CHAPTER 1

Concept of Knowledge

Knowledge is increasingly being recognized as the new strategic imperative of organizations. The most established paradigm is that knowledge is power. Therefore, one has to hoard it, keep it to oneself to maintain an advantage. The common attitude of most people is to hold on to one's knowledge since it is what makes him or her an asset to the organization. Today, knowledge is still considered power – an enormous power in fact – but the understanding has changed considerably, particularly from the perspective of organizations. The new paradigm is that within the organization knowledge must be shared in order for it to grow. It has been shown that the organization that shares knowledge among its management and staff grows stronger and becomes more competitive. This is the core of knowledge management – the sharing of knowledge.

Understanding Knowledge

In order to comprehend knowledge management, it is necessary to first understand the concept of knowledge. What is knowledge? How is it different from information? And how is information different from mere data?

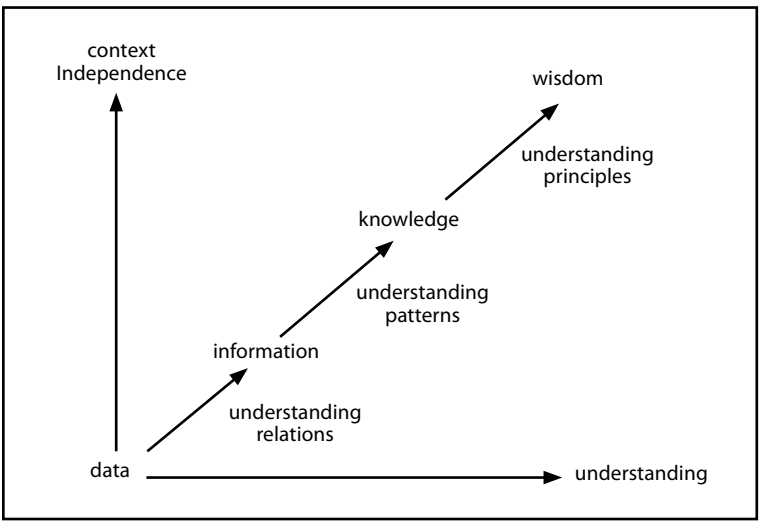
We begin with data. What is data? Data is a number or word or letter without any context. For example, numbers like 5 or 100, without any context, are mere data. Without reference to either space or time, these numbers or data are meaningless points in space and time. The key phrase here is "out of context". And since it is out of context then it has no meaningful relation to anything else.

A mere collection of data is not information. This means that if there is no relation between the pieces of data, then it is not information. What makes a collection of data information is the understanding of the relationships

between the pieces of data or between the collection of data and other information. In other words, what is essential in making data or a collection of data information is the context, that is, the relation between the pieces of data.

Let us take an example. If we are given numbers like 1 and 7, they do not mean much. We may relate to the number 1 as being less than 2 and greater than 0, while 7 is a number greater than 6 but less than 8. At this level of understanding, these numbers are mere data. However, if we associate 7 with the number of days in a week, then we create context. With context, these data become information. And the information given by that context is that there are 7 days in 1 week. We have established a relationship between the two pieces of data 1 and 7. We have associated the number 1 with week and the number 7 with days. We have placed the data within a context thus producing information.

Figure 1.1 Conceptual Progression from Data to Knowledge



We see from this example that information entails an understanding of the relations between data (e.g. the relation between the number 1

and number 7 in the context of the number of days in a week). In general, information remains relatively static in time and linear in nature (Figure 1.1). Since information merely provides the relationship between data, it therefore does not provide a foundation for why the data is what it is and does not indicate as to how the data is likely to change over time. In short, information is a relationship between data that is dependent on context for its meaning and with little implication for the future.

Box 1.1 An example: data, information and knowledge

This example uses a bank savings account to show how data, information and knowledge relate to the principal, interest rate and interest.

Data. The numbers 100 or 5%, completely out of context, are just pieces of data. Interest, principal, and interest rate, out of context, are not much more than data as each has multiple meanings which are context dependent.

Information. If I establish a bank savings account as the basis for context, then interest, principal, and interest rate become meaningful in that context with specific interpretations. Principal is the amount of money, $100, in the savings account. Interest rate, 5%, is the factor used by the bank to compute interest on the principal.

Knowledge. If I put $100 in my savings account, and the bank pays 5% interest yearly, then at the end of one year the bank will compute the interest of $5 and add it to my principal and I will have $105 in the bank. This pattern represents knowledge, which, when I understand it, allows me to understand how the pattern will evolve over time and the results it will produce. In understanding the pattern, I know and what I know is knowledge. If I deposit more money into my account, I know that I will earn more interest, while if I withdraw money from my account, I know that I will earn less interest.

Source: Bellinger, G., "Knowledge Management – Emerging Perspectives", <http://systems-thinking.org/kmgmt/kmgmt.htm> (2004).

When information is further processed, it has the potential for becoming knowledge. Information is further processed when one finds a pattern relation existing among data and information. And when one is able to realize and understand the patterns and their implications, then this collection of data and information becomes knowledge. But unlike mere information that is context dependent, knowledge has the tendency to create its own context. In other words, the patterns representing knowledge have a tendency to be self-contextualizing. These patterns which represent knowledge have a characteristic of being complete – a feature that mere information does not contain. These patterns are dynamic. They are constantly changing. But when these patterns are fully understood, there is a high level of predictability and reliability as to how the patterns will change or evolve over time.

Types of Knowledge

In the modern economy, the knowledge that it is able to harness is the organization's competitive advantage. This competitive advantage is realized through the full utilization of information and data coupled with the harnessing of people's skills and ideas as well as their commitments and motivations. In the corporate context, knowledge is the product of organization and systematic reasoning applied to data and information. It is the outcome of learning that provides the organization's only sustainable competitive advantage. As such knowledge is an essential asset that has become more important than land, labor or capital in today's economy.

In general, there are two types of knowledge: tacit knowledge and explicit knowledge. Tacit knowledge is that stored in the brain of a person. Explicit knowledge is that contained in documents or other forms of storage other than the human brain. Explicit knowledge may therefore be stored or imbedded in facilities, products, processes, services and systems. Both types of knowledge can be produced as a result of interactions or innovations. They can be the outcome of relationships or alliances. They permeate the daily functioning of organizations and contribute to the attainment of their objectives. Both tacit and explicit knowledge enable organizations to respond to novel situations and emerging challenges.

Tacit knowledge

Tacit knowledge is personal. It is stored in the heads of people. It is accumulated through study and experience. It is developed through the process of interaction with other people. Tacit knowledge grows through the practice of trial and error and the experience of success and failure.

Tacit knowledge, therefore, is context-specific. It is difficult to formalize, record, or articulate. It includes subjective insights, intuitions and conjectures. As intuitive knowledge, it is difficult to communicate and articulate. Since tacit knowledge is highly individualized, the degree and facility by which it can be shared depends to a great extent on the ability and willingness of the person possessing it to convey it to others.

The sharing of tacit knowledge is a great challenge to many organizations. Tacit knowledge can be shared and communicated through various activities and mechanisms. Activities include conversations, workshops, on-the-job training and the like. Mechanisms include, among others, the use of information technology tools such as email, groupware, instant messaging and related technologies.

In managing tacit knowledge, the very first hurdle to most organizations is identifying the tacit knowledge that is useful to the organization. Once relevant tacit knowledge is identified, it becomes extremely valuable to the organization possessing it because it is a unique asset that is difficult for other organizations to replicate. This very characteristic of being unique and hard to replicate is what makes tacit knowledge a basis of the organization's competitive advantage. Accordingly, it is essential for an organization to discover, propagate and utilize the tacit knowledge of its employees in order to optimize the use of its own intellectual capital.

In any organization, tacit knowledge is the essential prerequisite for making good decisions. A new executive not yet familiar with the organization will find it difficult to make good decisions since he or she has yet to acquire tacit knowledge about the workings of the organization. Tacit knowledge is

therefore crucial to getting things done and creating value for the organization. This is the essence of the "learning organization". Management and employees need to learn and internalize relevant knowledge through experience and action. And they need to generate new knowledge through personal and group interactions within the organization.

Explicit knowledge

Explicit knowledge is codified. It is stored in documents, databases, websites, emails and the like. It is knowledge that can be readily made available to others and transmitted or shared in the form of systematic and formal languages.

Explicit knowledge comprises anything that can be codified, documented and archived. These include knowledge assets such as reports, memos, business plans, drawings, patents, trademarks, customer lists, methodologies, and the like. They represent an accumulation of the organization's experience kept in a form that can readily be accessed by interested parties and replicated if desired. In many organizations these knowledge assets are stored with the help of computers and information technology.

Explicit knowledge is not completely separate from tacit knowledge. On the other hand, the two are mutually complementary. Without tacit knowledge it will be difficult, if not impossible, to understand explicit knowledge. For example, a person without technical, mathematical or scientific knowledge (tacit knowledge) will have great difficulty understanding a highly complex mathematical formulation or chemical process flow diagram, although it may be readily available from the organization's library or databases (explicit knowledge). And unless we try to convert tacit knowledge to explicit knowledge, we cannot reflect upon it, study and discuss it, and share it within the organization – since it will remain hidden and inaccessible inside the head of the person that has it.

Interaction between types of knowledge

Personal knowledge can become organizational knowledge through the dynamic interaction between tacit knowledge and explicit knowledge.

This dynamic process is the essence of knowledge creation in an organization. This interaction between the two types of knowledge brings about what is called the four modes of knowledge conversion (Nonaka 1996) .

The process of knowledge creation is based on a double spiral movement between tacit and explicit knowledge. Figure 1.2 shows the four modes of knowledge conversion: socialization (from individual tacit knowledge to group tacit knowledge), externalization (from tacit knowledge to explicit knowledge), combination (from separate explicit knowledge to systemic explicit knowledge), and internalization (from explicit knowledge to tacit knowledge).

Figure 1.2 Spiral of Organizational Knowledge Creation

	To tacit knowledge	To explicit knowledge
From tacit knowledge	Socialization	Externalization
From explicit knowledge	Internalization	Combination

Source: Nonaka, I., "Dialogue on leadership", <http://www.dialogueonleadership.org/Nonaka-1996.html> (1996).

Socialization is a process of creating common tacit knowledge through shared experiences. In socialization, a field of interaction is built where individuals share experiences and space at the same time. Through this process common unarticulated beliefs and embodied skills are created and developed. In socialization, the tacit knowledge of one person is shared and transmitted to another person and it becomes part of the other person's tacit knowledge.

Externalization is a process of articulating tacit knowledge into such explicit knowledge as concepts and/or diagrams. The process often uses metaphors, analogies, and/or sketches. This mode is triggered by a dialogue

intended to create concepts from tacit knowledge. A good example of externalization is the process of creating a new product concept or developing a new production process. Here the tacit knowledge in the brains of experts are articulated and expressed as concepts or drawings, thus becoming explicit knowledge that can be further studied and refined.

Combination is a process of assembling new and existing explicit knowledge into a systemic knowledge. For example a researcher can assemble an array of previously existing explicit knowledge in order to prepare a new set of specifications for a prototype of a new product. Or an engineer can combine available drawings and design specifications to produce a new process design or equipment. What commonly occurs is the combination of a newly created concept with existing knowledge to produce something tangible (e.g., a new product model).

Internalization is a process of embodying explicit knowledge into tacit knowledge or an individual's know-how or operational knowledge. An excellent example of this is "learning by doing or using." Explicit knowledge that is available as text, sound, or video facilitates the internalization process. The use of operating manuals for various machines or equipment is a quintessential example of explicit knowledge that is used for internalization. The instructions are learned and become part of the person's tacit knowledge.

The Knowledge Challenge

Knowledge is one of the most important assets of any organization. Unfortunately, very few are able to harness this asset in a meaningful way. Even fewer are organizations that are able to optimize the use of this important asset. In this context, it is helpful to identify two kinds of knowledge: core knowledge and enabling knowledge.

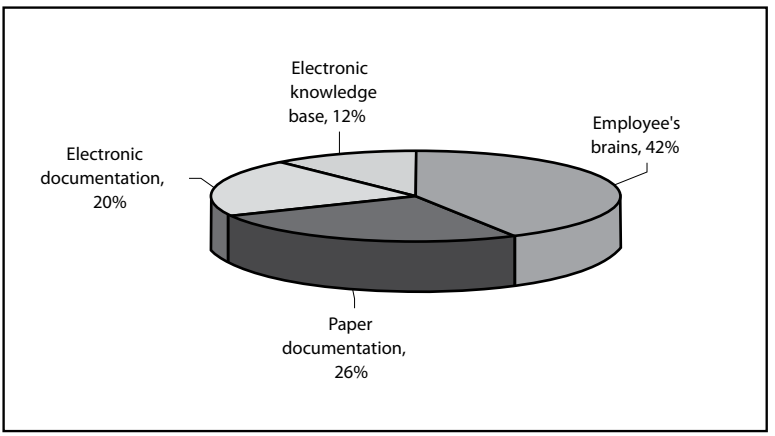
In any organization, certain areas of knowledge are more important than others. The kind of knowledge that is critical to the attainment of the organization's goal and the fulfillment of its strategy is called "core knowledge". Because core knowledge is critical to the organization, the management of core knowledge must be kept within the organization. It must be developed

and nurtured inside the organization.

Core knowledge alone cannot fully support an organization and make it competitive. There is need for knowledge that can maintain the effectiveness of the organization. Such knowledge is known as "enabling knowledge". When combined with the core knowledge, such enabling knowledge leads to the development of new products, processes and services. By its very nature, the management of enabling knowledge can be outsourced.

The core and enabling knowledge in organizations are more than a pure competitive advantage. This organizational knowledge makes possible focused and collective action. But as important as organizational knowledge is organizational memory. A great deal of the knowledge of the organization is created and stored at individual level. They are in the heads of people and groups of people who work in the organization – the employees, managers and top executives (Figure 1.3).

Figure 1.3 Primary repositories of an organization's knowledge



Source: The Delphi Group, Inc., (2000)

While much of the organizational knowledge is available as explicit knowledge, a significant portion of core and enabling knowledge remain

tacit. The willingness to share this tacit knowledge is influenced to a large extent by the managerial approaches to identify, capture and integrate that knowledge. These approaches include award and punishment systems and organizational procedures for assessment of individual performance. The effective implementation of these approaches can contribute to wider sharing of tacit knowledge within the organization.

This is the knowledge challenge. Organizations contain vast reservoirs of untapped core knowledge and enabling expertise. The problem is that top management usually does not know who has what information. Few top executives are aware of where core and enabling knowledge reside and how to enable this knowledge to flow through the organization. This is the very purpose of knowledge management. Knowledge management addresses this problem directly and pointedly. Thus, the importance of knowledge management!

Box 1.2 Definitions of Knowledge

The body of truth, information, and principles acquired by mankind. Interpreted information that can be used. - *<www.iteawww.org/TAA/Glossary.htm>*

Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain. - *<www.edu.uleth.ca/courses/ed3604/conmc/glsry/glsry.html>*

An organized body of factual or procedural information necessary to function in a position, including consideration of the amount, breadth (various types required), and depth (extent of both comprehensive and detailed understanding of a specific subject) needed. However, it is not expected that any one incumbent must possess all knowledge listed on the specification in order to be reallocated from one level to another. The range of knowledge to be expected would include a substantial range of knowledge and necessarily depends on the scope of responsibility and duties of the individual position. - *<www.michigan.gov/mdcs/0,1607,7-147-6879_9325-18616--,00.html>*

Box 1.2 Definitions of Knowledge

Organized body of information. The acquaintance with facts, truths or principles as from study or investigation or the familiarity with a partaker subject, branch of learning, etc. - <*www.seattlecentral.org/library/101/textbook/glossary.html*>

The sum of the information and experience the teacher has acquired or learned and is able to recall or use. - <*www.wmich.edu/evalctr/ess/glossary/glos-e-l.htm*>

Information evaluated and organized in the human mind so that it can be used purposefully. - <*www.aslib.co.uk/info/glossary.html*>

The final goal of the understanding in combining intuitions and concepts. If they are pure, the knowledge will be transcendental; if they are impure, the knowledge will be empirical. - <*www.hkbu.edu.hk/~ppp/ksp1/KSPglos.html*>

Knowledge is information associated with rules which allow inferences to be drawn automatically so that the information can be employed for useful purposes. - <*www.seanet.com/~daveg/glossary.htm*>

Familiarity, awareness, or understanding gained through experience or study. The sum or range of what has been perceived, discovered, or learned. - <*www.jfcom.mil/about/glossary.htm*>

The information context; understanding the significance of information. - <*www.cio.gov.bc.ca/other/daf/IRM_Glossary.htm*>

Justified belief that increases an entity's capacity for effective action (Nonaka); the highest degree of the speculative faculties, which consists in the perception of the truth of affirmative or negative propositions (Locke).-<*www.sims.berkeley.edu/courses/is213/s99/Projects/P9/web_site/ glossary.htm*>

Information plus semantic meaning. - <*wotug.ukc.ac.uk/parallel/acronyms/hpccgloss/all.html*>

Box 1.2 Definitions of Knowledge

Understanding and recall of information measured by depth, scope, and ability to integrate to resolve problems. - *<www.csufresno.edu/humres/Classification.Compensation/Glossary%20of%20Terms.htm>*

Information that people make use of, along with the rules and contexts of its use. - *<www.vnulearning.com/kmwp/glossary.html>*

Information required to develop skills. Job concepts or rules (declarative knowledge) and their interrelationship (structural knowledge). The job-specific content or information which a person has gained through training, education and/or experience. Knowledge is built upon the foundation of mental abilities that a person brings to the situation. - *<www.eurocontrol.int/eatmp/glossary/terms/terms-11.htm>*

Knowledge is part of the hierarchy made up of data, information and knowledge. Data are raw facts. Information is data with context and perspective. Knowledge is information with guidance for action based upon insight and experience. - *<www.itilpeople.com/Glossary/Glossary_k.htm>*

Comprises theory and information which may be formal, factual, descriptive or empirical; (intellectual) acquaintance with a range of facts or information; theoretical or practical understanding of an art, science, language, etc.; information obtained by study (OED). - *<www.ee.wits.ac.za/~ecsa/gen/g-04.html>*

Information defines facts (A is B). Knowledge defines what one should do if certain facts apply. Thus, if A is B, then do C. There are many different ways knowledge can be encoded, but policies and business rules are popular formats. - *<www.bptrends.com/resources_glossary.cfm>*

Knowledge is information that is relevant, actionable, and at least partially based on experience. - *Dorothy Leonard*

Knowledge can mean information, awareness, knowing, cognition, sapience, cognizance, science, experience, skill, insight, competence, know-how, practical ability, capability, learning, wisdom, certainty, and so on. The definition depends on the context in which the term is used. *- Karl-Erik Sveiby, The New Organizational Wealth.*

Knowledge is content in context to produce an actionable understanding. - *Dr. Robert Bauer, Xerox Parc.*