).

Organizational research has also shown that frames of reference and patterns of behavior develop to influence how employees and organizations acquire knowledge. March and Simon (1958) argue that backgrounds and experiences allow us to develop familiar solutions that are continually employed to resolve problems. This familiarity reduces the options explored to find knowledge relevant to a particular problem, and encourages us to acquire most knowledge from our zones of reference. In addition, newly gained knowledge is often similar to what the organization already possesses. Similarity of knowledge facilitates absorption and dissemination (Cohen and Levinthal, 1990; Hansen, 1999). Consequently, the organization may not access knowledge beyond its frame of reference:

> Individuals and organizations give preferred treatment to alternatives that represent a continuation of present programs over those that represent change...Persistence comes about primarily because the individual or organization does not search for or consider alternatives to the present course of action (March and Simon, 1958, p. 174).

The acquisition of new knowledge implies that the organization is accumulating more knowledge. This accumulation of new knowledge has several implications for the organization. First, it increases the organization's knowledge inventory. Increases in the knowledge inventory mean that existing knowledge may become obsolete. Knowledge can become obsolete not because it is no longer required, but as a result of employees' fascination with and commitment to using the new knowledge. The new knowledge is seen as ''chic'' and the way to go, and there is a concerted effort to be associated with the ''in thing''.

Second, accumulating new knowledge along with existing knowledge can make the latter obsolete. This often happens because organizations become so enamored with incorporating what is new that they often discard existing knowledge before its full value has been exploited. For example, new technologically advanced knowledge may prevent the organization from focusing on older knowledge that is still appropriate in the industry. Thus, the organization may use new sophisticated techniques even when they are inappropriate.

These implications linked to the acquisition of new knowledge suggest that a parallel function must be one of unlearning. By unlearning, the organization eliminates knowledge that it considers no longer relevant to its operations within the current or future environment (Hedberg, 1991). Organizations can unlearn by the simple process of destroying manuals and records of operating procedures. These activities allow for the unlearning of explicit knowledge or knowledge that the organization can codify and document.

Unlearning in organizations can also occur through employee turnover. Employee turnover allows those with knowledge to leave the organization and be replaced by employees with new knowledge. Turnover reduces the tacit knowledge linked to old ideas that the organization possesses. As employees leave the organization, they take organizational memory with them. That memory cannot be replaced because it is unique to those employees. For example, extremely successful investment bankers leaving one organization for another take the tacit knowledge that allows them to make important deals, although other organizations may be better positioned to make the same deals. New knowledge replaces the explicit and tacit knowledge lost through these activities. Consequently, unlearning accompanies acquisition of new knowledge (Hedberg, 1991; Weick, 1996).

The general gist of this discussion is that organizations' decisions regarding knowledge protection has major implications for dissemination efforts. Knowledge structures are

" The increased focus on knowledge management in organizations raises an interesting question regarding its use and protection. "

designed to ensure that those needing access to specific knowledge can gain it speedily. Because the problem space in which knowledge exists is large, access to information is not uniform, and there is a critical element to knowledge. Allowing access may be constrained by a number of factors; one of which is the organization's stage of development. When access is provided, it allows dissemination and appropriate application. Therefore, organizations' knowledge structures must be both accessible and restrictive. Organizations make decisions about what knowledge is important to their success and, in so doing, their initial impetus is to be as protective as possible. However, this protective instinct may lead to unnecessary restrictions to access, thereby limiting the ability to be competitive. By failing to erect the appropriate knowledge structures, organizations may create conditions that lead to unwarranted dissemination and subsequent loss of competitive advantage. How these knowledge structures are erected as organizations evolve through the various stages of development is the focus of the remainder of this article.

A taxonomy on stages of development and knowledge structures

The notion of stages of development is critical to any discussion of knowledge structures. An organization's stage of development is critical because it has an impact on:

- the quality and type of knowledge the organization acquires;
- how that knowledge is managed; and
- whose views are reflected in that knowledge and its structure.

As organizations develop and are established in the industry, how knowledge is used, managed, and accessed will change. Therefore, it is essential that researchers examine knowledge structures in relation to the organization's stage of development. To do so, this construct will be examined at the entrepreneurial, growth, maturity, and decline stages. These stages are emphasized because the knowledge structures and strategies employed will differ at each stage. Furthermore, the assumption is made that the organization will not decline. Therefore, efforts at the maturity stage will focus on breathing new life into the organization to support its continued existence.

Entrepreneurial stage

New organizations operate at what researchers commonly term the entrepreneurial stage. Except entrepreneurial organizations that are ''spinoffs'' of larger organizations, most entrepreneurial organizations face a series of problems in the industry. Entrepreneurial organizations must not only deal with limitations to funding, but also with the liability of newness (Fleming, 2001; Lant and Mezias, 1992). These and other factors combine to place significant limits on the activities of entrepreneurial organizations.

In many instances, entrepreneurial organizations strive for acceptance within the industry. These efforts to be accepted by established organizations in the industry are supported by actions in the organization that seek to mimic industry leaders and adopt standard industry practices. As a result, the entrepreneurial organization that seeks to be accepted as a legitimate member of the industry emphasizes the acquisition of knowledge that represents industry standards.

Other entrepreneurial organizations may not pursue industry acceptance, but instead attempt to distinguish themselves in the industry (Garud and Kumaraswamy, 1993). Rather than conform to existing standards, these organizations present themselves as outliers and create their unique identities in the industry. Through this movement toward non-conforming behaviors, entrepreneurial organizations that are outliers adopt different strategies to acquire knowledge, despite the fact that they are faced with the same challenges as their counterparts that pursue conforming behaviors. For example, Amazon chose to develop a virtual market for books and other materials rather than establish itself using the traditional tools such as bookstores.

Despite the difference in strategies pursued by conforming and nonconforming entrepreneurial organizations, the focus remains the same. Entrepreneurial organizations

must find ways to ensure that the knowledge needed can be acquired speedily and provide them with the tools needed to compete successfully (Fleming, 2001; Gavetti and Levinthal, 2000). The emphasis here is on getting knowledge that can be incorporated into these organizations to make them competitive. Acquiring much of that knowledge depends on the acquisition of individual knowledge. Individual knowledge must also go through a series of processes before it becomes knowledge at the organization level. If knowledge is to become an organizational asset, it must be developed through consensus and common frames of reference, and a common language must be created (Weick and Bougon, 1986).

Converting individual knowledge into an organizational asset also requires that careful attention be paid to the types of individuals recruited into these organizations. One must ensure that those recruited into these organizations have the mindset and commitment to developing entrepreneurial organizations by reducing their reluctance to share knowledge with their colleagues. For example, the willingness of its employees to share their knowledge with colleagues was a critical reason for Apple's successful entry into the computing sector (Crossman *et al.*, 1999).

Irrespective of the drive for conformity or nonconformity by entrepreneurial organizations, there must be an emphasis on recruitment strategies. And, this coupled with limits in funding have implications for the knowledge structures that can be adopted. Once entrepreneurial organizations have identified the relevant knowledge, the emphasis shifts to finding ways to make that knowledge easily accessible to all employees. In contrast to established organizations where rigid rules and procedures may exist, entrepreneurial organizations have an environment where no experts exist. Instead, employees in entrepreneurial organizations' perform multiple tasks, are not allowed to function as specialists, and become intimately involved at different times in various aspects of these organizations.

The intimate involvement of employees in various activities suggests that these organizations are loosely coupled systems that allow for the easy exchange of knowledge, and the development of innovative solutions. These loosely coupled systems allow for increased risk-taking. Several levels of management need not sanction decisions, and an employee or a select group of employees are free to make these decisions. The easy access to knowledge suggests that a simple knowledge structure exists to support access and innovativeness.

In sum, entrepreneurial organizations are dominated by the free movement of personnel across various boundaries to perform different tasks. Because employees are often performing a variety of tasks, they must have access to a fairly wide breadth of knowledge that allows them to perform these various tasks. Moreover, these organizations' limited resources leave them with a narrow ''window of opportunity'' to make their impact on the industry (Fleming, 2001; Greve and Taylor, 2000). These and several other factors combine to require knowledge structures that allow freedom of access to knowledge. Thus, it is best that a simple knowledge structure be used by entrepreneurial organizations. Accordingly, it is proposed that:

P1. Entrepreneurial organizations employ simple knowledge structures to support access to and dissemination of knowledge.

Growth stage

In time, organizations move from the entrepreneurial to the growth stage, shedding their liability of newness (Lant and Mezias, 1992), and becoming established industry

participants. At the growth stage, restrictions that limit the role and scope of employees replace managerial freedom. Employees adopt titles that convey what activities they control; those activities outside their control are considered ''off limits'', except in cases where involvement is necessary. The manager, once involved in several operations and with access to a broad body of knowledge, now only focuses on a specialized activity. Associated with this movement toward specialization is the development of constituent relationships to support these managers. Managers join associations and trade groups that provide them with tools to bolster their position in the organization's hierarchy (Lucas and Ogilvie, 2005).

Organizations at the growth stage define their markets clearly. In contrast to organizations at the entrepreneurial stage that attempt to establish niche markets, organizations at the growth stage have already established their market niches and focus on further refining those niches. Marginally profitable markets are removed from the organizations' portfolios to better concentrate resources on maximizing the gains from more profitable markets. This process of market elimination does not occur by simply examining the numbers associated with each market. To the contrary, decisions about the markets to be eliminated are highly politicized, and involve the development of coalitions and special interest groups that argue in support of a particular position (Coopey, 1995; Pfeffer, 1981; Block, 1987; Coopey and Burgoyne, 1999).

Managers develop political power in the organization by creating reports and position papers that support arguments in favor of maintaining specific markets at the expense of others. Pfeffer and Salancik's (1974) study of departmental funding in universities suggests that information related to available opportunities is based on the various department's position in the political hierarchy, and ability to gain access to information. Similarly, Pettigrew's (1973) examination of organizational change concluded that access to knowledge about the change and its consequences is linked to location in the political hierarchy, and the ability to gain access to information. Thus, the political processes that dominate this hierarchy of politics in the organization allow coalitions to be formed. Political coalitions emerge to bargain and negotiate over who gets access to knowledge, and what kind of knowledge each coalition member can share with others inside and outside of the coalition (Lyles and Schwenk, 1992). By extension, the knowledge structure that emerges is a reflection of the dominance of specific political coalitions and the views of their members.

Given the need to develop specific knowledge management strategies at the growth stage, and the role of political coalitions in supporting specific decisions, knowledge becomes a closely held item. In contrast to the organization at the entrepreneurial stage where knowledge was easily shared and accessed by all, it is now protected from those not supporting a particular strategy, and not sharing the same knowledge beliefs (Walsh, 1986). To do so requires the development of a tightly coupled system in which there is consensus regarding what knowledge is to be maintained, who should get access to that knowledge, and what aspects of that knowledge should be made available to specific parties.

Tightly coupled systems impose restrictions on organizations in their efforts to protect their knowledge inventory. The challenge here is how to increase the amount of control over knowledge dissemination without unduly hampering our competitive position. Instead of looking for opportunities across a broad spectrum, the knowledge protection strategy focuses on creating a complex structure that increases the level of controls over dissemination than what exists in entrepreneurial organizations (Greve and Taylor, 2000). Complex knowledge structures are adopted to fit the organizations' preferences and capabilities, given that they are now recognized as a viable industry participant. Accordingly, it is proposed that:

   P2.   Organizations at the growth stage develop complex knowledge structures to support access to and dissemination of knowledge.

Maturity stage

Organizations may eventually become mature members of the industry with established norms and values, and a desire to reinvent themselves. This focus on reinvention is intended to enhance their chances for survival rather than follow into what appears to be the next logical step: decline and eventual exodus from the industry. These organizations focus on becoming effective defenders of current markets and discoverers of new ones (Tushman and O'Reilly, 1997). In effect, mature organizations focus on both exploitation of current markets and exploration of new ones (March, 1991).

With a focus on protecting current markets and developing new ones, mature organizations are forced to confront challenges they have faced both at the entrepreneurial and the growth stages. These entrepreneurial challenges are in line with efforts to exploit innovative opportunities, while the growth challenges are associated with current positions. From experience, organizations know that operating at these two stages requires different approaches to managing knowledge. Since this is not an either/or scenario, organizations must develop a knowledge management strategy that allows for maximum benefits from both opportunities. To do so, organizations must develop dual knowledge management structures that are complementary and not competitive (Gavetti and Levinthal, 2000; Hansen, 2002). In so doing, they must develop a complex knowledge structure to be used in areas where the focus is on protection. They are highly complex structures designed to protect access to knowledge from those who are ''out of the loop''.

At the same time, organizations also look for innovative opportunities to redefine themselves. By redefining themselves, organizations are attempting to build portfolios that for the future will reduce the prospects of moving to the decline stage. They are facilitating the process of creative destruction that is designed to enhance prospects of survival. To develop these portfolios, the innovative section of these organizations adopts an entrepreneurial mode that is similar to what existed at an earlier stage (Gavetti and Levinthal, 2000; Tversky and Kahneman, 1979). The entrepreneurial mode involves developing a simple knowledge structure that allows for easy interaction and exchange of knowledge between various parties involved in the entrepreneurial process. Thus, organizations at the maturity stage have a dual knowledge structure that is complex in some areas, and simple in others. This dual structure exists to support the effective implementation of dual strategies to maintain the organizations' existing focus while simultaneously developing new ones through innovative activities. Accordingly, it is proposed that:

P3.   Organizations at the mature stage develop dual knowledge structures that support existing strategies and innovative activity.

Decline stage

Although organizations at the mature stage may attempt to transform themselves, they are not always successful. Some organizations fail to transform themselves and instead move into the decline stage, with significant implications for their knowledge management strategies. Organizations in the decline stage are in crisis and there is little room for error. Such crises may result from major threats to survival, reduced reaction times, and lack of foresight in anticipating future events.

Organizations at the decline stage are ideal candidates for following mimetic processes. These processes encourage organizations to imitate successful knowledge management strategies of other organizations (DiMaggio and Powell, 1983). Organizations at the decline

stage are dealing with significant uncertainty because their models of success no longer work and they do not understand well the circumstances under which they operate.

Desperate times call for desperate measures to be taken. In times of crisis, new thinking that challenges long-standing views is important. Such thinking leads to a reformulation of the basic tenets and principles that govern decision-making and influence the knowledge management strategies to be adopted. However, in order to determine the appropriate knowledge management strategy to be adopted, one must determine whether or not the depth of the crisis has been fully understood. March (1981) suggests that organizations engage in highly risky behavior when faced with crises. This highly risky behavior is a double-edged sword because it increases chances of survival but also increases chances of failure if organizations fail to find the right solutions. Organizations know that any crisis they successfully overcome represents a new ''lease on life'', and those not successfully overcome represent the ''kiss of death''.

If crises are not well diagnosed, then it is likely that those involved in its resolution will resort to known behaviors. These crises will be misinterpreted and assumptions will be made that the solutions lie within the existing frameworks and requires nothing else but to ''ride with the wave''. Staw *et al.* (1981) suggest that in organizations faced with a threat, the significance of which is not recognized, employees resort to known behaviors, restrict information processing, and limit the exchange of information (Fleming, 2001; Greve and Taylor, 2000). In these instances, knowledge structures similar to those used at the growth stage will be employed. The assumption here is that previously used knowledge structures are appropriate in the present circumstances. Organizations will continue to think ''in the box'' by continually making small incremental adjustments to the factors that traditionally influenced competitive success. It was the same kind of reasoning that dominated the automobile industry of the 1970s. Such reasoning helped to explain the failure of US automobile manufacturers to recognize the depth of the crisis posed by high oil prices and the consumer movement towards small fuel-efficient vehicles. A reliance on past sources of success and on making, at best, incremental changes dampened the process of crisis recognition (Winter, 2000).

Thus, organizations in the decline stage adopt knowledge management strategies when the significance of a threat to the organization is not fully recognized. Because organizations see the crisis as something similar to what has been experienced in the past, they adopt a band-aid approach by applying previously successful strategies (Fleming, 2001; Greve and Taylor, 2000; Vandenbosch and Higgins, 1996). Unless crises are fully recognized, organizations tend to only seek alternatives that are significantly similar to what they already know. This is the same as focusing on exploitation through which organizations seek to improve on what they currently are doing and build on what they already know (Knott, 2002; Levinthal and March, 1993). This emphasis does have the potential to expose the organizations to critical mistakes. Organizations risk facing obsolescence because of excessive exploitation and a failure to recognize the environmental changes that are reflected in the crisis (Knott, 2002). By overemphasizing exploitation, organizations are adopting a fairly static perspective of the environmental conditions. Accordingly, it is proposed that:

> *P4a.* Organizations that fail to recognize a crisis will adopt highly complex knowledge structures designed to limit unwarranted knowledge dissemination.

When crises and their severity are recognized by organizations, there are concerted efforts to find solutions. Organizations that have recognized the severity of crises have at least two things going in their favor: the recognition factor and the knowing that not all things are bad. As a consequence, there is a conscious effort to exploit what is going well and find solutions for what needs to be changed. Significant resources are devoted to finding groundbreaking knowledge that can place declining organizations in a better position to survive. Organizations recognize that the local search strategies they have used so far have been unsuccessful and move to find appropriate solutions for the crisis through global search (Hansen, 2002; Greve and Taylor, 2000). Organizations continue to exploit what they know for possible opportunities to stem the hemorrhaging, but they also assess opportunities in new areas.

Note that adopting a dual knowledge management structure is closely linked to a policy of exploitation and experimentation. In order to further this exploitation policy, organizations establish focal points or anchors to which they aspire with their current knowledge management strategies. Decision making research suggests that individuals are prone to establish these anchors even when it is obvious that success requires that they go beyond where those anchors will take them (Tversky and Kahneman, 1979; Winter, 2000). Moreover, this dual knowledge management structure does not require access to additional knowledge resources at the expense of existing ones. In instances where additional knowledge resources are available, they are committed to a better distribution between protecting existing positions and identifying new ones. Where such resources are unavailable, organizations reallocate existing resources to facilitate better knowledge management. This is in keeping with notions that the keys to organizations' success are often in their possession and do not need to acquire newer resources (Prahalad and Hamel, 1990). Adopting a dual structure at the decline stage is a recognition that recovery can be found by combining new things with things that are currently being done well. It emphasizes the need the fact that exploitation and exploration can be pursued simultaneously (Knott, 2002). Accordingly, it is proposed that:

P4b. Organizations that recognize crises are likely to adopt a dual knowledge structure to control access and dissemination of knowledge.

Conclusions and implications for future research

Researchers have paid significant attention to the subjects of human capital and knowledge resources within the strategy and organization theory fields. Much of this attention is spurred by the work of researchers who argue that knowledge is the source of a sustainable competitive advantage (Appleyard, 1996; Grant, 1996; Spender, 1996; Winter, 2000; Winter and Szulanski, 2001). Within the resource-based view of the firm, knowledge is the resource most likely to be inimitable, scarce, valuable, and difficult to duplicate. As such, knowledge is a prime source of causal ambiguity (Lippman and Rumelt, 1982).

In this article, it is argued that knowledge requires its own structure and that structure changes over time based on the organization's stage of development. Theoretical propositions are presented, and are the basis for discussing the existence and maintenance of knowledge structures in organizations. A critical point here is that knowledge structures are created out of the need to manage knowledge resources, control access to knowledge, and ensure that strategy is effectively implemented. Without these knowledge structures, free access to critical knowledge may result, and organizations can lose any competitive advantage that is based on the management of knowledge resources. Free access to knowledge makes duplication and imitation possible. Furthermore, if organizations are unaware of what knowledge they own and how these different types of knowledge are interrelated, then these resources cannot be managed effectively. For these and other reasons, this article has highlighted the importance of knowledge structures and their management to the successful implementation of strategy.

Studies in the sociology and management fields make a significant contribution to the discussion of knowledge structures. Nevertheless, to our knowledge, they have not addressed the subject using the constructs employed here. This article offers a

" **By failing to erect the appropriate knowledge structures, organizations may create conditions that lead to unwarranted dissemination and subsequent loss of competitive advantage.** "

complementary approach to examining the subject of knowledge structures by presenting a framework that incorporates the organizations' stage of development. These constructs allow us to look at new ways to discuss the design and implementation of knowledge management strategies.

Besides providing a complementary framework for analyzing knowledge structures, this article has other implications for the study of knowledge. From an empirical perspective, it allows for the examination of new constructs in the strategy, structure, performance debate. Although it is generally accepted that strategy, structure, and performance are related, it is now possible to examine the structure and accompanying substructures of knowledge, and their impact on strategy and performance. A more micro-level of analysis can be pursued by examining this relationship.

Finally, the relationship between organization age and knowledge structures needs to be examined further. Theoretical propositions have been presented suggesting that knowledge structures change with the age of the organization. If knowledge structures differ with the age of the organization, then how resources are allocated for the management of knowledge will be affected. From the arguments presented in the article, it appears that resource allocation for knowledge management changes based on the organization's stage of development. Therefore, to avoid creating generalizations about the management of knowledge resources, it must be determined how resources should be allocated to this critical activity over time.

References

Appleyard, M.A. (1996), ''How does knowledge flow? Interfirm patterns in the semiconductor industry'', *Strategic Management Journal*, Vol. 17, pp. 137-54.

Barnard, C.I. (1938), *Functions of the Executive*, Harvard University Press, Cambridge, MA.

Barney, J. (1991), ''Firm resources and sustained competitive advantage'', *Journal of Management*, Vol. 17, pp. 99-119.

Bechky, B. (1999), ''Creating shared meaning across occupational communities: an ethnographic study of a production floor'', paper presented at the Academy of Management Meeting, Chicago, IL.

Block, P. (1987), *The Empowered Manager*, Jossey-Bass, San Francisco, CA.

Cohen, W.M. and Levinthal, D.A. (1990), ''Absorptive capacity: a new perspective on learning and innovation'', *Administrative Science Quarterly*, Vol. 35, pp. 128-52.

Conner, K.R. and Prahalad, C.K. (1996), ''A resource-based theory of the firm: knowledge versus opportunism'', *Organization Science*, Vol. 7, pp. 477-501.

Coopey, J. (1995), ''The learning organization: power, politics, and ideology'', *Management Learning*, Vol. 26, pp. 193-213.

Coopey, J. and Burgoyne, J. (1999), ''Politics and learning'', paper presented at the 3rd International Conference on Organizational Learning, Lancaster University, Lancaster.

Crossman, M. and Bontis, N. (1998), ''The strategic management of organizational learning'', paper presented at the Organizational Learning Conference, George Washington University, Ashburn, VA.

Crossman, M.M., Lane, H.W. and White, R.E. (1999), ''An organizational learning framework: from intuition to institution'', *Academy of Management Review*, Vol. 24, pp. 522-37.

Daft, R.L. and Weick, K.E. (1984), ''Toward a model of organizations as interpretation systems'', *Academy of Management Review*, Vol. 9, pp. 284-95.

DiMaggio, P.J. and Powell, W.W. (1983), ''The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields'', *American Sociological Review*, Vol. 48, pp. 147-60.

Fleming, L. (2001), ''Recombinant uncertainty in technological search'', *Management Science*, Vol. 47, pp. 117-32.

Garud, R. and Kumaraswamy, A. (1993), ''Changing competitive dynamics in network industries: an exploration of Sun Microsystems' open systems strategy'', *Strategic Management Journal*, Vol. 14, pp. 351-69.

Gavetti, G. and Levinthal, D. (2000), ''Looking forward and looking backward: cognitive and experiential search'', *Administrative Science Quarterly*, Vol. 45, pp. 113-37.

Grant, R.M. (1996), ''Toward a knowledge-based theory of the firm'', *Strategic Management Journal*, Vol. 17, special issue, Winter, pp. 109-22.

Greve, H. and Taylor, A. (2000), ''Innovations as catalysts for organizational change: shifts in organizational cognition and search'', *Administrative Science Quarterly*, Vol. 45, pp. 54-80.

Hansen, M.T. (1999), ''The search-transfer problem: the role of weak ties in sharing knowledge across organization subunits'', *Administrative Science Quarterly*, Vol. 44, pp. 82-111.

Hansen, M.T. (2002), ''Knowledge networks: explaining effective knowledge sharing in multiunit companies'', *Organization Science*, Vol. 13, pp. 232-48.

Hedberg, B. (1991), ''How organizations learn and unlearn'', in Nystrom, P.C. and Starbuck, W.H. (Eds), *Handbook of Organizational Design*, Oxford University Press, New York, NY, pp. 3-27.

Knott, A. (2002), ''Exploration and exploitation as complements'', in Choo, C.W. and Bontis, N. (Eds), *The Strategic Management of Intellectual Capital*, Oxford University Press, New York, NY, pp. 339-58.

Lant, T.K. and Mezias, S.J. (1992), ''An organizational learning model of convergence and reorientation'', *Organization Science*, Vol. 3, pp. 47-71.

Levinthal, D.A. and March, J.G. (1993), ''The myopia of learning'', *Strategic Management Journal*, Vol. 14, special issue, Winter, pp. 95-112.

Levitt, B. and March, J. (1988), ''Organizational learning'', *Annual Review of Sociology*, Vol. 14, pp. 319-40.

Lippman, S. and Rumelt, R. (1982), ''Uncertain inimitability: an analysis of inter-firm differences in efficiency under competition'', *Bell Journal of Economics*, Vol. 13, pp. 418-38.

Lucas, L.M. and Ogilvie, D.T. (2005), ''The evolution of search strategies for knowledge by organizations'', *International Journal of Technology Management*, Vol. 4, pp. 244-68.

Lyles, M.A. and Schwenk, C.R. (1992), ''Top management, strategy, and organizational knowledge structures'', *Journal of Management Studies*, Vol. 29, pp. 155-74.

March, J.G. (1981), ''Footnotes to organizational change'', *Administrative Science Quarterly*, Vol. 26, pp. 563-77.

March, J.G. (1991), ''Exploration and exploitation in organizational learning'', *Organization Science*, Vol. 2, pp. 71-87.

March, J.G. and Simon, H.A. (1958), *Organizations*, Wiley, New York, NY.

Matusik, S.F. and Hill, C.W.L. (1998), ''The utilization of contingent work, knowledge creation, and competitive advantage'', *Academy of Management Review*, Vol. 23, pp. 680-97.

Nelson, R. and Winter, S. (1982), *An Evolutionary Theory of Economic Change*, Belknap Press, Cambridge, MA.

Penrose, E.T. (1959), *The Theory of the Growth of the Firm*, Wiley, New York, NY.

Pettigrew, A.M. (1973), *The Politics of Organizational Decision Making*, Harper & Row, London.

Pfeffer, J. (1981), *Power in Organizations*, Pitman, Marchfield, MA.

Pfeffer, J. and Salancik, G.R. (1974), ''Organizational decision making as a political process: the case of a university budget'', *Administrative Science Quarterly*, Vol. 19, pp. 135-51.

Prahalad, C.K. and Hamel, G. (1990), ''The core competence of the corporation'', *Harvard Business Review*, Vol. 68, May/June.

Simon, H. (1958), *Administrative Behavior*, Macmillan, New York, NY.

Spender, J.C. (1996), ''Making knowledge the basis of a dynamic theory of the firm'', *Strategic Management Journal*, Vol. 17, special issue, Winter, pp. 45-62.

Staw, B.M., Sandelands, L.E. and Dutton, J.E. (1981), ''Threat-rigidity effects in organizational behavior: a multilevel analysis'', *Administrative Science Quarterly*, Vol. 26, pp. 501-24.

Teece, D.J., Pisano, G. and Sheun, G. (1997), ''Dynamic capabilities and strategic management'', *Strategic Management Journal*, Vol. 18, pp. 509-33.

Tushman, M.L. and O'Reilly, C.A. III (1997), *Winning through Innovation: A Practical Guide to Leading Organizational Change and Renewal*, Harvard Business School Press, Boston, MA.

Tversky, A. and Kahneman, D. (1979), ''Judgement under uncertainty heuristics and biases'', *Science*, Vol. 185, pp. 1124-31.

Vandenbosch, B. and Higgins, C. (1996), ''Information acquisition and mental models: an investigation into the relationship between behavior and learning'', *Information Systems Research*, Vol. 7, pp. 198-214.

Walsh, J.P. (1986), ''The role of negotiated belief structures in strategy making'', *Journal of Management*, Vol. 12, pp. 325-38.

Weick, K.E. (1996), ''Drop your tools: an allegory for organizational studies'', *Administrative Science Quarterly*, Vol. 41, pp. 301-13.

Weick, K.E. and Bougon, M.G. (1986), ''Organizations as cognitive maps'', in Sims, H.P. Jr and Gioia, D.A. (Eds), *The Thinking Organization*, Jossey-Bass, San Francisco, CA, pp. 102-35.

Williamson, O.E. (1975), *Markets and Hierarchies: Analysis and Antitrust Implications*, The Free Press, New York, NY.

Williamson, O.E. (1985), *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, The Free Press, New York, NY.

Winter, S. (2000), ''The satisficing principle in capability learning'', *Strategic Management Journal*, Vol. 21, pp. 981-96.

Winter, S. and Szulanski, G. (2001), ''Replication as strategy'', *Organization Science*, Vol. 12, pp. 730-43.

About the author

Leyland M. Lucas is an Associate Professor in the Earl Graves School of Business and Management at Morgan State University. In 2002, he received a PhD degree in Organization Management with a specialty in Strategy from Rutgers, The State University of New Jersey, Graduate School of Management. He also holds Master in Business Administration degrees from Rutgers and Howard Universities, as well as a Diploma in Bank Lending from New York University and a Bachelor's Degree in Economics from the University of Guyana. Prior to joining academia, he worked for over 15 years as an economist and a mortgage banker both in the Third World and in the USA. His primary research interests are in organizational learning and knowledge transfer in and across organizational boundaries, understanding organizational capabilities, technology and innovation management, and entrepreneurship, with specific emphasis on capital accessibility among minority- and women-owned businesses. He has also published in these areas in various academic journals, including *Journal of Knowledge Management*, *The Learning Organization*, *Entrepreneurship Theory & Practice*, *International Journal of Learning & Intellectual Capital*, and *International Journal of Technology & Innovation Management*. He also has extensive teaching experience both in the USA and in Africa. Leyland M. Lucas can be contacted at: Leyland.Lucas@morgan.edu