



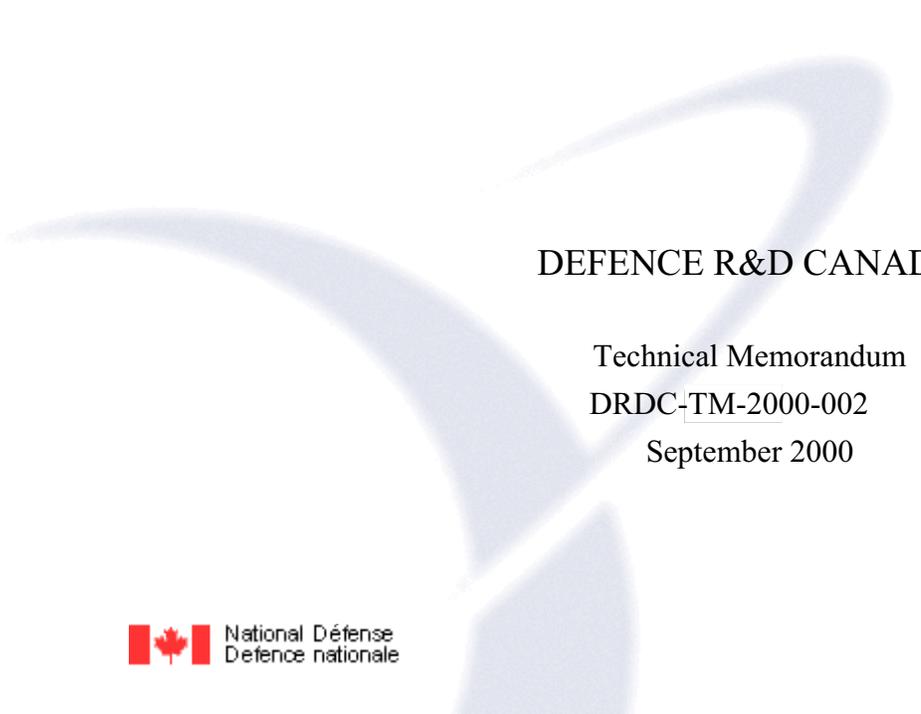
DEFENCE



DÉFENSE

The knowledge revolution—A literature review

Barbara T. Waruszynski



DEFENCE R&D CANADA

Technical Memorandum

DRDC-TM-2000-002

September 2000

**THE KNOWLEDGE REVOLUTION—
A Literature Review**

BARBARA T. WARUSZYNSKI, DS
Directorate of Science and Technology Policy

**DEFENCE R&D CANADA
DEPARTMENT OF NATIONAL DEFENCE**

**TECHNICAL MEMORANDUM
DRDC TM 2000-002
2000-09-07**

Author

Barbara T. Waruszynski
Defence Scientist

Approved by

Dr. Ingar Moen
Director of Science and Technology Policy

Approved for release by

Dr. Ingar Moen
Director of Science and Technology Policy

Abstract

In understanding the area of knowledge management, a literature review was conducted to determine if knowledge management is based on real business management practices or on the latest colloquialism in the new global knowledge economy. This paper explores the role of the knowledge infrastructure and outlines various definitions of knowledge management, taking into perspective: *Can knowledge really be managed?* Four theoretical perspectives of knowledge management strategies are put forward, including: the knowledge workers, organizational knowledge, technology as an enabler in leveraging knowledge and the knowledge-based economy. Several key theorists lay the groundwork for understanding the divergent knowledge strategies being employed by organizations. A discussion on the application of knowledge management strategies in relation to communities of practice is also put forward. Benefits and barriers to knowledge management are examined in reference to the development and implementation of knowledge management strategies and organizational frameworks. The literature review reveals that knowledge management is alive and well, and is being implemented within many organizations as an effective strategy in improving corporate business practices. The development of knowledge communities or communities of practice continues to be regarded as an effective method in bringing together individuals or groups for the purpose of capturing and exchanging ideas through creative and collaborative work strategies. One of the main concerns noted in the utilization of knowledge management strategies is understanding its overall effectiveness. The area of performance measurement needs to be explored further to determine if knowledge leveraging is really occurring, and if companies are successful in leveraging their knowledge. The implications and trends in knowledge management indicate that the future business environment will continue to be dependent on understanding the premise behind knowledge-related strategies, particularly in the area of collaborative innovation practices. Further questions need to be asked: *How are public organizations, particularly science and technology organizations (e.g. Department of National Defence, Department of Defense, Defence Evaluation and Research Agency, National Research Council) engaging in the collaborative innovation process? How are these organizations involved in innovating the future through the leveraging of their corporate knowledge? What are the business imperatives in understanding knowledge innovation initiatives? What knowledge-related strategies are considered to be the most effective in fulfilling future business mandates? From a global perspective, how is performance in leveraging knowledge being measured and benchmarked to similar business management practices?*

Résumé

Étant entendu le domaine de la gestion du savoir, on a mené une étude documentaire pour déterminer si la gestion du savoir repose sur de vraies pratiques de gestion des affaires ou sur la toute dernière expression familière de la nouvelle économie basée sur le savoir. Le présente article explore le rôle de l'infrastructure du savoir et énonce diverses définitions de la gestion du savoir, en considérant l'aspect : *Peut-on vraiment gérer le savoir?* On avance quatre aspects théoriques des stratégies de la gestion du savoir, soit : les travailleurs du savoir, la connaissance de l'organisation, la technologie comme catalyseur permettant d'exploiter le savoir et l'économie basée sur le savoir. Plusieurs théoriciens clés mettent jettent les bases de la compréhension des stratégies divergentes du savoir adoptées par les organisations. On présente également une discussion sur l'application des stratégies de la gestion du savoir relativement aux communautés de pratiques. Les avantages et les obstacles liés à la gestion du savoir sont étudiés en ce qui concerne l'élaboration et l'application des stratégies de la gestion du savoir et des cadres organisationnels. L'étude documentaire révèle que la gestion du savoir existe bel et bien et de nombreuses organisations la pratiquent comme stratégie efficace servant à améliorer les pratiques générales d'entreprise. On considère toujours que l'établissement de communautés du savoir ou de communautés de pratiques constitue une méthode efficace pour rassembler des gens ou des groupes dans le but d'acquérir et d'échanger des idées au moyen de stratégies de travail de création et de coopération. Une des questions la plus préoccupante observée dans l'application des stratégies de gestion du savoir est celle de la compréhension de son efficacité en général. L'aspect mesure du rendement a besoin d'être exploré plus loin afin de déterminer si on tire vraiment parti du savoir et si les entreprises réussissent à exploiter leur savoir. Les implications et les tendances de la gestion du savoir indiquent que l'entendement du principe sur lequel reposent les stratégies liées au savoir, surtout dans le domaine des pratiques d'innovation concertées, continuera d'être la base du futur environnement de l'entreprise. D'autres questions s'imposent : *Comment les organismes publics, surtout les organismes scientifiques et techniques (p.ex., le ministère de la Défense nationale (Canada), le Department of Defense (États-Unis), la Defence Evaluation and Research Agency, le Conseil national de recherches du Canada) prennent-ils part aux processus d'innovation concertées? Comment ces organismes se servent-ils de leurs connaissances de l'entreprise pour aider à l'innovation de l'avenir? Quelles sont les conditions d'activités exigées pour comprendre les initiatives d'innovation des connaissances? Quelles stratégies liées au savoir sont considérées les plus efficaces pour accomplir les futurs mandats de l'entreprise? Du point de vue mondial, comment mesure-t-on le rendement obtenu de l'exploitation des connaissances et comment l'identifie-t-on par rapport à celui des pratiques similaires de la gestion des activités?*

RDDC TM 2000-002.

Non classifié

Executive Summary

In a knowledge-based economy, many organizations are exploring the importance of incorporating knowledge management as a critical element within their corporate business strategy. There has been much debate on the topic of knowledge management: What is knowledge management? Is it the latest fad or is it integral to long-term business management strategies? For many organizations, the core competency for survival in the global knowledge environment is through the application of knowledge management strategies. Organizations are focusing on knowledge as a key resource—intellectual capital—which benefits new market challenges and opportunities. Gaining the knowledge advantage represents the foundation for many organizations—recognizing the value of corporate knowledge as being key to innovative thinking, investment and organizational performance.

To understand the role of knowledge management in today's global economy, a literature review was conducted to examine four perspectives integral to knowledge management strategies, including: the knowledge workers, organizational knowledge, technology as an enabler in leveraging knowledge and the knowledge-based economy. In reviewing these perspectives, this paper tries to answer the following questions: *Why are organizations employing knowledge management in leveraging corporate knowledge? What strategies are being implemented to leverage corporate knowledge? What are the benefits and barriers for organizations learning to work in the new knowledge economy? What are the generic trends in the new knowledge economy?*

The literature review reveals that knowledge management is growing in popularity, and is being implemented within many organizations as an effective strategy in improving corporate business practices. The development of knowledge communities or communities of practice continues to be regarded as an effective method in bringing together individuals or groups for the purpose of capturing and exchanging ideas through creative and collaborative work strategies. One of the main concerns noted in the utilization of knowledge management strategies is understanding its overall effectiveness. The area of performance measurement needs to be explored further to determine if knowledge leveraging is really occurring, and if companies are successful in leveraging their knowledge? The implications and trends in knowledge management indicate that the future business environment will continue to be dependent on understanding the premise behind knowledge-related strategies, particularly in the area of collaborative innovation practices. Further questions need to be asked: *How are public organizations, particularly science and technology organizations (e.g. Department of National Defence, Department of Defense, Defence Evaluation and Research Agency, National Research Council) engaging in the collaborative innovation process? How are these organizations involved in innovating the future through the leveraging of their corporate knowledge? What are the business imperatives in understanding knowledge innovation initiatives? What knowledge-related strategies are considered to be the most effective in fulfilling future business mandates? From a global perspective, how is performance in leveraging knowledge being measured and benchmarked to similar business management practices?*

Waruszynski, B. 2000. The Knowledge Revolution—A Literature Review. DRDC TM 2000-002. Directorate of Science and Technology Policy.

Sommaire

Dans une économie basée sur le savoir, de nombreuses organisations explorent l'importance qu'il y a à inclure la gestion du savoir comme un élément critique dans leur stratégie générale d'entreprise. La gestion du savoir a fait l'objet de beaucoup de discussions. Qu'est-ce que la gestion du savoir? Est-ce la dernière mode ou fait-elle partie intégrante des stratégies de la gestion des affaires? Pour beaucoup d'organisations, l'adoption des stratégies de la gestion du savoir représente la compétence indispensable pour survivre dans l'environnement de savoir mondial. Les organisations se concentrent sur le savoir en tant que ressource clé – capital intellectuel – qui favorise de nouvelles concurrences et de nouveaux débouchés. Rempporter des avantages en matière de savoir constitue le fondement de nombreuses organisations – reconnaître la valeur du savoir de l'entreprise comme étant essentielle à la pensée innovatrice, à l'investissement et au rendement de l'organisation.

Afin de comprendre le rôle de la gestion du savoir dans l'économie mondiale d'aujourd'hui, on a mené une étude documentaire visant à examiner quatre aspects faisant partie intégrante des stratégies de la gestion du savoir, soit : les travailleurs du savoir, la connaissance de l'organisation, la technologie comme catalyseur permettant d'exploiter le savoir et l'économie basée sur le savoir. En examinant ces aspects cette communication essaie de répondre aux questions suivantes : *Pourquoi les organisations utilisent-elles la gestion du savoir pour exploiter le savoir de l'entreprise? Quelles stratégies adopte-t-on pour exploiter le savoir de l'entreprise? Quels sont les avantages et les obstacles pour les organisations qui apprennent à travailler dans la nouvelle économie du savoir? Quelles sont les tendances génériques de la nouvelle économie du savoir?*

L'étude documentaire révèle que la gestion du savoir existe bel et bien et de nombreuses organisations la pratiquent comme stratégie efficace servant à améliorer les pratiques générales d'entreprise. On considère toujours que l'établissement de communautés du savoir ou de communautés de pratiques constitue une méthode efficace pour rassembler des gens ou des groupes dans le but d'acquérir et d'échanger des idées au moyen de stratégies de travail de création et de coopération. Une des questions la plus préoccupante observée dans l'application des stratégies de gestion du savoir est celle de la compréhension de son efficacité en général. L'aspect mesure du rendement a besoin d'être exploré plus loin afin de déterminer si on tire vraiment parti du savoir et si les entreprises réussissent à exploiter leur savoir. Les implications et les tendances de la gestion du savoir indiquent que l'entendement du principe sur lequel reposent les stratégies liées au savoir, surtout dans le domaine des pratiques d'innovation concertées, continuera d'être la base du futur environnement de l'entreprise. D'autres questions s'imposent : *Comment les organismes publics, surtout les organismes scientifiques et techniques (p.ex., le ministère de la Défense nationale (Canada), le Department of Defense (États-Unis), la Defence Evaluation and Research Agency, le Conseil national de recherches du Canada) prennent-ils part aux processus d'innovation concertées? Comment ces organismes se servent-ils de leurs connaissances de l'entreprise pour aider à l'innovation de l'avenir? Quelles sont les conditions d'activités exigées pour comprendre les initiatives d'innovation des connaissances? Quelles stratégies liées au savoir sont considérées les plus efficaces pour accomplir les futurs mandats de l'entreprise? Du point de vue mondial, comment mesure-t-on le rendement obtenu de l'exploitation des connaissances et comment l'identifie-t-on par rapport à celui des pratiques similaires de la gestion des activités.*

Waruszynski, B. (2000). La révolution du savoir. RDDC. Direction de la politique scientifique et technologique. TM 2000-002.

Table of Contents

Abstract	i
Résumé.....	ii
Executive Summary	ii
Sommaire	iii
Tables and Figures	vi
Acknowledgements	vii
1 Introduction	1
2 The Role of the Knowledge Infrastructure.....	2
2.1 Understanding the Concept of Knowledge	2
2.2 The Application of Knowledge Management Strategies	4
People—The Knowledge Workers.....	6
Organizational Knowledge.....	7
Technology as an Enabler in Leveraging Knowledge	9
The Knowledge-Based Economy.....	11
2.3 Communities of Practice	13
3 The Benefits and Barriers to Knowledge Management	17
4 Framework for Leveraging Knowledge	19
5 Performance Measurement—Leveraging Knowledge	20
6 Implications on the Future Direction of Knowledge Management.....	22
7 Conclusion.....	26
8 References	28

Tables and Figures

Tables

Table 2-1—Four Major Focus Areas of Communities of Practice (APQC).....16

Table 3-1— Benefits and Barriers to Implementing a Knowledge Management Strategy.....18

Figures

Figure 4-1—Model on Organizational Knowledge (APQC).....20

Acknowledgements

I would like to thank Mr. Gregory Evanik, past-president of SCOAP—formerly known as the Society of Canadian Office Automation Professionals (SCOAP)—for his dedication, professionalism and insightful comments in reviewing this paper. Mr. Evanik’s positive and constructive assessment of this paper will continue to pave the way for future papers on knowledge leveraging within science and technology organizations. SCOAP is an Ottawa-based, non-profit organization, that explores the management, use and impact of information in a knowledge-based society’—focusing on the importance of innovation and creativity within organizations committed to employing knowledge leveraging strategies.

THE KNOWLEDGE REVOLUTION— *A Literature Review*

1 Introduction

In a knowledge-based economy, recognizing the value of nourishing corporate knowledge represents the foundation of organizations and their business strategies. Peter Drucker's oft-repeated assertion that "knowledge has become the key economic resource and the dominant—and perhaps even the only—source of competitive advantage"¹ has been acknowledged by businesses, academics, practitioners and consultants as an important element to understanding the value of knowledge. Recognizing the value of our knowledge is key to innovative thinking and corporate investment, and is the cornerstone to organizational performance. As a result, organizations are beginning to examine "knowledge" as a resource—intellectual capital², and are trying to understand its role with respect to knowledge strategies (e.g., effective methods and techniques used within organizations in leveraging knowledge). Businesses are taking on strategic initiatives to enhance their knowledge power—to ensure their survival in a competitive economy. For many organizations, the core competency for survival in the new global knowledge environment is *knowledge management*. Knowledge management is seen as a significant component of a business strategy that will equip an organization with opportunities and flexibilities to manage new market challenges and future prospects. Organizations are recognizing the value of employing knowledge management strategies—focusing on the importance of employee skills, talents, abilities and experiences in leveraging corporate knowledge. As a result, connecting people to enable and encourage thought processes is the premise for understanding how knowledge can be leveraged across organizations for improving its products and services, and responding to client needs.

This paper examines the concept of knowledge management from a critical standpoint, and tries to determine if knowledge management is based on real business management strategies or on the latest colloquialism in the new global knowledge economy. It explores the role of the knowledge infrastructure and outlines various definitions of knowledge management, taking into perspective: *Can knowledge really be managed?* Four theoretical perspectives of knowledge management strategies are put forward, including: the knowledge workers, organizational knowledge, technology as an enabler in leveraging knowledge and the knowledge-based economy. These perspectives try to demonstrate the divergent knowledge strategies being employed by organizations. A discussion on the application of knowledge management strategies in relation to communities of practice is put forward. Benefits and barriers to knowledge management are examined in reference to the development and implementation of knowledge management strategies and organizational frameworks. The issue of measuring knowledge leveraging is also discussed, along with the implications of trends and directions of knowledge strategies for the future business environment. From a global perspective, this paper tries to answer the following questions: *Why are organizations employing knowledge management in leveraging corporate knowledge? What strategies are being implemented to leverage corporate knowledge? What are the benefits and barriers for organizations learning to work in the new knowledge economy? What are the generic trends in the new knowledge economy?*

¹ Peter Drucker. (1995). *Managing in a Time of Great Change*, Oxford: Butterworth-Heinemann.

² See Leif Edvinsson and Michael Malone. (1997). *Intellectual Capital: Realizing Your Company's True Value by Finding its Hidden Brainpower*, New York: Harper Business.

2 The Role of the Knowledge Infrastructure

Since the late 1980's, organizations have been struggling with the changing needs of corporate management practices. Downsizing and budget cutbacks have had a tumultuous impact on the manner in which information is managed, and more importantly, on replacing the knowledge that had walked out the corporate doors. As a direct result, corporate knowledge had been lost. Business Process Reengineering (BPR), which mainly focused on process-related knowledge³, has also had an impact on the knowledge infrastructure. Some of the BPR failures admitted to their inability to track the intangible knowledge—the knowledge inside people's heads. Webber (1999, 43-44) states that “reengineering does not seek to create a knowledge company; it promotes information technology as a replacement for investment in knowledge development...reengineering was supposed to help companies compete in the knowledge era, but in practice it is anathema to the new economy.” In addition, demographics continue to show an increase in senior, more experienced people leaving organizations for retirement. As a result, corporate managers are changing the needs of their business models—exploring the importance of preserving their corporate knowledge. This knowledge attentiveness has led us to explore the corporate knowledge explosion—the *knowledge revolution*.

Within the past decade, the changing needs of organizations have led to a new way of leveraging knowledge in the global economy. There is a pervasive shift from information to knowledge—where the human dynamics of organizations are continuing to evolve. We have also seen the shift from: bureaucracies to networks; training and development to learning; local/national to transnational strategies; and competitive to collaborative strategies.⁴ Change in management styles had introduced us to *Fifth Generation Management* (Dr. Charles Savage), *The Fifth Discipline* (Peter Senge) and *Intelligent Enterprise* (James Brian Quinn). Their unequivocal managerial perspectives paved the way to new management thinking, including: co-creation, dynamic teaming, knowledge networking, the learning organization, and revolutionizing organizational strategies into intelligent enterprises. With the evolution of changing management systems and trends, organizations are realizing that to stay competitive, they must have the corporate knowledge to advance in their respective fields. Industries and companies must be able to meet the demands of their consumers and produce excellent products and services to their clients. As a direct result, the knowledge revolution has become the product of its own business environment.

2.1 Understanding the Concept of Knowledge

In understanding the concept of knowledge, it is important to briefly differentiate between data and information and how these concepts contribute to our ability to create and sustain knowledge.

Data

According to Davenport and Prusak (1998), data is a set of discrete, objective facts about events. Data, in itself, does not allow for judgement or interpretation. It represents the raw materials used in organizations for the purpose of creating information. Essentially, data are elements of analysis.⁵ Taken from this standpoint, then, how does information differ from data?

³ See Rudy Ruggles and Dan Holtshouse. (1999). “Gaining the Knowledge Advantage”, in *The Knowledge Advantage*, pp 1-19, for a comprehensive overview.

⁴ See Debra Amidon (1997), *Innovation Strategy for the Knowledge Economy: The KEN Awakening*, for a thorough review of the changing shifts in management trends, pp. 17-21.

⁵ Debra Amidon (1997) also provides a comprehensive review of data, information and knowledge.

Information

One way to understand information is to view it as “data that makes a difference.”⁶ Information is meant to ‘inform’. Information becomes data with context (Amidon, 1997). Many organizations are caught up in the management of its information—being perplexed about the vast quantities of information. *What do we do with all of this information? How do we manage how information gets processed in the minds of workers?* For instance, the problem in managing emails has resulted in an explosion of software being developed and implemented to redirect emails or empty information in the ‘recycle bin’. Information has relevance—it has meaning whenever the individual uses the data for an intended purpose. So, when does information become knowledge?

Knowledge

Knowledge, as a concept, has been explored for many centuries by renowned philosophers, including: Saint Thomas Aquinas, Aristotle, Saint Augustine, René Descartes, Georg Wilhelm Friedrich Hegel, Immanuel Kant, Plato and Jean Paul Sartre, to name several. ‘To know is to think...and to think is to know.’ According to Polanyi (1966, 4): “we can know more than we can tell.” Knowledge comes from people and their experiences; and it is through our experiences that we can build on our knowledge. McDermott (1999, 105) puts forward the following definition of knowledge:

Knowledge is the residue of thinking. Knowledge comes from experience. However, it is not just raw experience. It comes from experience that we have reflected on, made sense of, tested against other’s experience. It is experience that is informed by theory, facts, and understanding. It is experience we make sense of in relationship to a field or discipline. Knowledge is what we retain as a result of thinking through a problem, what we remember from the route of thinking we took through the field.....From the point of view of the person who knows, knowledge is a kind of sticky residue of insight about using information and experience to think.

Knowledge is based on both *tacit knowledge*—experiences, abilities/skills, values, culture, and *explicit knowledge*—codified information (e.g., document repositories, portals). Michael Polanyi (1966), who coined the term *tacit knowledge*, describes the structure of knowledge as incorporating tacit components (e.g., skills that are learned through personal experience). Our experiences are based on subjective, personal knowledge—not objective knowledge. Tacit knowledge consists of “know-how” skills (e.g., a craftsman’s expertise), mental models, beliefs and perspectives ingrained in people, thus shaping their perceptions of the world (Nonaka, 1998). In the corporate business environment, organizations have been grappling with being able to identify this tacit knowledge and to retain this knowledge as corporate knowledge.

In the context of knowledge management, Grey (1996) gives the following definition:

Knowledge is the full utilization of information and data, coupled with the potential of people’s skills, competencies, ideas, intuitions, commitments and motivations. In today’s economy, knowledge is people, money, leverage, learning, flexibility, power and competitive advantage...Knowledge is action, focused innovation, pooled expertise, special relationships and alliances. Knowledge is value-added behaviours

⁶ See Thomas Davenport and Laurence Prusak (1998) for a more thorough review of data and information.

and activities. For knowledge to be of value, it must be focused, current, tested and shared.⁷

Similarly, Davenport and Prusak (1998, 5) state:

Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of the knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms.

Debra Amidon (1997, 5) eloquently surmises:

Knowledge is a significantly unique attribute when viewed from the perspective of the individual, the team, or the organization as a whole. Gaining knowledge is a human process dealing with mental objects, requiring awareness and intuition, and is transferable only through learning.

The above authors argue that knowledge becomes the foundation of corporate life. It rests on the laurels and underpinnings of every organization to strive for business intelligence in an age of enhanced competitiveness. Although the area of knowledge management has received an enormous amount of recognition, researchers are examining the basis of this concept and its application to current and future organizational management practices. *In other words, what is the role of knowledge management? How effective are knowledge management strategies in helping organizations achieve their business needs and goals?*

2.2 The Application of Knowledge Management Strategies

Knowledge management strategies have been widely implemented across diverse organizations, such as: British Petroleum, Buckman Laboratories, Chrysler Corporation, Ernst & Young, Ford Motor Company, General Motors, Hewlett-Packard Company, Honda, IBM, Microsoft Corporation, Monsanto Corporation, Motorola, Nortel, Polaroid Corporation, Skandia, The World Bank and Xerox Corporation. These strategies enable organizations to view their processes as “knowledge” processes. This involves both *tacit and explicit knowledge*. The focus is on the synergy of data and the information processing capacity of information technologies, and the creative and innovative capacity of their human behaviours.⁸ As a focal point, knowledge management involves leveraging collective knowledge.⁹ Various definitions have been cited in explaining knowledge management, including:

Knowledge management is the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation. It requires turning personal knowledge into corporate knowledge that can be widely shared throughout an organization and appropriately applied.¹⁰

⁷ See Denham Grey. (1996). “What is Knowledge Management?” *The Knowledge Management Forum*, Web site.

⁸ Dr. Yogesh Malhotra. (1998). Interview on Knowledge Management.

⁹ Exocom. (1999). “Knowledge Management: A New Way of Doing Business.” Margot Brown, Knowledge Management Practice Leader, Friday, December 10 (presentation).

¹⁰ David Skyrme Associates. (1997). “Knowledge Management: Making sense of an oxymoron.” *Management Insight No. 2*.

*Knowledge management is the collection of processes that govern the creation, dissemination and utilization of knowledge.*¹¹

*Knowledge management is the explicit, systematic process of cultivating how knowledge is created, shared and translated into action. Significant attention must be given to know-how (competency), know-who (who's who), know-where (repositories) and know-why (motivation).*¹²

*Corporate knowledge management is the process whereby knowledge seekers are linked with knowledge sources, and knowledge is transferred.*¹³

*Knowledge management can be viewed as a process for optimizing the effective application of intellectual capital to achieve organizational perspectives.*¹⁴

*Knowledge management is the process through which an enterprise uses its collective intelligence to accomplish its strategic objectives.*¹⁵

*Knowledge management is the management of the organization towards the continuous renewal of the organizational knowledge base—this means (e.g., creation of supportive organizational structures, facilitation of organizational members, putting IT instruments with emphasis on teamwork and diffusion of knowledge (e.g., GroupWare) into place).*¹⁶

*Knowledge management is an audit of “intellectual assets” that highlights unique sources, critical functions and potential bottlenecks which hinder knowledge flows to the point of use. It protects intellectual assets from decay, seeks opportunities to enhance decisions, services and products through adding intelligence, increasing value and providing flexibility. Knowledge management complements and enhances other organizational initiatives such as total quality management (TQM), business process re-engineering (BPR) and organizational learning, providing a new and urgent focus to sustain competitive position.*¹⁷

Knowledge management is the “conscious strategy of putting both tacit and explicit knowledge into action by creating context, infrastructure, and learning cycles that enable people to find and use the collective knowledge of the enterprise (American Productivity and Quality Center 2000, 1).

By reviewing all of these definitions, it may be argued that knowledge itself cannot be managed, although the information and the workers' practices can be enhanced to leverage knowledge.

¹¹ Brian Newman. (1996). “An Open Discussion of Knowledge Management”. (1991). *The Knowledge Management Forum*.

¹² David Owens. (1999). *Knowledge Management Review*, September/October, Issue (10), p.26.

¹³ Dr. Arthur J Murray. (1996). “What is Knowledge Management?” *The Knowledge Management Forum*.

¹⁴ Alex Bennet. (2000). “Building the Knowledge Enterprise.” Presentation made at the e-gov Knowledge Management Conference (Arlington, Virginia). Department of the Navy.

¹⁵ Dr. R Barquin. (2000). “From Bits and Bytes to Wisdom: A Proposed Ascending Scale.” Presentation made at the e-gov Knowledge Management Conference (Arlington, Virginia).

¹⁶ Thomas Bertels. (1996). “What is Knowledge Management?” *The Knowledge Management Forum*, Web site.

¹⁷ Denham Grey. (1996). “What is Knowledge Management?” *The Knowledge Management Forum*.

Most experts in the area have acknowledged that knowledge management can be depicted as an oxymoron¹⁸:

*Knowledge is a human function. It originates and resides in a human being. In that sense, it is a misnomer to say that we can manage knowledge. We cannot manage what happens in people's brains, and it's presumptuous to say we can manage people's thought processes. But we can manage how that knowledge is used and we can build systems, tools and mechanisms to help people better express and thereby share their ideas.*¹⁹

In understanding the application of knowledge management initiatives within organizations, knowledge-based companies are employing knowledge management strategies from different perspectives. This paper puts forward four different perspectives in understanding the knowledge management strategies employed by diverse organizations, including: People—The Knowledge Workers, Organizational Knowledge, Technology as an Enabler in Leveraging Knowledge, and the Knowledge-Based Economy.²⁰ This paper will try to explain these four perspectives, keeping in mind that these four elements work together to support all knowledge strategies. Although these four perspectives are neither exclusive nor exhaustive, they allow the reader to position knowledge management into specific contextual environments.

People—The Knowledge Workers

Most people would agree that it is the individual who holds the knowledge and exercises that knowledge within the corporate environment. It is within this context that Peter Drucker has written numerous papers on the *knowledge worker*. As a major proponent of the knowledge worker, Drucker (1999, 53-54) states:

Every knowledge worker must first be a teacher, creating a wider understanding of their knowledge. It is their job to describe to the organization the power and limitations of their area of expertise. The knowledge worker must be clear about what people should know about their area, especially what they can and cannot produce. Ultimately, becoming a learning organization requires first becoming a teaching organization...It is imperative that the knowledge worker educate his associates as to what his job and knowledge are...The knowledge worker must define his or her information needs.

Webber (1999) asserts that people are at the height of companies; and the people, the knowledge workers, contribute to the success of company portfolios. According to Webber, business reengineering represented one of the most detrimental management processes. It excluded the knowledge worker from successfully contributing to the overall corporate mission. Therefore, people need to come first. For instance, at Buckman Laboratories, the company is the people...and the power in the company is vested in the network of knowledge workers.²¹ At Arthur Andersen consulting firm, knowledge managers, who are part of the Arthur Andersen

¹⁸ David Skyrme Associates. (1997). "Knowledge Management: Making sense of an oxymoron." *Management Insight No. 2*.

¹⁹ Thomas Koulopoulos, Richard Spinello and Wayne Toms. (1997). *Corporate Instinct: Building a Knowing Enterprise for the 21st Century*, New York: Van Nostrand Reinhold, p. 52-53.

²⁰ See Rudy Ruggles and Dan Holtshouse in "Gaining the Knowledge Advantage", in *The Knowledge Advantage*, pp 15-19, 1999. Rudy Ruggles and Dan Holtshouse give an excellent overview of the knowledge advantage from the following levels: individual, organization, strategy and economy. These viewpoints were incorporated into this paper to demonstrate the varying perspectives of knowledge management.

²¹ Alan Webber. (1999). "Knowledge is Power! Welcome Democracy!," in Rudy Ruggles and Dan Holtshouse (Eds.), *The Knowledge Advantage*, pp. 46-47.

Sharing Network, monitor the information and transfer knowledge for 80 sharing communities.²² At Siemens Business Services, the company's knowledge management strategy is centred around people through the creation of a supra-culture communities of practice.²³ Siemens' focus is on "identifying expert networks, creating intentional ones, nurturing them, and enabling them with efficient communication and collaborative tools" (Jubert, 1999).

In the emerging global knowledge environment, researchers will need to address several key questions which may emerge on the future of knowledge workers. *What will be the characteristics of the new knowledge worker? What will be the specific roles undertaken by these new knowledge workers? Will organizations be focusing on key core competencies in hiring future knowledge workers? If so, what are the key core competencies and resources needed to sustain the new knowledge economy? Will organizations enhance the need to promote the importance of the learning organization?*

Organizational Knowledge

At the organizational level, the application of knowledge management strategies is dependent on the needs of an organization. There are organizations that take a general approach to knowledge management, and incorporate the essential aspects to help identify their knowledge needs; while for others, a more focused approach is essential. As a result, the significance of knowledge management at the organizational level is based on taking a knowledge-based approach to understanding business practices.

The application of knowledge management ideas is very real—companies are focusing on implementing knowledge management strategies to get the knowledge edge. Specific strategic areas (e.g., knowledge creation and knowledge innovation) are dominating the business world, with organizations honing in on their knowledge niche to remain competitive in their day-to-day business strategies.

Knowledge Creation:

Nonaka (1999, 67) puts forward the following definition of knowledge creation:

Organizational knowledge creation is a continuous and dynamic process of interaction between tacit and explicit knowledge...Teams need to articulate new knowledge and to combine it with existing knowledge so that they can share it with other groups or departments to create organizational knowledge.

Nonaka (1999) states that in a 'knowledge creating company, the sole business is continuous innovation.' Knowledge is dynamic, not static. The continuous creation of knowledge goes through four modes of knowledge conversion: socialization, externalization, combination and internalization (SECI model). The socialization (i.e., the conversion from tacit to tacit knowledge) refers to the process of creating tacit knowledge (e.g., shared mental models, technical skills and experiences). Externalization (i.e., the conversion from tacit to explicit) represents the process of articulating tacit knowledge into explicit knowledge (e.g., explicit concepts or languages). Combination (i.e., the conversion from explicit to explicit) refers to the combination and systemization of concepts through symbols (e.g., languages or figures through various media via documents, meetings, telephone conversations or computerized communication). Internalization (i.e., the conversion of explicit to tacit) refers to the process of

²² American Productivity and Quality Center. (2000). *Knowledge Management: A Guide for Your Journey to Best Practice Processes*. USA.

²³ Anne Jubert. (1999). "Developing an infrastructure for communities of practice: the Siemens Experience." *Proceedings of the International Online Information Meeting*, Vol. 23, pp. 165-168.

embodying the explicit knowledge. These four modes are integral to understanding the process of knowledge creation. As a result, tacit to explicit knowledge needs to be articulated to ensure organizational participation in the leveraging of knowledge. This is represented in Nonaka's "spiral of knowledge". Innovation, on the other hand, can only materialize through the interaction of tacit and explicit knowledge. It is this source of tacit knowledge that needs to be nurtured and supported for any organizational knowledge creation. Self-transcendence is key to knowledge creation; and enabling conditions, such as, vision, strategy, structure, system and leadership help to promote this continuous, evolving process. As a result, Japanese companies, such as Honda, Canon and 3M have demonstrated their successes through enhanced innovation—with an ability to create new knowledge toward the production of successful products and technologies.

Nonaka and Takeuchi (1995) purport that Japanese companies have been very successful as a result of their skills and expertise at "organizational knowledge creation". Organizational knowledge creation refers to the ability of a 'company to create new knowledge, transfer that knowledge throughout the organization, and embrace it in its products, services and systems.' Its success lies in sharing the knowledge that is collected from outside the organization, integrating this knowledge into corporate knowledge, and allowing individuals to use this knowledge for further development of new technologies and products. As a result, a conversion process takes place—the conversion of external knowledge to internal knowledge—which in turn, puts out new knowledge in the form of 'products, services or systems'. This conversion process is the fuel for continuous innovation—the key to understanding why Japanese companies continue to be highly successful. This continuous innovation, in turn, leads to competitive advantage.

Nonaka and Takeuchi (1995) also assert that within the development of a knowledge creating organization, Western companies have not reached the same level of organizational knowledge creation as those companies found in the East. As a result, a West/East dichotomy exists between the polar countries: Westerners emphasize explicit knowledge and focus on the individual; while Easterners emphasize the tacit knowledge and focus on groups. Both sides need to examine the other for achieving a more balanced approach in promoting organizational knowledge creation.

Knowledge Innovation:

Knowledge innovation is becoming more critical for organizations. According to Amidon (1997, 7), knowledge innovation refers to the "creation, evolution, exchange and application of new ideas into marketable goods and services for the success of an enterprise, for the vitality of a nation's economy and for the advancement of society."²⁴ Innovation is cited as the single most important benefit of knowledge management.²⁵ Knowledge innovation exemplifies the notion that innovation is the one competence needed for the future.

Xerox PARC has put forward its theory of *knowledge ecologies*, explaining how knowledge is turned into innovation (Bauer, 1999). It involves the interconnection of how we organize our work, how we invest and use technology as well as the organizational practices and processes implemented by the workers. According to Bauer (1999, 94), the "competence, the skill base, and the capabilities of the organization are where we have to start in a knowledge ecology, in a knowledge management world." The focus is on 'harnessing the collective learning knowledge and skills within the organization.' Bauer (1999, 120) states:

The problem with the strategy-dominated model of management is that it continues to view the organization simply as an economic entity; in reality, a company is also a social institution. Managers need to understand this

²⁴See Debra Amidon for a more complete overview on the "case for knowledge innovation" on p. 7.

²⁵ Ernst & Young Survey. (1997). "Business Intelligence."

difference and manage accordingly, especially in companies where knowledge is the key asset. Rather than viewing organization structure as an aggregation of tasks and responsibilities, managers must perceive it as a way to redefine roles and relationships around the key tasks of the organization. Rather than focusing on fragmented tasks, managers at all levels must work together toward the common goals of entrepreneurship, competence-building, and renewal. Finally, companies must do away with a systems approach designed purely to eliminate the risk of human error. Rather than managing people as if they were controllable costs and replaceable parts—sources of error to be eliminated—we must recognize them as organizational assets and the embodiments of knowledge.

In her book entitled, *Innovation Strategy for the Knowledge Economy: The Ken Awakening*, Debra Amidon (1997, 65) focuses on the “creation of an innovation strategy as a bonding initiative that creates a common language, capitalizes on distinctive competencies, and fuses collective knowledge into a shared purpose.” Amidon puts forward an innovation strategy that combines 10 modules, including: Collaborative Process, Performance Measures, Education and Development, Distributed Learning Network, Intelligence Market Positioning, Knowledge Products and Services, Collaborative Market Penetration, Market Image Campaign, Leadership Competencies and Communications Technology.²⁶ The first five modules focus on internal management responsibilities; while the latter five focus on the external organization interfaces. These modules are meant to stimulate discussion, not to propose any definitive management strategy. Organizations need to examine how they relate to this knowledge innovation strategy to be able to determine their point of departure in the global knowledge economy.

Organizational knowledge begins with a culture of openness—removing the hierarchical stovepipes normally found within large corporations and government departments. Its focus is based on organizational teamwork—contributions made to the corporate knowledge bank. According to Koulopoulos, Spinello and Toms (1997, 141), however, “hierarchies themselves are not innately perverse or inefficient...some degree of hierarchy is essential, especially for large, complex organizations.” The changing role of these hierarchical structures is mainly based on changing technology and its ability to facilitate patterns of communication with organizations. As a result, the need for a complex hierarchy is greatly diminished. In addition, companies need to focus on change, not just innovation. Peter Drucker (2000, 139) states: “Today you need an organization that is a change leader, not just an innovator...If you start out by looking at change as threats, you will never innovate.” Drucker asserts that companies need to look at every change and determine if it is an opportunity or a passing fad. “A change is something people do, and a fad is something people talk about.” Similarly, Amidon (1997, 13-14) states: “There is a realization that change must be embraced rather than feared. It must be seen as the foundation for progress.” Therefore, organizations need to balance their innovative capacities with their ability to provide and promote a culture of change.

Technology as an Enabler in Leveraging Knowledge

There has been a growing debate whether technology should be viewed as an enabler to create knowledge rather than a means to communicate knowledge. Technology, as an enabler, allows for the capturing, sharing, transferring and leveraging of knowledge within organizations. With the advent of advanced computer technology (e.g., Intranet, Internet and Extranet), people within organizations are able to share and leverage their knowledge more effectively, efficiently and

²⁶ For a complete overview of Debra Amidon’s innovation strategy, which combines 10 modules, including: Collaborative Process, Performance Measures, Education and Development, Distributed Learning Network, Intelligence Market Positioning, Knowledge Products and Services, Collaborative Market Penetration, Market Image Campaign, Leadership Competencies and Communications Technology, please refer to pages 91-109.

rapidly than ever before. According to *The State of the Knowledge Industry Progress Report / Government 2000* (SKIPR-Gov 2000), technologies at the centre of a knowledge management strategy include: Data Warehousing/Decision Support; Data Mining; Search Engine/Workflow/Document Management; E-mail/Messaging; Collaborative Computing; Video-conferencing; and Web Technologies. The Report supports the notion that technology is an enabler in knowledge management; however, it cannot be seen as a stand alone in providing a knowledge management solution. Technology is mainly used for explicit knowledge; however, transfer of tacit knowledge mainly comes from people's heads. The interaction between two people or more is the basis of building on tacit knowledge; and it is through this interaction that knowledge is leveraged through the organization. Databases, directories, emails, videos and video-conferencing can play significant roles in leveraging knowledge. Interactive technologies (i.e., electronic communications) are very beneficial in capturing the day-to-day information necessary for the collaborative transfer of knowledge. It is important to understand, however, how technologies are mapped against the applications of knowledge management. For instance, emails can provide valuable information, and thereby, enhance knowledge; however, many organizations do not have more functional email systems set up to sort relevant material from inconsequential information.

The greatest trap in knowledge management is using information management tools and concepts to design knowledge management systems.²⁷ This is not a new phenomenon. Knowledge management and information management require different sets of concepts and tools. According to Nonaka (1999, 86-87), 'information is a commodity; while knowledge represents a dynamic human process of justifying personal beliefs toward the truth.' McDermott (1999) states that leveraging knowledge involves much more than...documenting procedures, linking people electronically, or creating web sites...not enough to get people to think together, share insights they didn't know they had, or generate new knowledge. The *SKIP Report 2000* states that "knowledge management is not the network of hardware, the suite of software, the databases, the document management repository and the corporate portal that provides—as we have heard many times before—"the right information to the right people in the right format at the right time." Information technology should be used to support communities—to assist them in collecting, organizing and making sense of the relevant data/information in leveraging people's knowledge. Community co-ordinators can organize, maintain and distribute information to interested members by using their knowledge of the discipline to determine what is important, groundbreaking and useful, and how members can enrich their minds by summarizing, combining, contrasting and integrating information (McDermott, 1999). Therefore, knowledge management tools must go beyond information management tools: they must support knowledge creation and transfer.²⁸

One of the key challenges in implementing knowledge management tools revolves around taxonomies. Standardizing taxonomies for leveraging knowledge is a challenge and needs to be intuitive by the users who will try to make sense of the information. Taxonomies are best standardized according to the community members who are using and interpreting the data/information. Information should be formatted, indexed and easily transferred for easier retrieval (e.g., data mining, search engines); however, the systems for organizing information should belong to the community members (McDermott, 1999). As a result, the technologies that are implemented within organizations are meant to act as enablers in leveraging knowledge.

²⁷ See Richard McDermott. (1999). Why information technology inspired but cannot deliver knowledge management. *California Management Review*, 41, 4, 103(1), Summer.

²⁸ *The State of the Knowledge Industry Progress Report / Government 2000*. "The Definitive Report on Knowledge Management in Government. Knowledge Management: An e-gov Conference", The Foundation for Electronic Government. (2000). Alexandria, Virginia, p. 2-6.

The Knowledge-Based Economy

As knowledge market boundaries expand, companies are continuously focusing on the advancement of knowledge management strategies within the new knowledge economy. Consulting practices, web sites, books, journals, magazines, conferences, forums and other related resources are becoming rampant in the pursuit of knowledge leveraging. Many companies are hiring Chief Knowledge Officers (CKO), managers (CKM) and directors—seeking innovative, creative and dynamic professionals to enable them to advance in the competitive arena. This is the new business wave!, or is it?

McDermott (1999) states that knowledge management is the fuel for innovation. In a recent study²⁹, 80 per cent of all companies ranked innovation as the primary competitive factor. Another study³⁰ indicated that knowledge management is making a difference in their organizations, with 74 per cent of the respondents stating that knowledge management practices are having a positive impact on their businesses. To be able to leverage knowledge within any organization, it must “rest in the cultural practices and organizational attitudes regarding collaboration, knowledge sharing and open communication”.³¹ Amidon (1997, 40) states: “Knowledge, unlike labor, land, and financial capital, is a limitless resource and expands when shared or utilized.”

According to a new global study from Korn/Ferry International, conducted in partnership with the University of Southern California’s Center for Effective Organizations at the Marshall School of Business, a major downfall in managing a knowledge organization is to implement a “one-size-fits-all” knowledge strategy.³² The report entitled, *Strategies for the Knowledge Economy: From Rhetoric to Reality*, focuses on the knowledge management challenges facing organizations in the new knowledge economy, and tries to ‘identify the successes of global businesses in generating, retaining and leveraging their knowledge.’ The report outlines the *Do’s* and *Don’ts* in implementing a knowledge management strategy. Regarding the *Do’s*, companies should put together a strong business case for why a shift towards a knowledge enterprise is essential. The vision and values for implementing a knowledge management strategy should be clearly established and communicated across the organization. The skills and knowledge requirements should also be clearly delineated, as well as the implementation of a set of metrics to measure long and short-term performance. Regarding the *Don’ts*, knowledge management should not be delegated to the IT division nor to an individual responsible for KM initiatives. Knowledge management should be embedded in the day-to-day work practices of “frontline workers and their business leaders.” Promoting learning—but rewarding performance only—is another misnomer, according to the report. In addition, shifting all of the responsibility to the workers for developing professionally is not advisable. Furthermore, business leaders should continue to communicate the future requirements of the organization as well as how employees can master new skills that would enable them to contribute to the overall success of the company.

In the knowledge economy, Davis and Meyer (1999, 246) state that “value is created through knowledge and through intangible means rather than tangible ones.” They propose a four-quarter economic life cycle which includes: new scientific or technological developments; a vision of a new economic infrastructure; a take-off change in business; and a period of organizational

²⁹ See Thomas Koulopoulos, Richard Spinello and Wayne Toms. (1997). *Corporate Instinct: Building a Knowing Enterprise for the 21st Century*, Van Nostrand Reinhold: New York, p. 255.

³⁰ See Rudy Ruggles and Dan Holtshouse. (1999). “Gaining the Knowledge Advantage”, in *The Knowledge Advantage*, pp 1-19.

³¹ See Thomas Koulopoulos and Carl Frappaolo. (1999). *Smart Things to Know about Knowledge Management*, p.7.

³² Korn/Ferry study cited in Stuart Rock, Editorial Director, Business Voice. “Do’s and Don’ts for leaders in the knowledge economy,” in *Knowledge Management*, June 2000.

innovation. Speed, connectivity and intangibles are the key major drivers in the new knowledge economy. In addition, Amidon (1997) states that organizations implementing “best practices competencies” may soon begin to realize that there may be revenue opportunities in bundling knowledge products and services. This would benefit companies and external clients in making available the knowledge of their products and services. Therefore, opportunities to learn and to build on each other’s ideas are made available through interactions with internal and external clients/customers.

In general, knowledge management has come to mean organizing infrastructure (e.g., technology, space), processes, intellectual capital (content), and internal structure (e.g., incentives, reporting/teaming configurations) to better create, capture, access and apply knowledge (Ruggles and Holtshouse 1999, 9). The goal for knowledge management is not based on controlling people’s thought processes....but on ways to manage how that knowledge is used, and to develop systems and mechanisms to facilitate the expression and thereby sharing of ideas and know-how.³³ Creating value through knowledge is the primary objective for most companies practicing knowledge strategies. Businesses alike are increasingly focusing on implementing knowledge strategies and are trying to understand what lies beneath the concept of knowledge management. For example, Vince Barabba of General Motors implemented a Decision Dialog Process as a team-based strategy for making better decisions, and in turn, contributing to individual and organizational knowledge.³⁴ Skandia, on the other hand, is focusing on measuring its intellectual capital. Even with the negative impacts of restructuring, reengineering and downsizing of companies (i.e., the ability to be creative and innovative), organizations are realizing the need to move forward in the new global economy.

The above theoretical perspectives try to provide a context within which organizations try to substantiate their roles in their application of knowledge management strategies. As a result, knowledge based business approaches are becoming evermore popular. A Knowledge Advantage Conference (1997)³⁵ summed up the “knowledge-based business approaches” in leveraging their corporate knowledge, focusing on the following seven areas:

- **Infrastructure**—*creating the physical and technological support environments which allow knowledge sharing and representation;*
- **Content**—*representing, embedding, organizing and supporting knowledge content and intellectual capital;*
- **Processes**—*actively bringing knowledge to bear in the context of specific processes (e.g., new product development);*
- **Organization**—*consciously designing and structuring elements of the organization to support knowledge management and application (e.g., recognizing communities of practice, creating incentive systems which support knowledge sharing);*
- **Relationships**—*establishing and maintaining knowledge-based relationships with customers, suppliers, and other strategic partners;*
- **Products and Services**—*enhancing the organization’s offers by embedding knowledge within them or in their interactions with their users;*
- **Strategy**—*setting corporate strategy based upon the belief that knowledge is the key resource, realizing that the basic strategic question is “How can we create the most value from what we know as an organization?”*

³³ See Thomas Koulopoulos and Carl Frappaolo. (1999). *Smart Things to Know about Knowledge Management*, p. 18.

³⁴ See Rudy Ruggles and Dan Holtshouse. (1999). “Gaining the Knowledge Advantage”, in *The Knowledge Advantage*, pp. 11-12.

³⁵ *Ibid.*, pp. 12-13. Summary by Rudy Ruggles and Dan Holtshouse (1999).

It has been demonstrated that innovation in a company is nourished and driven by knowledge-based capabilities and by management systems to help leverage their capabilities.³⁶ A new economy is emerging—an economy of knowledge and innovation.³⁷ Continuous innovation is essential to organizations. Within the dynamics of knowledge creation, the interaction of tacit and explicit knowledge creates innovation.³⁸ This social interaction among individuals and groups creates a dynamism of creativity. This creativity becomes the driver for knowledge-based organizations, and lays the foundation for specialized forums (e.g., communities of practice).

2.3 Communities of Practice

Communities of practice or communities of knowledge³⁹ involve groups that share certain types of knowledge, information, interests or expertise—forming communities that engage in collective learning through social practices. Wenger (1999, 1) defines these communities as “communities that accumulate collective learning into social practices.” Wenger and Snyder (1999, 1) elaborate on the above definition by stating that communities of practice are “groups of people informally bound together by shared expertise and passion for a joint enterprise—engineers engaged in deep-water drilling, for example, consultants who specialise in strategic marketing, or frontline managers in charge of check-processing at a large commercial bank.” Moreover, Amidon (1997, 49) puts forward the following mission of *communities of knowledge practice*: “Harnessing complementary competencies with a shared purpose toward a common strategic vision.”

In essence, communities of practice lay the foundation for leveraging tacit knowledge.⁴⁰ Some groups meet virtually, and others physically converge at group meetings. These thematic groups help organizations cultivate new and innovative ideas in situations where process improvement or new product development is necessary to remain competitive in the marketplace (APQC, 2000).⁴¹ Communities of practice engage in free-flowing discussions, focusing on creative ways that may encourage new approaches to problems. According to Wenger and Snyder (1999), communities of practice can promote and drive strategy, foster new business lines, focus on problem-solving techniques, and help to disseminate best practices. Although communities of practice have been around in various forms since the beginning of history, the terminology is only recently being applied to knowledge management, and its focus is on learning from the intangible (or tacit) knowledge outputs.

According to the American Productivity and Quality Center (2000), communities of practice are becoming more integral to implement within organizations. The Center states:

*This new organizational form is becoming a key success factor for impacting time to market, reuse of knowledge, response time, employee development, creation of knowledge-sharing relationships, organizational learning, and change implementation. Organizations that want to embed knowledge management are viewing Communities of Practice as an essential business practice for the 21st century.*⁴²

³⁶ Touraj Nasseri. (1996). “Knowledge Leverage”.

³⁷ Alan Webber. (1999). “Knowledge is Power! Welcome Democracy!,” in *The Knowledge Advantage*, pp. 41-49.

³⁸ Ikujiro Nonaka. (1999). “The Dynamics of Knowledge Creation,” in *The Knowledge Advantage*, pp. 63-87.

³⁹ Ibid., p. 74.

⁴⁰ See Richard McDermott’s paper on “Knowing in Community: 10 Critical Success Factors in Building Communities of Practice.” (1999). The paper is located at the following URL: www.co-i-l.com/coil/knowledge-garden/cop/knowning.shtml.

⁴¹ American Productivity and Quality Center (APQC). (2000). Web site www.apqc.org/proposal/6576km6/.

⁴² Ibid.

Identifying potential communities of practice has been regarded as an integral element to the development of an organization's core competencies. For instance, Wenger and Snyder (1999, 5) put forward the following example:

At Shell, a potential community leader joins forces with a consultant and interviews prospective members. They look at challenges and problems that people across units and teams have in common and that would thus serve as bases for a community of practice. The interviews are not only a means of collecting information; they also generate enthusiasm for the embryonic community. After laying the groundwork, the co-ordinator calls the community of practice together, and the group begins discussing plans for activities that will build individual and group capabilities and advance the company's strategic agenda.

Businesses alike are increasingly examining the prospects of implementing communities of practice. Other examples of organizations engaging in communities of practice, include:

- *American Management Systems (AMS)*: Thought leaders have been nominated by their business units to spearhead a communities of practice in a number of strategic areas.⁴³
- *The World Bank*: The president established the vision of a "knowledge bank" to enable thought leaders to focus on the Bank's mission to eradicate poverty through the establishment of communities of practice.⁴⁴
- *Buckman Labs*: Members of communities of practice from across the globe respond to practice-specific queries within 24 hours.⁴⁵
- *Xerox*: The creation of advanced development technology centres allow the organization to bridge the gaps between research and the business community. This is reflected in the company's definition of communities of practice.⁴⁶
- *Analog Devices*: Ray Stata, CEO and Chairman of Analog, encourages the development of a "community of inquirers", encouraging employees to understand and leverage each other's knowledge, skills, experience and ideas.⁴⁷
- *Shell*: Shell has committed itself to the development of a community-development toolkit which guides communities through successive life stages.⁴⁸
- *DaimlerChrysler*: DaimlerChrysler has engineering communities of practice, called "Tech Clubs", which bring together specialists in specific subsystems (e.g., brakes or seats). These communities of practice discuss issues, co-ordinate efforts, document engineering practices and lessons learned, maintain relationships with vendors, make recommendations to purchasing, and work closely with training and competitive teardown.⁴⁹
- *Siemens Business Services*: Siemens is focusing on creating a supra-culture of virtual communities and maintaining these communities of practice. To date, employees have been gaining experience through technical communities, learning networks and interest groups. Through the process of creating and building communities, the

⁴³ Etienne Wenger and William Snyder. (1999). *Communities of Practice: The Organizational Frontier*.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ See Bob Bauer (1999) "Turning Knowledge into Innovation", in Rudy Ruggles and Dan Holtshouse (Eds.), *The Knowledge Advantage*, pp. 96-97.

⁴⁷ See Debra Amidon (1997), *Innovation Strategy for the Knowledge Economy: The Ken Awakening*, pp. 68-72, for a more thorough review of Analog Devices.

⁴⁸ Etienne Wenger. (1999). *Communities of Practice: The Key to Knowledge Strategy*, p. 8.

⁴⁹ Ibid., p. 13.

company has been focusing on creating common processes for knowledge creation, knowledge sharing, and incentives and rewards for people to adopt new behaviours.⁵⁰

In general, informalized communities of practice encourage knowledge leveraging. According to McDermott (1999), a knowledge strategy should incorporate systems for sharing information and forums for thinking. The focus is on tying a communities of practice strategic framework to the knowledge management business strategy. This strategic framework must address how communities of practice will be sustained over time. It should also ask the following questions: *What are the responsibilities of organizations in supporting communities of practice? What performance measures would indicate the success of communities of practice?*

Wenger (1999, 3), a noted expert in the area of communities of practice, puts forward a knowledge strategy based on communities of practice. This strategy involves seven basic steps under four streams of activity:

Build a strong capability framework:

1. Understand strategic knowledge needs: what knowledge is critical to success?
2. Engage practice domains: where will people form communities around practices they can engage in and identify with?

Build a social learning system:

3. Develop communities: how to help key communities reach their full potential?
4. Work the boundaries: how to link communities into broader learning systems?

Build a knowledge organization:

5. Foster belonging: how to engage people's identities and sense of meaning?
6. Run the business: how to integrate communities of practice into running the business of the organization?

Build an action-learning momentum:

7. Apply, assess, reflect and renew: how to deploy a knowledge strategy through waves of organizational transformation?

In its most recent consortium learning forum, the American Productivity and Quality Center (2000) is focusing on four major aspects of communities of practice.⁵¹ Table 2-1 outlines these key focus areas:

⁵⁰ Anne Jubert. (1999). "Developing an infrastructure for communities of practice: the Siemens Experience." *Proceedings of the International Online Information Meeting*, Vol. 23, pp. 165-168.

⁵¹ APQC 2000. Adapted from the APQC Web site: www.apqc.org/proposal/6576km6/.

Table 2-1—Four Major Focus Areas of Communities of Practice-CoP (APQC, 2000)⁵²

Focus Area 1: Planning and Initiating Communities of Practice: *How to identify and select successful communities of practice:*

- How and why do organizations make communities of practice into the heart of knowledge management strategies?
- What are the various types of communities?
- How do you discover existing communities of practice within your organization?
- How do you build a business case to initiate a new community of practice or fund an existing one?
- How do you determine a need for communities of practice?

Focus Area 2: Creating Communities of Practice: *Essential components of the design and support of communities of practice:*

- How do communities create a mission, objectives and deliverables?
- What financial support is required to establish a CoP?
- How do organizations begin cultivating an environment to allow for the formation and development of communities?
- How do you initiate the process of building a CoPs inside your organization?
- What kind of structures should CoPs have?
- How do community structures relate to the existing organizational structure?
- What roles are needed to support CoPs?
- How do you identify who should be members of CoPs?
- How do you determine who needs to be affiliated with your CoPs?
- How do you motivate and reward participation in CoPs?
- What technological tools are needed to effectively support CoPs?

Focus Area 3: Maintaining and Institutionalizing Communities of Practice: *How to sustain and expand the success of your CoPs:*

- What are the challenges CoPs face once they are built? How do these challenges change over time?
- How do you support CoPs through the stages of their lifecycle?
- What elements within your culture are critical for effective CoPs to flourish?
- How do you motivate and reward participation in CoPs?
- How is this tied to the formal performance appraisal and reward system?
- How do you motivate members of CoPs to be active participants?
- What financial support is required to maintain a CoP?
- How do you support and facilitate communities for long-term benefits? How do you sustain CoPs and scale up the whole knowledge management program?
- How can CoPs be leveraged across the entire corporate community?
- How do CoPs integrate with the overall KM strategy?
- How are CoPs integrated into the overall organization?

Focus Area 4: Measuring Effectiveness: *How to understand, evaluate, and measure the value of your CoPs to the organization:*

- How do organizations evaluate the health and effectiveness of CoPs across their life cycle?
- How do measures vary across the life cycle?
- For what do you hold CoPs accountable?
- How do you manage the performance of CoPs? Is the focus on activities, results, or building knowledge assets?
- What measures are used to understand CoPs' costs?
- How do you assess the value communities contribute to the organization, teams, business units and community members?
- What are true measures of success for a variety of CoPs?

⁵² APQC. (2000). Adapted from the APQC Web site: www.apqc.org/proposal/6576km6/. This information is republished with permission from the American Productivity and Quality Center (APQC).

Communities of practice have been around in various forms—predominantly as part of informal structures within organizations. They need to be supported and nurtured to enable further collaboration with interested members. It is true that information technology has enhanced communities of practice from a global perspective (e.g., virtual knowledge teams); however, the people are integral to the overall success of collaboration/sharing and to the future of organizational practices. Communicating ideas with interested members is not a new phenomenon; however, in times of down-sizing, reengineering and insufficient resources, issues have emerged across organizations that would ultimately create barriers to the importance of collective knowledge. For instance, a *New York Times* survey (1996) revealed that 70 per cent of workers compete more with co-workers today (1997) than they did only a few years ago; with only 20 per cent co-operating more. *Has this changed in the new millennium? Are workers more engaged in increased collaboration through the establishment of communities of practice? And if so, how can we measure the potential success rate of these communities of practice?*

3 The Benefits and Barriers to Knowledge Management

The literature reveals that establishing a culture which encourages knowledge creation and sharing is critical to the success of any organization. Cultures that promote stovepipes and internal hoarding of information may deter others from taking part in the development of a knowledge management business strategy. The question remains: how does one develop and implement an effective knowledge management business strategy and at the same time, try to find a balance between protecting intellectual property and circulating ideas? Studies are continuing to show that collaborative practices are more beneficial to companies (Amidon, 1997). Sharing and collaborating help to leverage the talents of highly skilled professionals; however, implementing a knowledge management strategy takes years of instilling a culture that employs knowledge-based practices. In a recent study, participants in a *Creating a Knowledge-Sharing Culture* (1999) stated that the biggest impediments in creating a knowledge-sharing cultural environment revolved around the lack of time needed to transfer knowledge and an environment that fosters the “not invented here” philosophy (APQC, 2000). Research indicated that increases in knowledge-sharing helped people to discover how profitable collaboration may be. For instance, this paper has put forward examples which demonstrate that communities-of-practice or cross-functional teams support knowledge creation and sharing, and help in the overall productivity of organizational work practices. However, nurturing this kind of culture should not be based upon a dramatic change to the overall existing culture. The literature review reveals that it be based on tying and promoting knowledge sharing and collaboration to the existing core values of an organization, recognizing the importance of protecting Intellectual Property.

A summary comprised of several articles and studies⁵³ of possible benefits and barriers to implementing a knowledge management strategy have been put forward in Table 3-1, including:

⁵³ This summary is a compilation of the following studies, including: The Delphi Group (Boston) Survey 1998; Survey for Information Management Strategy Magazine (published by Information Strategy), conducted by Peter Murray and Andrew Myers of the Cranfield School of Management 1998; Teltech Resource Network Corp (Third Quarter 1998).

Table 3-1— Benefits and Barriers to Implementing a Knowledge Management Strategy

BENEFITS	BARRIERS
<ul style="list-style-type: none"> ▪ <i>Bring together organizational expertise</i> ▪ <i>Enhance business decisions</i> ▪ <i>Improve productivity</i> ▪ <i>Improve information</i> ▪ <i>Improve customer service</i> ▪ <i>Empower employees</i> ▪ <i>Promote learning</i> ▪ <i>Eliminate re-inventing the wheel</i> ▪ <i>Enhance knowledge flow and processes</i> ▪ <i>Promote innovation</i> ▪ <i>Deliver high quality products</i> ▪ <i>Enhance flexibility</i> ▪ <i>Capture information</i> ▪ <i>Create knowledge</i> ▪ <i>Share and learn</i> 	<ul style="list-style-type: none"> ▪ <i>Hierarchical structures/senior leadership</i> ▪ <i>Stovepipes</i> ▪ <i>Lack of teaming approaches</i> ▪ <i>Rules</i> ▪ <i>Lack of resources</i> ▪ <i>Lack of time</i> ▪ <i>Specialized functions and tasks</i> ▪ <i>Continual change</i> ▪ <i>Award system not aligned with KM</i> ▪ <i>Mission shortfall</i> ▪ <i>Information management (including IT) equated with knowledge management</i>

Establishing a structured reward and recognition system may help to promote and encourage collaborative organizational development. Whether these rewards are tangible or intangible, they are a means of acknowledging the value of sharing knowledge, appreciating the contributions people make, and increasing awareness about the importance of not hoarding what you know.⁵⁴

Skyrme (1997)⁵⁵ outlines companies that are benefiting from the implementation of knowledge strategies. These companies include:

British Petroleum: ‘Through virtual team-working using videoconferencing, BP has accelerated its solution of critical operation problems.’

Hoffman La Roche: ‘The Right First Time program has enabled this company to reduce the cost and time in accomplishing regulatory approvals for new drugs.’

Dow Chemical: ‘This company has been able to generate over \$125 million in revenues from licensing, including other methods for exploiting their intangible assets.’

Texas Instruments: ‘Through the sharing of best practices between their semiconductor fabrication plants, this company has saved the equivalent of investing in a new plant.’

Skandia Assurance: ‘Through the development of new measures of intellectual capital, the company has increased their revenues more quickly than their industry average.’

Hewlett-Packard: ‘By sharing existing company expertise, Hewlett-Packard is able to bring new products to the market more quickly than before.’

⁵⁴ APQC. (2000). *Knowledge Management: A Guide for Your Journey to Best Practice Processes*, p.21.

⁵⁵ David Skyrme Associates. (1997). “Knowledge Management: Making Sense of an Oxymoron.” URL: <http://www.skyrme.com/insights/22km.htm>.

4 Framework for Leveraging Knowledge

A coherent framework for leveraging knowledge involves taking steps towards the development of a corporate strategic knowledge solution. Such a framework may increase the effectiveness of an organizational network by: facilitating the identification of synergies and strategic partners (including industries and universities); and ensuring that the greatest pool of knowledge is available and accessible for input to policy and strategy.

In addressing a framework for leveraging knowledge, it is integral to examine the following issues:

- 1) From a global/macro perspective, how will a coherent knowledge framework benefit organizations for knowledge creation/acquisition, knowledge storage, knowledge distribution/transfer and knowledge application? How will this help organizations achieve their business objectives?
- 2) What tools are required for transferring knowledge, particularly in sharing and exploiting knowledge?
- 3) Which technologies are driving organizations into the field of leveraging knowledge?
- 4) How will organizations identify knowledge problems and opportunities, and develop and implement knowledge solutions?⁵⁶ For example, organizations may need to:
 - a) *Identify key organizational knowledge from the corporate mission, objectives and strategy.*
 - b) *Identify task knowledge through functional and process analysis—knowledge processes.*
 - c) *Identify role and individual knowledge through an analysis of the organizational structure and analysis of individual roles.*
 - d) *Assess the organization against the standards provided by the Thinking/Learning Organization.*
 - e) *Identify knowledge problems and opportunities, needs and assets.*
 - f) *Determine the appropriate tools and techniques for sharing knowledge (including the migration of information into future systems).*
 - g) *Develop (where appropriate) paper or software models of knowledge.*
 - h) *Design, develop and implement strategies and solutions to satisfy knowledge management goals.*

In understanding knowledge management and related strategies, organizations must be able to capture and evaluate all of its tacit and codified knowledge assets. They need to capture the knowledge in a usable form and move the knowledge to those who can use it in their analyzing, synthesizing and decision-making processes.

Organizational models on knowledge management have been developed and implemented across organizations, for the purpose of understanding how knowledge-related strategies would work within their business environment. For the most part, models are devised to help capture, store and communicate enterprise knowledge in many forms ranging from stories (verbal models) to diagrams (pictorial models) to spreadsheets (quantitative models).⁵⁷ Each organization determines what model is appropriate for creating, using, sharing and leveraging their knowledge.

⁵⁶ Adapted from Robert Taylor. Knowledge Management. “What is Knowledge Management?” *The Knowledge Management Forum* (1996).

⁵⁷ Ed Vail. (2000). “Using Models for Knowledge Management.” *Knowledge Management Review*. Best Practices, Case Studies and Research. March/April 2000.

For example, the American Productivity and Quality Center (APQC) ⁵⁸ put forward the following model on organizational knowledge. The life cycle of this model centres around Strategy and Leadership, Culture, Technology and Measurement which are integral factors in leveraging organizational knowledge:

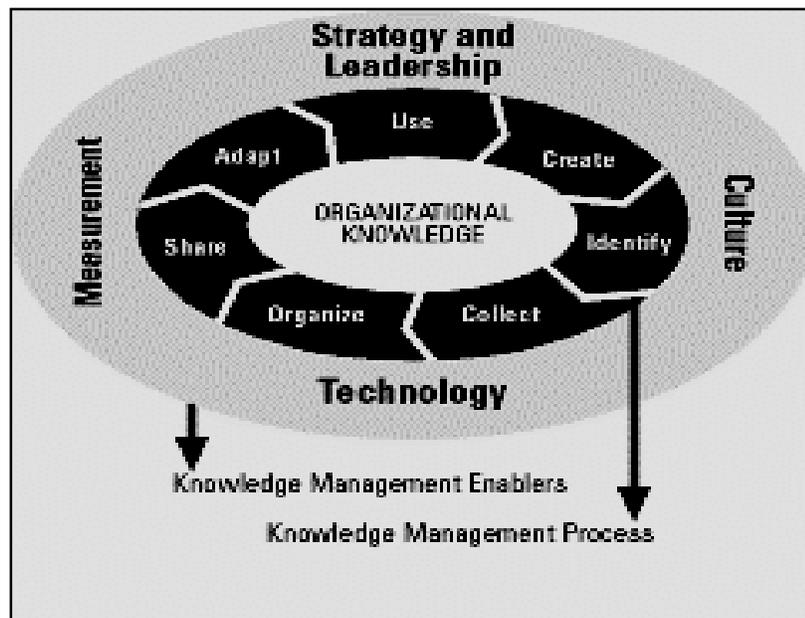


Figure 4-1— Model on Organizational Knowledge (APQC)
(Reproduced with permission from APQC)

Organizations employing tailor-made knowledge management models will need to continue to demonstrate the importance of examining the critical issues affecting individual knowledge strategies. One of the key issues include measuring the performance of these knowledge management strategies—an essential element in promoting effective business management strategies to employees and senior management.

5 Performance Measurement—Leveraging Knowledge

Measuring the applications and tools for leveraging knowledge is key to understanding the effectiveness of organizational activities. In APQC's (2000) *Using Information Technology to Support Knowledge Management* study, participants stated that the most common business improvement outcomes were practice and process improvement, business growth, increased customer satisfaction, and enhanced employee capability/organizational learning. Taken altogether, a performance measurement system should encompass the organization's value system, objectives and overall business strategy. In putting forward an effective strategy for measuring knowledge activity-based performance, it becomes important to examine the effectiveness of the tools and applications being used for leveraging knowledge. Defining an organization's activity measures is a starting point, and needs to be defined further using both qualitative and quantitative measures.

Implementing knowledge management strategies within organizations purports to measuring how effective these strategies are in understanding productivity, performance and job satisfaction. In essence, it means that we need to be able to measure intangible factors (based on tacit knowledge)

⁵⁸ APQC and Arthur Andersen. (2000). *Knowledge Management: A Guide for Your Journey to Best Practice Processes, 2000*. Figure adapted from the APQC Web site at www.apqc.org. This model was developed by APQC and Arthur Andersen in 1995. This information is republished with permission from the American Productivity and Quality Center (APQC).

in the knowledge economy. For the most part, companies have been engaging in the implementation of knowledge strategies; however, how are these companies measuring their overall performance? A recent report⁵⁹ published by Best Practices, entitled, *Knowledge Management of Internal Best Practices*, endeavours to ‘benchmark best practices in the knowledge management field with reference to 55 highly effective organizations from a variety of industries.’⁶⁰ Operationalizing theoretical concepts becomes a tenuous task; however, the report focuses on providing pragmatic examples of high performance within the identified organizations. Some cited examples include:

- **Xerox** has a policy of providing convenient places where workers can get together for informal conversations. This get together is known as “the distributed coffee pot”. It was a result of a study produced by the company’s Palo Alto Research Centre, where they found that repairmen learn a great deal about fixing copiers by “hanging around and swapping stories”.
- **General Electric** has implemented a job rotation program for transferring best practice knowledge throughout the organization. Through the implementation of this program, GE reduced the delay between order and delivery by 75 per cent, reduced inventory by \$200 million, and increased their return-on-investment by 8.5 per cent.

Additional research and information on measuring performance in knowledge management are needed to assist companies in evaluating their overall performance related to the area of knowledge management or knowledge-related strategies. In Canada, federal departments are only beginning to examine the effectiveness of knowledge management strategies, including: Treasury Board Secretariat, National Research Council and the Department of National Defence⁶¹. This view is reflected in a recent OECD (2000) publication, *Knowledge Management in the Learning Society: Education and Skills*⁶², stating that the transmission and application of knowledge management in the public sector are poor compared to private industry. Governments in the United Kingdom (e.g., British and Scottish governments) are recognizing the importance of knowledge management within the public sector (e.g., The National Criminal Intelligence Service); however, these knowledge management initiatives are mainly information-based systems which provide better information flow and services to interested organizations. According to a recent report by Cranfield University and Microsoft⁶³, business in the UK are still struggling to see the benefits of knowledge. The report, entitled *Releasing the Value of Knowledge*, relays that businesses in the UK are not leading in the area of knowledge management initiatives and strategies. In fact, they are negating Tony Blair’s vision of a knowledge-driven economy. According to the report, 80 per cent of organizations revealed that knowledge management could power innovation and growth; however, only 53 per cent have fully realized any knowledge benefits. Yet, companies in the financial services sector ranked high in all aspects of “knowledge exploitation”: in particular, best practices, knowledge infrastructure and working practices. The report highlights, however, that this failure to see knowledge-related benefits is the result of a lack of leadership.

⁵⁹ Best Practices. (2000). *Knowledge Management of Internal Best Practices* (www.best-in-class.com).

⁶⁰ See Leah Halliday (2000) on “Effective knowledge management by example: A new report by Best Practices looks at how leading organizations are implementing KM.” *Knowledge Management Magazine*. July/August 2000, p. 10.

⁶¹ These organizations will be examined in a subsequent paper on “Leveraging Knowledge—Scanning the Science and Technology Community,” Defence R&D Canada, The Department of National Defence, Canada, DRDC TM 2000-003, 2000.

⁶² Organisation for Economic Co-operation and Development (OECD). (2000). *Knowledge Management in the Learning Society: Education and Skills*. Centre for Educational Research and Innovation, Paris.

⁶³ Knowledge Management. (2000). Falling short of Tony’s dream. This magazine cites the Cranfield University-Microsoft Report, *Releasing the Value of Knowledge*, pp. 22-23.

Peter Drucker identified innovation to be critical to the success of organizations; however, he also acknowledged the importance of having the “ability to measure the performance thereof.” Amidon (1997, 96) puts forward the following questions for consideration as they pertain to performance measures, including:

- *Is the business strategy known and is it clear? Who is responsible for performing the assessment?*
- *Are the performance measures designed to gauge the qualitative as well as the quantitative indices of the enterprise?*
- *Are the measurement systems created as an end or a means to promote value in the eyes of the customers and stakeholders?*
- *Is the instrumentation in place (e.g., metrics, reports, technologies) to ensure proper, consistent calibration over time?*
- *Is the measurement process perceived as a punitive (i.e., command-and-control) or learning activity?*
- *Are there incentive/reward mechanisms to promote idea creation, responsible risk-taking, and application into products/services?*
- *Have you a means to define and measure the intangible assets (i.e., intellectual capital, value of collaboration/interaction, degree of contribution) of the enterprise?*

6 Implications on the Future Direction of Knowledge Management

The future impact of knowledge management will depend on how organizations are strategizing in capturing and using corporate knowledge to enhance their products and services. In essence, organizations will be examining their information infrastructures to determine the quality and quantity of information necessary in providing value to the corporate knowledge. In so doing, organizations will also be looking at establishing effective networks for encouraging collaboration and enhanced knowledge strategies and systems (e.g., communities of practice).

According to a recent study⁶⁴ conducted by KPMG Consulting, knowledge management is here to stay. The results reveal:

- *Over two-thirds of respondents had or were setting up a KM initiative, while the concept of KM was in general well-recognized as an essential business tool.*
- *The majority of those interviewed had a good grasp of the potential role that KM could play—79 per cent of respondents thought that KM plays an ‘extremely’ or ‘very significant’ role in improving competitive advantage, while 72 per cent felt KM had an important role to play in improving customer focus.*
- *Two-thirds of respondents felt KM to be very instrumental in both revenue and profit growth. Almost three-quarters of those with a KM programme said they had achieved better decision-making, 68 per cent said they were capable of responding more rapidly to key business issues and 64 per cent said they had delivered improved customer service.*
- *In terms of the tools used in KM, 93 per cent of respondents used the Internet for knowledge management purposes, 78 per cent used an intranet, and 63 per cent had data warehousing and mining technologies.*

The KPMG Consulting study also reveals several problems⁶⁵, including:

⁶⁴ David Parlby. (2000). “Knowledge management—the story so far”, in *Knowledge Management Magazine*, July/August, p. 26. The italicized points are summarized by David Parlby.

⁶⁵ Ibid., p. 27. The italicized points are summarized by David Parlby.

- *A significant number of respondents reported problems at the grass roots of the KM project, which are ultimately, undermining the effectiveness of the system. Thirty-six per cent stated that the benefits they had received had failed to meet their expectations. Reasons include: lack of user uptake due to insufficient communication; a failure to integrate KM into everyday working practices; lack of training; or a sense that there was little personal benefit of using the KM system for the user.*
- *Even though companies were happy with the benefits that they had achieved through adopting KM, nearly two-thirds of organizations complained that they were suffering from information overload—the creation of a knowledge glut or an overwhelming collection of information for information’s sake. Sixty-seven per cent of respondents reported that employees want to share and use knowledge but simply do not have the time.*
- *Fifty-six per cent had complained about people reinventing the wheel, while half of those interviewed felt their staff had difficulty locating the requisite information.*
- *Sixty-two per cent of respondents felt that their workforce was not using the available technology to share knowledge effectively.*

The Report concludes that although knowledge management is receiving considerable attention in the business world, organizations will continue to grapple with the efficacy of knowledge management business strategies. The main problem lies with the fact that the majority of organizations are thinking about knowledge management in mostly technological terms, and thus, neglecting the importance of the human component to successful knowledge management implementation.

Other trends and strategic directions in the area of knowledge management are forecasted to have a positive impact on the way companies will conduct their businesses, including:

- By 2003, more than ½ of the Fortune 1000 companies will implement knowledge management. Knowledge management will be a mainstream *business practice* among market leaders in all industries.⁶⁶
- *Knowledge innovation* is becoming more critical for companies/organizations. Knowledge innovation is cited as the single most important benefit of knowledge management,⁶⁷ and exemplifies the notion that innovation is the one competence needed for the future.
- Building strategic relationships through (virtual) *communities of practice* is the way of the future.⁶⁸
 - Developing strong relationships to build communities of practice.
 - Exchanging knowledge to achieve mutual benefits.
 - Establishing network dynamics to increase returns.
- Modern *collaborative managerial standards* in the area of knowledge management strategies may focus more on: collaborative innovation processes; systematic performance measurements; centralized research and educational facilities; distributed learning network of innovation centers; ‘real-time’ intelligence capabilities; value-added products and services; collaborative innovation practices with alliances and joint

⁶⁶ Exocom—Knowledge Management: A New Way of Doing Business. Margot Brown, Knowledge Management Practice Leader, December 10, 1999 (presentation). Based on the knowledge management “trends and Directions for 1998-2003”, by the Gartner Group.

⁶⁷ Ernst & Young. (1997). Survey Business Intelligence.

⁶⁸ APQC. (2000). In their most recent knowledge management consortium, APQC state that organizations are viewing communities of practice as an integral business practice for the 21st century.

- ventures; advertising campaigns that reflect intellectual competencies; leading by example; and electronic learning tools through cyberspace use (Amidon 1997, 141-142).
- *Knowledge reintermediation* is going to become an important trend (e.g., the Defence Evaluation and Research Agency (DERA) is a “knowledge intermediary in the defence industry—enabling military strategists, weapons developers and communications experts to work together to develop new systems and tools to meet the needs of modern warfare”).⁶⁹
 - *Corporate instinct* may be the future extension of knowledge management strategizing. According to Koulopoulos, Spinello and Toms (1997, 29):

Competitive advantage is not only the sum of the intellectual parts; it is the speed of summation, or using the vocabulary of corporate instinct, the speed of what we will refer to as the knowledge chain. As the pace of innovation, mergers and partnerships, and obsolescence increases, the speed of a company's knowledge chain becomes a benchmark challenge for leveraging intellectual capital into success in all industries.

The implications for organizations employing knowledge management strategies are far-reaching today and will continue to be well into the future. Within the past five years, advanced technologies, such as the Internet, are impacting on knowledge related initiatives; and as a result, are leading the revolutionary change in management practices. Amidon (1997, 88) challenges us by asking: *How do we define the distinctions between information processing and knowledge processing in a way that takes advantage of technical advancements and optimized intellectual interaction?*

While the knowledge revolution is inspired by new information systems, McDermott (1999) states that it will take human systems to realize it.⁷⁰ Building communities across *teams, disciplines, time, space and business units* represent effective ways in leveraging knowledge across interested members. The implications for leveraging knowledge include: developing communities; focusing on knowledge important to both the business and the people; creating forums for thinking as well as systems for sharing information; allowing the community to decide what to share and how to share it; creating a community support structure; using the community's terms for organizing knowledge; integrating sharing knowledge into the natural flow of work; and treating culture change as a community issue (McDermott, 1999). This can involve the continuous training and education for personnel to seek opportunities for competency development, which in turn, will help to leverage the talents of highly skilled professionals.

Thus, can we say that knowledge management is the latest colloquialism? According to Webber (1999, 41-42): Knowledge is not a fad, nor a movement, nor the next business era to be written off as just another out-of-date and off-the-mark strategy. The way in which knowledge has become critical to the way that we do business is nothing short of a revolution. For Webber, the path of real change is the knowledge revolution. Koulopoulos, Spinello and Toms (1997, 140) corroborate by saying: “Corporate instinct can only be liberated in the organization if people are given the power and tools to become free agents of change.” It is through corporate intelligence that organizations will be able to take on new responses to new circumstances—a step upward from knowledge management.

Whether knowledge management is seen as a fad, whether it will fade away as the latest business trend (i.e., the latest in management practices), the one aspect that we have learned from knowledge management is the importance of people. People are still depicted as the knowledge

⁶⁹ Helen Simms. “New age knowledge”, *Knowledge Management*, May 2000, pp. 14-15.

⁷⁰ See Richard McDermott. (1999). “Why information technology inspired but cannot deliver knowledge management.” *California Management Review*, 41, 4, 103(1), Summer.

makers! Dorren (2000, 12) argues: “A knowledge sharing system can never replace people because people are the oxygen within every organization—without oxygen we die...without people and their knowledge, organisations die.” The value of partnering, capitalizing on external market changes, and the art and science of competitive and collaborative position will become increasingly more important as years progress (Amidon 1997, 104). Organizations will continue to develop and implement more effective mechanisms (e.g., learning systems and networks) to recognize and reward those practising knowledge collaboration, whether engaging in discussions one-on-one or within communities of practice. The concept of “leadership” may strive toward reaching a shared vision in promoting and collaborating ideas in the new global knowledge economy.

The emerging issues within the knowledge revolution will continue to ask a plethora of questions involving the viability of knowledge management initiatives. Questions will revolve around future management trends, enhanced innovative knowledge paradigms, new knowledge markets, knowledge forums or communities of practice, performance measurement, core competencies and changing perspectives (e.g., knowledge ethics). A more collaborative strategy seems to be the way of the future. This will involve changing our current culture and business practices to fit the needs of a new, changing and highly engaging knowledge economy. Amidon (1997, 82) asserts: “The shift in orientation to intangible assets will revolutionize the way enterprises are measured.” According to Webber (1999, 49):

The knowledge revolution will be a revolution of democracy, a movement characterized by dispersal of power, and by managers who lead through empowering front-line knowledge workers to contribute and to make decisions. It will be a movement led by managers who close the gap between the work force and the customer and who are willing to trust and respect the people who are the company. It will reward companies, managers, and knowledge workers who will accept nothing short of reinventing business.

7 Conclusion

The literature review suggests that success of knowledge management within organizations will depend on the sharing, collaboration and creativity of its people. The four perspectives outlined in this paper—the knowledge workers, organizational knowledge, technology as an enabler in leveraging knowledge and the knowledge-based economy—have tried to demonstrate the divergent knowledge strategies and perspectives being employed by organizations. These foci have concentrated on the success of capturing and leveraging knowledge from people, business, management and application perspectives. As a result, the literature reveals that each company will continue to develop its own knowledge strategy and framework in conjunction with its organizational corporate needs, culture and leadership, as well as its capacity to be a creative and innovative enterprise.

Collaborative strategies, such as the development and implementation of communities of practice, are receiving greater recognition in promoting successful knowledge management applications for the advancement of corporate knowledge. Companies, such as the American Productivity and Quality Center, American Management Systems, Buckman Laboratories, Analog Devices and Siemens Business Services, are promoting communities of practice as ‘an essential business practice for the 21st century.’ Organizations are employing communities of practice to help cultivate innovative ideas and encourage newer approaches to problem-solving and decision-making. Enhanced collaboration, through the establishment of communities of practice, is critical to its overall success; however, organizations need to focus on the performance measures that would evaluate the success of these groups.

The benefits to implementing a knowledge management strategy have been put forward, including: enhanced decision-making; improved productivity and customer service; enhanced knowledge flow and processes; and increased innovation. On the other hand, barriers to successful implementation of knowledge management have also been delineated, including: hierarchical structures (e.g. stovepipes); lack of time and resources; information management being equated with knowledge-related strategies; and mission shortfall. However, companies, such as British Petroleum, Dow Chemical, Skandia Assurance and Hewlett-Packard, are reaping the benefits of their knowledge management strategies through enhanced collaboration and increased revenues and products.

The future of knowledge management strategies will be contingent upon their application to the advancement of management systems. As a direct result, employing instruments to measure performance will continue to be critical in understanding the effectiveness of future knowledge-related strategies and their frameworks. From a management perspective, we still need to focus on how knowledge related activities and practices will benefit organizations in carrying out their strategic goals and objectives. It has been demonstrated that other trends and strategic directions in the area of knowledge management are forecasted to have a positive impact on the way companies will continue to conduct their business. Collaborative ventures related to knowledge management or knowledge strategies will be increasingly evidenced across private industry and will become more evident within the public sector. From a more global perspective, we still need to ask the following questions: *How are public organizations, for instance, science and technology organizations (e.g. Department of National Defence, Department of Defense, Defence Evaluation and Research Agency, National Research Council), engaging in the collaborative innovation process? How are these organizations involved in innovating the future through the leveraging of their corporate knowledge? What are the business imperatives in understanding knowledge innovation initiatives? What knowledge-related strategies are considered to be the most effective in fulfilling future business mandates? From a global perspective, how is performance in leveraging knowledge being measured and benchmarked to similar business management practices?*

In sum, the impact of the knowledge revolution will continue to drive the needs of organizations in leveraging their corporate knowledge. Our ability to instill a culture of change, learning and innovation will also be a part of this revolution. The evolving nature of knowledge-related strategies will dominate the business arena for quite some time—compelling us to continue to fight the battles within the knowledge revolution.

8 References

- American Productivity and Quality Center. (2000). "Building and sustaining communities of practice: continuing success in knowledge management." American Productivity and Quality Center. (Online). URL: <http://www.apqc.org/proposal/6576km6/>.
- American Productivity and Quality Center. (2000). *Knowledge Management: A Guide for Your Journey to Best-Practice Processes*. Houston, Texas: APQC.
- Amidon, D. M. (1997). *Innovation Strategy for the Knowledge Economy: The KEN Awakening*, Newton, MA: Butterworth-Heinemann.
- Barquin, R. (2000). "From Bits and Bytes to Wisdom: A Proposed Ascending Scale." Presentation made at the e-gov Knowledge Management Conference (Arlington, Virginia).
- Bauer, B. (1999). "Turning Knowledge into Innovation." In R. Ruggles and D. Holtshouse, (Eds.), *The Knowledge Advantage*, NH-US: Capstone US, Business Books Network, pp. 89-101.
- Bennet, A. (2000). "Building the Knowledge Enterprise." Presentation made at the e-gov Knowledge Management Conference (Arlington, Virginia). Department of the Navy, US.
- Bertels, T. (1996). "What is Knowledge Management?" *The Knowledge Management Forum*. (Online). URL: http://www.km-forum.org/what_is.htm.
- Best Practices. (2000). *Knowledge Management of Internal Best Practices*. (Online). URL: <http://www.best-in-class.com>.
- Davenport, T. H. and Prusak, L. (1998). *Working Knowledge*. Boston: MA: Harvard Business School Press.
- Davis, S. and Meyer, C. (1999). "The Role of Knowledge in the Connected Economy." In R. Ruggles and D. Holtshouse (Eds.), *The Knowledge Advantage*, pp. 89-101. NH-US: Capstone US, Business Books Network.
- (The) Delphi Group. (1998). "Survey of KM Practice in US." (Online). URL: <http://choo.fis.utoronto.ca/UvA/Kmsurvey/default.html>.
- Dorren, K. (2000). "Knowledge loss leads to organisational asphyxiation", *Knowledge Management Magazine*. London, England: Bizmedia Ltd.
- Drucker, P. (1995). *Managing in a Time of Great Change*, Oxford: Butterworth-Heinemann.
- Drucker, P. (1999). "Managing Knowledge Workers in a Changing World". In R. Ruggles and D. Holtshouse (Eds.), *The Knowledge Advantage*, NH-US: Capstone US, Business Books Network, pp. 53-54.
- Drucker, P. (2000). "Sage Advice." *Business 2.0.*, pp. 134-144.
- Edvinsson, L. and Malone, M. (1997). *Intellectual Capital: Realizing Your Company's True Value by Finding its Hidden Brainpower*. New York: Harper Business.
- Ernst & Young. (1997). *Business Intelligence*. (Online). URL: <http://www.entovation.com/backgrnd/art.htm>.

- Exocom. (1999). "Knowledge Management: A New Way of Doing Business." Presentation made to the Department of National Defence, Defence Research Establishment Ottawa (DREO), December 10.
- Grey, D. (1996). "What is Knowledge Management?" *The Knowledge Management Forum*. (Online). URL: http://www.km-forum.org/what_is.htm.
- Halliday, L. (2000). "Effective knowledge management by example: A new report by Best Practices looks at how leading organizations are implementing KM." In *Knowledge Management*, London, England: Bizmedia Ltd. July/August, p. 10.
- Information Strategy. (1998). "The Facts about Knowledge." Survey for Information Management Strategy Magazine. Conducted by P. Murray and A. Myers of the Cranfield School of Management. (Online). URL: <http://www.info-strategy.com/knowsurl/>.
- Jubert, A. (1999). "Developing an infrastructure for communities of practice: the Siemens Experience." *Proceedings of the International Online Information Meeting*, Vol. 23, pp. 165-168.
- Knowledge Management. (2000). "Falling short of Tony's dream." *Knowledge Management*, London, England: Bizmedia Ltd., July/August, pp. 22-23.
- Koulopoulos, T., Spinello, R. and Toms, W. (1997). *Corporate Instinct: Building a Knowing Enterprise for the 21st Century*. New York: Van Nostrand Reinhold.
- Koulopoulos, T. M. and Frappaolo, C. (1999). *Smart Things to Know about Knowledge Management*. NH-US: Capstone US, Business Books Network.
- Lipnack, J. and Stamps, J. (1994). *The Age of the Network: Operating Principles for the 21st Century*. New York: John Wiley and Sons.
- Malhotra, Y. (1998). "Interview on Knowledge Management." Knowledge.net/ Knowledge Overview. (Online). URL: <http://hale.pepperdine.edu/~gyperry/km1/overview.html>.
- McDermott, R. (1999). "Knowing in Community: 10 Critical Success Factors in Building Communities of Practice." (1999). (Online). URL: <http://www.co-i-l.com/coil/knowledge-garden/cop/knowing.shtml>.
- McDermott, R. (1999). "Why information technology inspired but cannot deliver knowledge management." *California Management Review*, 41, 4, 103(1), Summer, pp. 103-117.
- Murray, A. J. (1996). "What is Knowledge Management?" *The Knowledge Management Forum*. (Online). URL: http://www.km-forum.org/what_is.htm.
- Nasseri, T. (1996). "Knowledge Leverage. The Ultimate Advantage." In *Kognos: The E. Journal of Knowledge Issues*, Summer. (Online). URL: <http://magi.com/~godbout/Kbase/kognos11.htm>.
- Newman, B. (1996). "An Open Discussion of Knowledge Management". (1991). *The Knowledge Management Forum*. (Online). URL: http://www.km-forum.org/what_is.htm.

- Nonaka, I. (1998). "The Knowledge-Creating Company", in *Harvard Business Review on Knowledge Management*. Boston: MA: Harvard Business School Publishing, pp. 21-45.
- Nonaka, I. (1999). "The Dynamics of Knowledge Creation," in R. Ruggles and D. Holtshouse (Eds.), *The Knowledge Advantage*, NH-US Capstone US: Business Books Network, pp. 63-87.
- Nonaka, I. and Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press.
- Organisation for Economic Co-operation and Development (OECD). (2000). *Knowledge Management in the Learning Society: Education and Skills*. Centre for Educational Research and Innovation, Paris.
- Owens, D. (1999). *Knowledge Management Review*, September/October, Issue 10, p.26.
- Parlby, D. (2000). "Knowledge management—the story so far", in *Knowledge Management*, July/August, pp. 26-27.
- Polanyi, M. (1966). *The Tacit Dimension*. Garden City, New York: Doubleday & Co.
- Rock, S. (2000). "Do's and Don'ts for leaders in the knowledge economy", Korn/Ferry study cited in, *Knowledge Management*. London, England: Bizmedia Ltd., June, pp. 10-11.
- Ruggles, R. and Holtshouse, D. (1999). "Gaining the Knowledge Advantage", in R. Ruggles and D. Holtshouse (Eds.), *The Knowledge Advantage*. NH-US Capstone US: Business Books Network, pp. 1-19.
- Simms, H. (2000). "New age knowledge", *Knowledge Management*, May 2000, pp. 14-15.
- SKIPR-Gov 2000. (2000). *The State of the Knowledge Industry Progress Report / Government 2000*, "The Definitive Report on Knowledge Management in Government. Knowledge Management: An e-gov Conference", The Foundation for Electronic Government. (2000). Alexandria, Virginia.
- Skyrme Associates, D. (1997). "Knowledge Management: Making sense of an oxymoron." *Management Insight No. 2*. (Online). URL: <http://www.skyrme.com/insights/22km.htm>.
- Taylor, R. (1996). "What is Knowledge Management?" *The Knowledge Management Forum*, March 31. (Online). URL: http://www.km-forum.org/what_is.htm.
- Teltech Resource Network Corp. (1998). "Teltech Study: Finding Value in Knowledge Management." URL: <http://choo.fis.utoronto.ca/UvA/Kmsurvey/default.html>.
- Vail, E. 2000. "Using Models for Knowledge Management." *Knowledge Management Review*. Best Practices, Case Studies and Research, March/April 2000.
- Webber, A. (1999). "Knowledge is Power! Welcome Democracy!," in R. Ruggles and D. Holtshouse (Eds.), *The Knowledge Advantage*, NH-US Capstone US: Business Books Network, pp. 46-47.
- Wenger, E. (1999). *Communities of Practice: The Key to Knowledge Strategy*. North San Juan, CA, pp. 1-16, (individual paper).

- Wenger, E. and Snyder, W. (1999). *Communities of Practice: The Organizational Frontier*. North San Juan, CA., (individual paper).
- Wenig, G. R. (1996). "What is Knowledge Management", in *The Knowledge Management Forum*, March 31. (Online). URL: http://www.km-forum.org/what_is.htm.

DOCUMENT CONTROL DATA SHEET		
1a.PERFORMING AGENCY DRDC		2. SECURITY CLASSIFICATION Unclassified
1b.PUBLISHING AGENCY DRDC		
3. TITLE (U) The Knowledge Revolution—A Literature Review		
4.AUTHOR Waruszynski, Barbara Theresa		
5.DATE OF PUBLICATION September 7, 2000		6.NO.OF PAGES 45
7.DESRIPTIVE NOTES		
8.SPONSORING/MONITORING/CONTRACTING/TASKING AGENCY		
9.ORIGINATORS DOCUMENT NUMBER Technical Memorandum 2000-02	10.CONTRACT,GRANT,THRUST AND/OR PROJECT NO. 20 ae	11.OTHER DOCUMENT NOS.
12.DOCUMENT RELEASABILITY Unlimited distribution		
13.DOCUMENT ANNOUNCEMENT Unlimited		

14.ABSTRACT

In understanding the area of knowledge management, a literature review was conducted to determine if knowledge management is based on real business management practices or on the latest colloquialism in the new global knowledge economy. This paper explores the role of the knowledge infrastructure and outlines various definitions of knowledge management, taking into perspective: *Can knowledge really be managed?* Four theoretical perspectives of knowledge management strategies are put forward, including: the knowledge workers, organizational knowledge, technology as an enabler in leveraging knowledge and the knowledge-based economy. Several key theorists lay the groundwork for understanding the divergent knowledge strategies being employed by organizations. A discussion on the application of knowledge management strategies in relation to communities of practice is also put forward. Benefits and barriers to knowledge management are examined in reference to the development and implementation of knowledge management strategies and organizational frameworks. The literature review reveals that knowledge management is alive and well, and is being implemented within many organizations as an effective strategy in improving corporate business practices. The development of knowledge communities or communities of practice continues to be regarded as an effective method in bringing together individuals or groups for the purpose of capturing and exchanging ideas through creative and collaborative work strategies. One of the main concerns noted in the utilization of knowledge management strategies is understanding its overall effectiveness. The area of performance measurement needs to be explored further to determine if knowledge leveraging is really occurring, and if companies are successful in leveraging their knowledge? The implications and trends in knowledge management indicate that the future business environment will continue to be dependent on understanding the premise behind knowledge-related strategies, particularly in the area of collaborative innovation practices. Further questions need to be asked: *How are public organizations, particularly science and technology organizations (e.g. Department of National Defence, Department of Defense, Defence Evaluation and Research Agency, National Research Council) engaging in the collaborative innovation process? How are these organizations involved in innovating the future through the leveraging of their corporate knowledge? What are the business imperatives in understanding knowledge innovation initiatives? What knowledge-related strategies are considered to be the most effective in fulfilling future business mandates? From a global perspective, how is performance in leveraging knowledge being measured and benchmarked to similar business management practices?*

Étant entendu le domaine de la gestion du savoir, on a mené une étude documentaire pour déterminer si la gestion du savoir repose sur de vraies pratiques de gestion des affaires ou sur la toute dernière expression familière de la nouvelle économie basée sur le savoir. Le présente article explore le rôle de l'infrastructure du savoir et énonce diverses définitions de la gestion du savoir, en considérant l'aspect : *Peut-on vraiment gérer le savoir?* On avance quatre aspects théoriques des stratégies de la gestion du savoir, soit : les travailleurs du savoir, la connaissance de l'organisation, la technologie comme catalyseur permettant d'exploiter le savoir et l'économie basée sur le savoir. Plusieurs théoriciens clés mettent jettent les bases de la compréhension des stratégies divergentes du savoir adoptées par les organisations. On présente également une discussion sur l'application des stratégies de la gestion du savoir relativement aux communautés de pratiques. Les avantages et les obstacles liés à la gestion du savoir sont étudiés en ce qui concerne l'élaboration et l'application des stratégies de la gestion du savoir et des cadres organisationnels. L'étude documentaire révèle que la gestion du savoir existe bel et bien et de nombreuses organisations la pratiquent comme stratégie efficace servant à améliorer les pratiques générales d'entreprise. On considère toujours que l'établissement de communautés du savoir ou de communautés de pratiques constitue une méthode efficace pour rassembler des gens ou des groupes dans le but d'acquérir et d'échanger des idées au moyen de stratégies de travail de création et de coopération. Une des questions la plus préoccupante observée dans l'application des stratégies de gestion du savoir est celle de la compréhension de son efficacité en général. L'aspect mesure du rendement a besoin d'être exploré plus loin afin de déterminer si on tire vraiment parti du savoir et si les entreprises réussissent à exploiter leur savoir. Les implications et les tendances de la gestion du savoir indiquent que l'entendement du principe sur lequel reposent les stratégies liées au savoir, surtout dans le domaine des pratiques d'innovation concertées, continuera d'être la base du futur environnement de l'entreprise. D'autres questions s'imposent : *Comment les organismes publics, surtout les organismes scientifiques et techniques (p.ex., le ministère de la Défense nationale, le département de la Défense, la Defence Evaluation and Research Agency, le National Research Council) prennent-ils part aux processus d'innovation concertées? Comment ces organismes se servent-ils de leurs connaissances de l'entreprise pour aider à l'innovation de l'avenir? Quelles sont les conditions d'activités exigées pour comprendre les initiatives d'innovation des connaissances? Quelles stratégies liées au savoir sont considérées les plus efficaces pour accomplir les futurs mandats de l'entreprise? Du point de vue mondial, comment mesure-t-on le rendement obtenu de l'exploitation des connaissances et comment l'identifie-t-on par rapport à celui des pratiques similaires de la gestion des activités.*

15.KEYWORDS,DESCRIPTORS or IDENTIFIERS

(U) Knowledge; Knowledge Management; Knowledge Revolution; Knowledge Innovation; Collaboration; Communities of Practice; Knowledge-based Economy.

Defence R&D Canada

is the national authority for providing
Science and Technology (S&T) leadership
in the advancement and maintenance
of Canada's defence capabilities.

R et D pour la défense Canada

est responsable, au niveau national, pour
les sciences et la technologie (S et T)
au service de l'avancement et du maintien des
capacités de défense du Canada.



www.drdc-rddc.dnd.ca