1. What is Knowledge?

1.1 Definition

As a starting point of exploring into the realm of Knowledge Management, let's first take a close look at the definition of knowledge itself and the definition of the so-called organizational knowledge.

Throughout history, knowledge has always been viewed from multiple perspectives --- abstract, philosophical, religious and practical etc. As the result, the discourse of knowledge over the human history has generated various definitions. Plato in his *Meno, Phaedo and Theaetetus* first defined the concept of knowledge as “justified true belief”, which has been predominant during the history of western philosophy ever since. Beckman (1998) has compiled a number of other definitions of knowledge and organizational knowledge, some of which are quoted in the following:

- Knowledge is organized information applicable to program solving (Woolf, 1990).
- Knowledge is information that has been organized and analyzed to make it understandable and applicable to problem solving or decision making (Turban, 1992)
- Knowledge consists of truths and beliefs, perspectives and concepts, judgments and expectations, methodologies and ‘know-how’ (Wiig, 1993).
- Knowledge is the whole set of insights, experiences and procedures which are considered correct and true and which, therefore, guide the thoughts, behaviors and communication of people (Van der Spek and Spijkervet, 1997).
- Knowledge is reasoning about information to actively guide task execution, problem-solving and decision making in order to perform, learn and teach (Beckman, 1997).
- Organizational knowledge is processed information embedded in routines and processes which enable actions. It is also knowledge captured by organization’s systems, processes, products, rules and culture (Myers, 1996)
- Organizational knowledge is the collective sum of human-centered assets, intellectual property assets, infrastructure assets and market assets (Brooking, 1996).

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It seems that the attempts to define knowledge have reflected the multifaceted nature of knowledge itself and it is almost impossible to have one single definition that covers all aspects of knowledge and at the same time receive unanimous consensus, especially when the embodiment of knowledge changes at different individual, organizational and social levels. This is the reason why many authors have pointed out the difficulty of succinctly defining the concept of knowledge, suggesting that it would seem appropriate to avoid imposing a strict definition but rather regarding knowledge as a “multi-layered, multifaceted concept” that “can impact different organizations in very different ways”. However, at least, borrowing from these various definitions put forward by different scholars, we can conclude that knowledge is a fluent mix of structured experience, beliefs, relevant information and intuition of experts and, besides residing in human minds, knowledge can also exist in such forms as organization’s systems, processes, products and culture etc..

1.2 Knowledge Taxonomy

Knowledge can be characterized in many ways. Popular taxonomies include the following:

a) Propositional and Perspective Knowledge

According to Joe Mokyr, useful knowledge can be partitioned into two subsets: one is the knowledge that catalogues natural phenomena and regularities, which he calls propositional knowledge. The other is the knowledge that prescribes certain actions that constitute the manipulation of natural phenomena for human material needs, which is called perspective knowledge.

Propositional knowledge contains what people usually call “science” as a subset, but at the same time it contains a great deal more than science. Propositional knowledge also contains practical informal knowledge about nature; an intuitive grasp of basic mechanics; regularities of nature and even things as informal as folk wisdoms etc.

Perspective knowledge has the form of techniques or instructions. They reside either in people’s brains or in storage devices. They consist of designs and directions for how to adapt means to a well-defined end. They can all be taught, imitated, communicated, and improved upon. A “how-to” manual is a codified set of techniques. An addition to the perspective knowledge set of a society would be regarded as an “invention”.

For example: Propositional knowledge contains practical informal knowledge about nature such as the properties of materials, heat, motion, plants, and animals; an intuitive grasp of basic mechanics (including the six “basic machines” of classical antiquity: the lever, pulley, screw, balance, wedge, and wheel); regularities of ocean currents and the weather; and folk wisdoms in the “an-apple-a-day-keeps-the-doctor-away” tradition. Geography is very much part of it:

knowing where things are is logically prior to the set of instructions of how to go from here to there. Prescriptive knowledge has the form of techniques or instructions: the archetypical technique is the recipe, which instructs one how to prepare a certain dish. In principle, all techniques are such sets, although vastly more complex and often full with nested do-loops, if-then statements and so on. It is the technique, not the artifact, that is the fundamental unit of analysis in evolutionary accounts of technology. They are sets of executable instructions or recipes for how to manipulate nature.

b) Explicit and Tacit Knowledge

A more widely accepted taxonomy on knowledge, first introduced by Polanyi in 1966\(^5\) and popularized by Nonaka and Takeuchi, is their categorization of explicit and tacit knowledge. According to these two:

**Explicit knowledge** is that which:\(^6\)

- can be expressed in words and numbers and can be easily communicated and shared in the form of hard data, scientific formulae, codified procedures or universal principles

whereas **tacit knowledge** is:

- highly personal and hard to formalize. Subjective insights, intuitions and hunches fall into this category of knowledge.

Thus, explicit knowledge in organizations is typically found in documents and databases, while tacit knowledge is that which is in the heads of people. More than often, tacit knowledge is even based on the subjective insights, intuitions, and hunches and is deeply rooted in an individual's actions and experience and even ideals, values and emotions. According to Polanyi knowledge that can be expressed in words and numbers only represents the tip of the iceberg of the entire body of possible knowledge\(^7\). Explicit knowledge is also sometimes called formal knowledge while tacit knowledge is called informal knowledge. However, it should be pointed out that, the associated names do not automatically suggest their different levels of importance. Many times, due to reasons to be discussed later, for organizations to build their strategic competitiveness and long-term development, tacit knowledge is actually more important than explicit knowledge and should consequently be the focus of knowledge management programs. The following table has better illustrated some of the key characteristics of these two forms of knowledge as suggested by Nonaka and Takeuchi\(^8\):

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Table 1: Tacit and explicit knowledge

<table>
<thead>
<tr>
<th>Tacit Knowledge (subjective)</th>
<th>Explicit Knowledge (objective)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of experience (body)</td>
<td>Knowledge of rationality (mind)</td>
</tr>
<tr>
<td>Simultaneous knowledge (here and now)</td>
<td>Sequential knowledge (there and then)</td>
</tr>
<tr>
<td>Analog knowledge (practice)</td>
<td>Digital knowledge (theory)</td>
</tr>
</tbody>
</table>

c) Core, Advanced and Innovative Knowledge

Besides the above-mentioned two knowledge taxonomies, there are many other different types. For example, Michael H. Zach\(^9\), from the perspective of knowledge’s specific function to an organization’s competitive edge, classified knowledge according to whether it is core, advanced or innovative. To him:

**Core knowledge** is that minimum scope and level of knowledge required just to “play the game”. Having that level of knowledge and capability will not assure the long-term competitive viability of an organization, but does present a basic industry knowledge barrier to entry. Core knowledge tends to be commonly held by members of an industry and therefore provides little advantage other than over nonmembers.

**Advanced knowledge** enables an organization to be competitively viable. The organization may have generally the same level, scope or quality of knowledge as its competitors although the specific knowledge content will often vary among competitors, enabling knowledge differentiation. Organizations may choose to compete on knowledge head-on in the same strategic position, hoping to know more than a competitor. They instead may choose to compete for that position by differentiating their knowledge.

**Innovative knowledge** is that knowledge that enables an organization to lead its industry and competitors and to significantly differentiate itself from its competitors. Innovative knowledge often enables an organization to change the rule of the game.

*For example: For Honda Motor Co., Ltd., to compete in the car industry it definitely needs to know how to design, manufacture and market cars, which is the core knowledge that allows itself to stay in the game. However in order to survive and make profits in this highly competitive industry it also needs to have certain advantages compared with its competitors so as to entice customers to buy their products, which requires such advanced knowledge about manufacturing cars with relatively low-cost yet higher-than-average fuel economy. But for long-term development and competitive edge all these are just not enough. Consequently Honda cultivates its innovative knowledge in the area of engines. It claims itself not just simply a car manufacturer, rather it is the maker of perfect engines. And*

armed with this innovative knowledge, besides passenger cars, it has other series of highly successful products lines that revolves around its engines, and thus makes the company become one of the most successful and profitable player within the industry.

We feel that no matter how knowledge is categorized, there is always a part of “special knowledge” which is more difficult to be systematically codified and accessed by the whole organization. It is precisely this kind of intangibility that constitutes an organization’s core competency and makes it competitive, and consequently, it is what a successful knowledge management program should focus on, even though unfortunately, in reality people tend to neglect this part of knowledge due to various reasons.

During the presentation of this material we are going to stick with Nonaka and Takeuchi’s categorization of knowledge through explicit and tacit knowledge. This is partly because their categorization is the most popular among mainstream knowledge management researches and practices. More importantly, we feel that their description would do a better job in grasping and revealing the actual phenomenon and problems of current knowledge management reality.

1.3 Knowledge Dimensions and Levers

Opining on the above definitions and classifications of knowledge, four dimensions of knowledge are commonplace, which include:

**Focus:** Is the knowledge operational or strategic? Obviously operational and strategic knowledge need to be treated differently under the knowledge management process. At the same time operational or strategic knowledge could also have external or internal manifestations respectively.

**Complexity:** The complexity degree of context that gives meaning and makes knowledge useful, which is also where different taxonomies schemes come into place (i.e. tacit knowledge vs. explicit knowledge).

**Life span:** The validity and criteria of knowledge. People tend to forget that although the “truthfulness” of knowledge may remain the same, its “usefulness” most likely will change or diminish as time goes by and environment changes. This needs to be put into consideration for the design of any successful knowledge management programs; and

**Dynamics:** How knowledge evolves. The very definition of knowledge reveals that it is highly dynamic. A successful knowledge management program needs to have certain mechanisms built into it so as to manage and capture this dynamic dimension of knowledge.

Because knowledge is complex and dynamic, although one might easily find explicit knowledge exists in various ready-to-access forms (i.e. books, ‘databases’, CDs, tapes etc.), tacit knowledge exists in places that may not so easily be identified. David J. Skyrme introduced seven, what he called, levers as the common embodiment of knowledge that exists within the organization or is embedded into the process of its various operations, as well as the associated key knowledge management activities in the following table\(^\text{10}\):

Table 2: Seven Knowledge Levers

<table>
<thead>
<tr>
<th>Lever</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Knowledge</td>
<td>Developing deep knowledge sharing relationships. Understanding the needs of your customers' customers. Articulating unmet needs. Identifying new opportunities.</td>
</tr>
<tr>
<td>Stakeholder Relationships</td>
<td>Improving knowledge flows between suppliers, employees, shareholders, community etc. using this knowledge to inform key strategies.</td>
</tr>
<tr>
<td>Business Environment Insights</td>
<td>Systematic environmental scanning, including political, economic, technology, social and environmental trends. Competitor analysis. Market intelligence systems.</td>
</tr>
<tr>
<td>Knowledge in Processes</td>
<td>Embedding knowledge into business processes and management decision-making.</td>
</tr>
<tr>
<td>Knowledge in Products and Services</td>
<td>Knowledge embedded in products. Surround products with knowledge e.g. in user guides, and enhanced knowledge-intensive services.</td>
</tr>
</tbody>
</table>

With the combined understanding of these two aspects, it would be up to the successfulness of the knowledge management program to mine these specific areas and to link the findings with the organization’s long-term strategic development.

1.4 Differences between Knowledge, Information and Data

One of the annoying trends in the current practice of knowledge management arena is that the concepts of knowledge and information tend to be used almost interchangeably throughout the literature and praxis. For example, the management of information captured on organization’s databases is often considered as an example of organizational knowledge and knowledge management. Information and data management are important pillars of knowledge management. However, knowledge management encompasses broader issues and, in particular, creation of processes, environment and behaviors that allow people to transform information into the organization and create and share knowledge. Thus, knowledge management needs to encompass people, process, technology and culture. Moreover, organizational databases and
connectivity do not guarantee the sharing of information over time\textsuperscript{11}. In some instances, databases and connectivity result in too much information, or information overload, posing a threat to aspects of knowledge quality such as relevance\textsuperscript{12}.

Typically, as Davenport and Prusak have explained\textsuperscript{13}:

- Data is: simple observation of states of the world
- Information is: data endowed with relevance and purpose
- Knowledge is: Valuable information from the human mind.

Knowledge builds upon information that is extracted from data. In contrast to data that can be characterized as a property of things, knowledge is a property of agents predisposing them to act in particular circumstances. Information is that subset of the data residing in things that activates an agent through the perceptual or cognitive filters. In contrast to information, knowledge cannot be directly observed. Its existence can only be inferred from actions of agents.

The relationship between these three concepts is actually very well presented by Skyrme and Amidon, with the addition of wisdom, in the diagram of what they called “The Pyramid of Knowledge Hierarchy”\textsuperscript{14}:

![Figure 1: The Pyramid of Knowledge Hierarchy](image)

\begin{itemize}
\item\textsuperscript{11} Nada K. Kakabadse, Alexander Kouzmin and Andrew Kakabadse (2001), \textit{From Tacit Knowledge to Knowledge Management: Leveraging Invisible Assets}, Knowledge and Process Management Volume 8 Number 3 pp 137–154.
\item\textsuperscript{12} Sharda R, Frankwick GL, Turetken O (1999), \textit{Group knowledge networks: a framework and an implementation}. Information System Frontiers 1, No. 3, 221–239.
\end{itemize}
Besides that, Bellinger et al. has also developed a hierarchy diagram comprising data, information, knowledge and wisdom, with the addition of different levels of understanding achieved during the transition through these four categories.

Figure 2: The Data, Information, Knowledge and Wisdom Hierarchy\(^{15}\)

The key to Bellinger's hierarchy diagram is the different levels of achieved understanding. In common with the earlier approaches, data may be viewed as some disconnected collection of facts about a domain that have little intrinsic interest. Information emerges from the domain when relationships between the facts are established and understood; this is somewhat richer than simply establishing a context for the facts. Knowledge emerges when the patterns of relationships are identified and understood; a quite different perspective from size and longevity. Finally wisdom (the pinnacle of understanding) uncovers the principles that describe the patterns of relationships. Along with the increasing of hierarchy from data to wisdom, correctedness and understanding also increase during this transition process.

For example: The differences between data, information and knowledge as well as the different types of knowledge can be more vividly explained using the analogy of cake-making. An analysis of a cake's constituents provides data. For most purposes this is not very useful, just by the looking at it one might not even tell it is a cake. A list of ingredients (information) is more useful as it gives the data context, so that an experienced cooker could probably make the cake. However, if everything is written down with the form of a recipe, then this becomes knowledge, it could tell everyone how to make the cake. The recipe is knowledge, but it is only the explicit knowledge. If the process of making the cake is very complicated, or even some of the process is hard to be expressed on paper, then the final taste of

the cake would really depend on the mastery of tacit knowledge, even with the recipe on hand, not everyone could make a very good cake.

2. What is Knowledge Management?

2.1 Definition

From the individual’s perspective knowledge would be meaningless useless if it can be transferred to and acquired by an actual person and from the organization’s perspective knowledge would be worthless if it could not be put into application when it is needed for organization’s business. Thus it would be of great importance for an organization to provide strategies to get the right knowledge to the right people at the right time and in the right format. As the complexity of organizations increases, together with the growing scale and scope of information activities due to the development of Information and Communication Technologies (ICTs), effectively and efficiently managing knowledge becomes a pressing necessity of strategic importance for modern organizations.

Bassi defines knowledge management as\textsuperscript{16}:

> a process of knowledge creation, capturing and application through its documenting and codifying, storage and dissemination through data banks and communication channels with the purpose of increasing the organizational effectiveness.

The online Media Access Group called Knowledge Praxis (www.media-access.com/main.html) defines knowledge management as a business activity with two primary aspects:

- Treating the knowledge component of business activities as an explicit concern of business reflected in strategy, policy, and practice at all levels of the organization.

- Making a direct connection between an organization’s intellectual assets — both explicit [recorded] and tacit [personal know-how] — and positive business results.

Based on interviews with the Chief Knowledge Officers from various organizations, Skyrme define knowledge management as\textsuperscript{17}:

> the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation, in pursuit of organizational objectives.

Notwithstanding the difficulty of establishing a consensus definition for knowledge management, at least the following range of key considerations in relation to knowledge management should be identified:

- It is fundamental that knowledge should be utilized and shared within the organization; and if possible, should be stored in its most explicit forms.


\textsuperscript{17} David J. Skyrme (2002), \textit{Knowledge Management: Approaches and Policies}
• Knowledge management does not just stop on the purpose of sharing, knowledge management should also be regarded as the enabler of innovation and learning.

• The purpose of knowledge management is to make organizations more efficient and effective, and to be aligned with organizational strategy for the support of achieving organizational objectives.

2.2 The Evolution of Knowledge Management

Knowledge management has a long and distinguished history. It was initiated arguably as long ago as in the 1960s, when Peter Drucker first coined the term “knowledge worker”[18]. Debra Amidon has composed a detailed timeline of knowledge management and has traced many of the early roots going back to the early 1980s, some of the significant events were:[19]

• 1986 – publication by Swedish knowledge management pioneer Karl-Erik Sveiby of The Know-How Company (with Tom Lloyd).

• 1987 – ‘Managing the Knowledge Assets into the 21st Century’ round table (between US academia, business and government) – one of the first nationwide efforts to harness intellectual capital.

• 1991 – appointment of Leif Edvinsson as Vice President of intellectual capital for Skandia, arguably the first formal board level appointment related to knowledge management.


• 1993 – ‘Intellectual capital: your company’s most valuable asset’ – article by Tom Stewart in Fortune that helped raise awareness of knowledge management in the world of business.

• 1995 – first business seminars and conferences in the USA e.g. Knowledge For Strategic Advantage – co-sponsored by Arthur Andersen and the American Productivity and Quality Center, held in Houston.

• 1996 – first business conferences in Europe.

• 1998 – The World Bank chooses the theme Knowledge for Development as the topic for its annual world development report.

There has been a rapid spread of the influence and uptake of knowledge management following its wider promotion since late 1990s. There are now more than a dozen periodicals and

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[18] As quoted in Panchak, “The Future of Manufacturing”, Peter Drucker has observed: “Increasingly, the human being does not work in mass production, but in what might be called “team production.” And that means that increasingly the producing human being is a knowledge worker. Workers as they did before the Industrial Revolution, own the means of production. The means is between their ears.”

magazines with knowledge management in their title, such as Knowledge Management, Knowledge Management Magazine, Knowledge Management Review and the Journal of Knowledge Management. All provide a valuable ongoing resource for knowledge managers and include helpful case studies and guidance from experts.

Although first seen in the private sector knowledge-intensive large companies in the oil, pharmaceutical, high technology and financial services industries, it has spread into most other industries as well as the public sector. In the last couple of years, especially after the publishing of the United Nations Millennium Declaration (General Assembly resolution 55/2) and the report of the U.N. Secretary-General on a road map toward its implementation (A/56/326), which acknowledges knowledge, innovation and technology (KIT) as key resources that must be marshaled if the goals in the Declaration are to be realized. After a somewhat slow start, most national and local governments all over the world have also started to adopt knowledge management. People can find national projects and initiatives in countries and regions ranging from the Parana region of Brazil, to Singapore (the Innovation Island).

Nowadays there is hardly a large organization or national and local government that does not recognize the value and benefits creating potential of knowledge. There are also many existing knowledge management related initiatives among different organizations and government entities, even though, in our opinion, some of those are not necessarily on the right track.

2.3 The Status of Knowledge Management

Currently knowledge management is a widely used term but is also a term that seems to give rise to a degree of confusion. This is because it appears that there is nothing particularly new in the concept, in some sense it simply represents a re-packaging of things that good organizations should do as a matter of course. As OECD (2003b) suggests, knowledge management is simply using established management tools (e.g. performance management, HR, new opportunities presented by information and communication technologies etc) to improve knowledge sharing within an organization and the outside world. However, the reality is that designing and implementing a successful knowledge management program is not as simple as one takes it for granted. Even though all the necessary "established management tools" for knowledge management are there, this is not to suggest that organizations should assume that knowledge management just naturally happens.

As noted before, nowadays no one doubts that better management of knowledge within the organization will lead to improved innovation and competitive edge. Everyone agrees on the goal---better utilization of knowledge. It is the approach to this goal that is hotly debated.

In a year-long study of international best practice regarding the companies’ adopting strategy to maximize the return on their knowledge assets, Skyrme found two types of strategies. The first is to make better use of the knowledge that already exists within the organization, for example by sharing best practices. Hence, the first knowledge management initiative of many organizations

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20 U.N. Economic and Social Council, May 10th, 2002, Capacity of the public sector to support the creation and application of knowledge, innovation and technology for development, Report of the Secretariat
22 David J. Skyrme and Debra M. Amidon (1997), Creating the Knowledge-based Business, Business Intelligence
(between a third and a half according to surveys) is that of installing or improving an Intranet. The second major thrust of knowledge-focused strategies is that of innovation, the creation of new knowledge and turning ideas into valuable products and services. This is sometimes referred to as knowledge innovation. Many managers mistakenly believe that this is about R&D and creativity. The research found no shortage of creativity in organizations. The real challenge is not to lose these creative ideas and to allow them to flow where they can be used. This needs better innovation, knowledge conversion and commercialization processes. This thrust of strategy is the most difficult, yet ultimately has the best potential for improved company performance.

In a review of 39 knowledge management projects in the private sector, Davenport, et al. identified four broad types of objectives. The first type of objective was the creation of knowledge repositories. These projects generally took the form of database management programs. Three types of databases were identified. The first type focused on external knowledge and utilized tools such as competitive intelligence systems that gathered information from outside sources. The second were mechanisms for better using structured internal knowledge contained in reports and manuals (i.e. document capture) and for the codification of internal tacit knowledge. These structured internal databases often contain information such as customer and product information, description of specific sales presentations and tactics, and other tidbits that would help sales and marketing. The third type were informal means of capturing know-how and lessons learned (i.e. sharing of internal tacit knowledge), usually in the form of discussion group archives using tools like Lotus Notes.

The second objective was to improve knowledge access. These projects focused on the access to and the sharing of knowledge. One way was through the use of databases that are directories of external experts (expert networks). Such directories could also characterize internal expertise, such as one example of a software company whose “expert network” describes over 300 types of knowledge competencies necessary for software development projects. The system is used to match personnel with software development projects. Other techniques involve advanced communications technologies, including desktop videoconferencing and document sharing tools, to facilitate the direct sharing of knowledge and information among co-workers.

The third objective was to enhance the knowledge environment. Projects in this category sought to change norms and values to encourage both the creation and sharing of knowledge. In part, these organizational approaches attempt to shift what is valued in the organization. In one example, a large computer company attempted to promote the re-use of component designs—a form of sharing knowledge—to avoid “reinventing- the-wheel” every time they developed a new product. To do this, they shifted corporate values to emphasize the importance of quick design (“time-to-market”) and downplayed the importance of the originality of the design.

The final objective was the management of knowledge as an asset. These projects involved creating formal audits and metrics of knowledge management at the corporate level. Essentially, they attempt to codify intellectual capital and report them on the company's balance sheet. Such projects are part of the management and accounting professions’ endeavors to understand and explain intangible assets. One of the most recent activities in this area is the attempt to devise accounting measures that treat skill-development (“training”) as an investment rather than a cost.

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3. How is Knowledge Management Different from What Has Been Done Before?

3.1 Collaborating with the Established Management Tools (A Holistic Perspective)

As we have discussed before, some believe that there is nothing specifically new in the concept of knowledge management and it is simply using established management tools (e.g. performance management, HR, new opportunities presented by information and communication technologies etc) to improve knowledge sharing and creation within an organization and the outside world. Although many of the established management tools have existed long before the term of knowledge management started to be accepted by scholars and practitioners, none of those management tools have ever clearly recognized KNOWLEDGE as its fundamental managing object as knowledge management has.

Although one may claim that every society has always been a knowledge society and every organization has always been managing knowledge in the sense that it has been using knowledge – formally and informally - in economic growth and in social development. However, the ICT revolution at the end of the 20th century revamps the ways in which knowledge can be created, harvested, assembled, combined, manipulated, enhanced and channeled. This increases the efficiency and effectiveness of using knowledge in economic growth and development to the extent that it is becoming the leading factor for adding value and for wealth creation in the market economy. But in the meantime as we are enjoying the convenience and benefits generated by the development of ICT and more effective means of managing knowledge, consequently the increasing complexity of organizations together with the growing scale and scope of information activities, puts new demands on an organization's routine operations. If not administrated carefully, costly investment in ICT for the purpose of establishing a knowledge management system would only lead to information/knowledge overload, and possibly even make the organization's operation less efficient and effective than it was before. No matter what, one thing is clear, in this Knowledge Age intellect, creative, and innovative ideas are becoming a primary source of advantage, which can only be effectively generated through better management of knowledge. Therefore, knowledge management, besides being the latest addition to the existing arena of management tools for organizational administration, also carries the potential of dramatically advancing human development and increasing the quality of life. It is just from this perspective, in carrying out knowledge management programs, that one needs to collaborate knowledge management initiatives with some of the other existing management tools as they are closely related to and ultimately determine the successes of knowledge management.

For this purpose, we have identified the following existing management tools that need to be specifically collaborated with an organization's knowledge management initiatives.

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a) Change Management

Initiating a knowledge management program within an organization is essentially to bring changes into the organization, hence many of the techniques from change management will also apply. Organizations do not simply change by themselves. The more successful the organization is the more reluctantly will it welcome new initiatives that might potentially break the “organizational balance”. In order to promote changes within the organization, top management needs to create “urgency for change”; in order to implement changes the management teams needs to find “zealots” and “champions” within the organization who are the true believers of new ideas that are going to be brought into the organization. Along the way, timetables, milestones, measurement systems need to be established. These ideas, originated from change management, all apply to knowledge management programs.

b) Learning Organization

The concept of learning organization itself is actually built upon some of the ideas of change management and is regarded as a “higher-level” management tool compared with change management. Instead of constantly carrying out change management initiatives to increase an organization’s effectiveness and efficiency, ideally a learning environment could be formalized within the organization so that it can learn and constantly transform accordingly by itself. Actually one component of the goals for knowledge management is to establish a learning environment within the organization, because only by so doing can knowledge be shared internally and externally. Naturally the concept of learning organization is also perfectly applicable to knowledge management.

c) Human Resource Management

Knowledge management is to manage knowledge. But knowledge, especially tacit knowledge, resides in people’s minds, and “people walk”. Therefore a successful knowledge management program would require a successful human resource management. To effectively implement a knowledge management program, employees need to be empowered. Effective rewarding system as well as mechanisms designed to divert the common belief from “knowledge is power” to “sharing knowledge is power” should also be established. All these need to be cooperated by the HR department and supported by techniques from HR management.

d) Top Leadership Management

Without the full support from the top management team almost no new management initiatives could become successful within the organization. Knowledge itself has unique characteristics and Knowledge management as a relatively new managing concept particularly needs support form top management. Some of the top leadership management techniques which can be used here may include the formulation of long-term organizational strategic plan. Top leadership should be consistent with the on-going knowledge management programs and show their commitment toward new initiatives. Effective communication channels and maybe “open-door” policy should also exist between top leadership and employees.
To summarize, all these existing tools of management constitute the most valuable resources within modern organizations for the successful pursuit of ultimate organizational goals. For this reason, we believe a successful knowledge management system should be the embodiment of the above-mentioned concepts and maintain a holistic view of adopting them for the purpose of better managing knowledge.

4. What Are the Drivers for Knowledge Management and Why Do We Need Knowledge Management in Government?

4.1 Drivers of Knowledge Management

As the regulator of market, the main driving forces behind knowledge management in government are both market-driven as well as self-driven. The major drivers for knowledge management in government which we identify are as follows:

• The marketplace is increasingly competitive and the rate of innovation is constantly rising. Most of the major players in the private sector are developing their own knowledge management systems. Under this background, government’s knowledge must also evolve and be assimilated at an ever faster rate.

• The current trends require different governmental agencies on different levels to collaborate and share information with each other, which requires an effective knowledge management program in place.

• Constant “reorganization” and “outsourcing” activities in government mean that the relationships in which informal (tacit) knowledge is shared are often broken. In certain cases, some governmental agencies are also facing a demographic situation in which many of their experienced and knowledgeable staff will soon reach the retirement age. Knowledge usually takes time to experience and acquire. Nowadays with the expansion of knowledge base employees are equipped with less and less time in facing with the expanded learning curve. A successful knowledge management system will help to preserve knowledge as well as to help employees to acquire knowledge more efficiently and effectively.

• Current e-government practice has absorbed a great amount of first-hand valuable customer information. Obviously this type of information needs to be processed and transformed and to create new knowledge and then be directed back to the “back office” for the formulation of better policies.

• Innovation will usually lead to faster, better and cheaper products and services. Government is constantly under pressure for increasing its effectiveness and efficiency. To accomplish this usually requires an innovation system that converts knowledge efficiently and effectively into products, services and processes.
4.2 The Need for KM in Government

Although government is typically regarded as a later adopter in the area of knowledge management naturally it cannot afford to overlook a ground swell that is currently transforming players in the private sector. In its history governments have traditionally had a hand in the evolution of science, technology capabilities and ideas, both in the development of their underlying knowledge bases and in the provision of the physical and policy infrastructures on which the progress of new sciences, technologies and ideas depend on. There is no obvious reason indicating that government would be lagging behind in this knowledge management trend for a very long time. Also due to the ever-existing pressure for increasing its own effectiveness and efficiency, and customers have come to expect greater customization of products and services at an ever-decreasing cost as they are more used to the convenience brought by today's ICT and other related technologies. These have actually been revealed by a series of recent governmental endeavors in the promotion of the ideas of knowledge management (i.e. U.N. Millennium Declaration), especially the development of e-government within all different levels of government. This shows that government is quickly catching up and is ready to commence its own knowledge management initiatives. Then, to be more specific, what are the most relevant needs of KM in government?

First, for the more effective and efficient public administration. Knowledge management is needed in government because of the needs for more effective and efficient public administration. Government is particularly affected by active practice of knowledge management because it is a knowledge-intensive organization. It deals with information and knowledge on citizens, businesses, the market, laws, and policies etc. on the daily basis. Government organizations host a particularly high percentage of professionals and specialists who command important domains of knowledge. It is these people's “skills” and “expertise” that make the government functions smoothly. However “people walk”, how to maintain and preserve knowledge resided in these professionals and specialists is of crucial importance for the government to continue and consistently offer high quality products and services to its citizens, especially when it is estimated that more and more government workforces are approaching the age of retirement in the coming years. Also many “products” and “services” offered by the government are actually delivered in the shape of information and knowledge themselves. With constant “reorganization” and increased scale of information activities within government, how to avoid “reinventing the wheel” becomes a very practical matter of saving resources and improving efficiency during the line of public administration works. It is also quite clear the traditional bureaucratic model of government is not functioning very well in the current knowledge era. All these need to be solved and improved through new mechanisms and practices generated through knowledge management programs in government.

Second, for the improvement of democratic principles of public administration. Knowledge management is needed in government also because it will improve some of the democratic principles of public administration. Utilizing the embedded ICT infrastructure systems in the government, knowledge management program will greatly enhance the accessibility and traceability of government operations and thus in turn can lead to greater accountability. In the meantime responsiveness of the government will automatically increase because, on the one hand greater accessibility and accountability goes with a greater sense of responsibility, and on the other hand citizens have gained the access to a series of more convenient tools and channels that allow
them and guarantee them to be heard by their public servants and representatives. All these combined together will also lead to greater transparency in government. Greater access to government information can help in ensuring that the public at large can know what the government is doing and how it is doing its job. In short, a more democratic government offering “better governance” is possible through the implementation of knowledge management.

Third, for the promotion of human development. Knowledge management is needed in government due to the perspectives of government’s role of promoting human development. In this knowledge era, knowledge is the most valuable resource for the development of society and mankind. Besides simply aiming at improving effectiveness and efficiency for the pursuit of organizational goals, in broader and more important sense, knowledge management should also aim at the promotion of knowledge society so that everyone can enjoy its benefits. Some of the essential functions of government are correcting market failures and supplying public services and goods the private sector would otherwise not supply. Knowledge itself is a public good. It is a public good because, at the physical level, one can share it with others without losing it and it is not rival in consumption. Government action can have a major impact by setting an overall strategy and action plan related to a country’s knowledge systems. It can serve as the knowledge broker for knowledge sharing and creation, and provide the impetus for the development of knowledge society by formulating a vision. It can play a key role in setting substantive priorities and goals and coordinating the development of a broad conceptual framework that is based on a systematic approach. Government can also initiate a participatory process which brings together multiple stakeholders and results in a holistic and people-centered national knowledge strategy. To that end, setting up knowledge management programs within government organizations is also the need of the whole society. The feature that distinguishes this particular set of government knowledge management programs from all its counterparts in the private sector is the potential pervasiveness of their impact throughout the society and the strength of the feedback that they generate through growth and development. Knowledge management programs in government, if guided by the goal of human development, can also improve the quality and safety of the lives of all citizens.

5. Barriers, Setbacks and Misperception of Knowledge Management

5.1 Barriers and Challenges in Knowledge Management

There are several challenges in understanding, organizing, and managing knowledge. McDermott summarizes these challenges as:

- A technical challenge to design human and information systems to organize information, but also to think together. It is established that information technology inspires the vision of effective information and knowledge management, but cannot itself bring the vision into action.

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• A **management challenge** to create a knowledge sharing environment. We all know that in this new era “sharing knowledge is power”. But simply by the motto itself can not easily change people’s view of “knowledge is power” especially when they think giving up one’s own knowledge might eventually result in self-un-empowerment.

• A **personal challenge** to be open to the ideas of others. The personal challenge is connected to the fact that knowledge resides in the minds of employees. Knowledge is mainly seen as an intangible asset and needs to be managed through a cognitive approach. In this regard, contextual and cultural means are important to encourage knowledge sharing and communication.

• A **social challenge** to develop communities that share knowledge. Research in many fields often captures the strength provided to people by their social networks under a social capital paradigm. However, the relation between information behavior and social capital has seldom been realized in information science research, although social aspects in connection with information behavior are studied. Even if human information behavior is a well-defined area of research in information science, the majority of the studies have concentrated on individual information behavior. Today it has become evident that the social challenge and the social dimensions must also be put forward to make the picture of information behavior and knowledge sharing coherent.

Generally speaking, just like any change programs, developing a new approach to knowledge management is likely to meet with resistance, which has the potential to seriously slow the program or even causes its failure. For knowledge management the following obstacles might be expected to be faced with by all organizations26:

• **A lack of conviction that change is needed** --- If people are not properly informed or the purpose and benefits are not explicitly explained to them, they are likely to view the present situation as satisfactory and an effort to change as useless and unsatisfactory. Related to this is dislike of imposed change. People resent being treated as passive objects and having changes imposed on them about which they can not express their views.

• **A belief that knowledge relates only to certain groups or positions** and therefore is a subject that most employees do not need to bother about.

• **An over-emphasis on technology** which needs to be seen as an enabler rather than an end in itself. However, ‘technophobia’, where organizations are uneasy with using technology tools as a support for knowledge sharing, can be equally inhibiting.

• **Fear of the unknown** - People do not like uncertainty and may prefer an imperfect present to an unknown and uncertain future. Knowledge management requires a level of confidence within the organization to encourage people to share and get involved. If people are uncertain about the future they are less likely to do this.

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26 Joanna O’Riordan (2005), *A Review of Knowledge Management in the Irish Civil Service*, CPMR Discussion Paper 30
• An enduring notion that knowledge is power - This factor can go to the heart of organization culture where the competitive internal environment can foster knowledge hoarding.

• A lack of business focus - treating knowledge management as an end in itself and creating a knowledge management program because everyone else is doing the same or because it might pay off later. Knowledge management projects tend to be successful only if they are linked to real business issues.

These are the barriers and obstacles common to knowledge management in all organizations. But it seems that, besides cultural and contextual challenges, there are several inherently rooted misunderstandings within the government organizations which have further hindered the successful implementation of knowledge management. These typically include unawareness of the existence of additional knowledge that government organizations possess; lack of acknowledgment that government workers are knowledge workers; and inadequate concern for knowledge as an asset of strategic importance. More specific to their unique characteristics, in carrying out knowledge management initiatives, government organizations also face such problems as:

• Political agenda
• Budgetary constraints
• Constant change in top management as the principle of democracy

5.2 Possible Setbacks of Knowledge Management

In this knowledge era it is certainly short-sighted for any organization to neglect the advantage of knowledge management. But at the same time, it should also be noted that knowledge management is not just a new management tool with almighty powers that is capable to solve all problems within an organization. Actually, judging from some of the current knowledge management practices, knowledge management also comes with some “added costs” and “unintended consequences”. Some of those include:

• Improved knowledge management practices come with added costs in terms of information overloading and extra time dedicated to activities in this area.

• Knowledge management is seen as a quick win instead of a series of long-term closely coordinated activities. Actually unless it is firmly embedded into the culture and process of organizations and appropriate rewarding and motivation systems are in place, the promises of knowledge management will be very hard to be realized.

• Too much emphasis is put on technology and “electronic interactions”, while many of the very effective “old-fashioned” methods are completely forgotten and abandoned. Knowledge management does not just mean hi-tech. Technology is just enabler, face-to-face interpersonal interaction and conversation are very important as well.

• Over-ambitious with the scope and scale of knowledge management programs in the organization. Knowledge is very difficult to manage. If ever completely possible, it is better to start with a pilot KM program.
5.3 Misperception - The Danger of “Information Processing Mentality” as a Trend of Current Knowledge Management

As we have mentioned before, according to Nonaka and Takeuchi knowledge exists in its explicit and tacit forms. Explicit knowledge (or information) in organizations is typically found in documents and databases while tacit knowledge is that which is in the heads of people. As a result the current practice of knowledge management is normally viewed as a two-fold phenomena. The first is the management of explicit knowledge using techniques such as those used in the discipline of information resources management, sometimes this is also called the “technology-side” or the “IT-track” of knowledge management. The second is the creation of the environment in which people can develop and share knowledge, sometimes this is also called the “soft-side” or the “People-track” of knowledge management.

Explicit knowledge and information can be easily written down, codified and stored in database. For this type of activity we have already acquired necessary skills and more than adequate tools. Yet this kind of knowledge is hardly where an organization's competitive edge is found. Instead the edge is often found in complex, context-sensitive knowledge, which is difficult if not impossible to be codified and stored. Although most people can understand that the success of knowledge management should be relying on both sides, because of the fact that nowadays organizations are so used to the convenience of retrieving and disseminating information through new electronic means invented with the development of ICT, in practice many organizations have developed a so called “information processing mentality” for knowledge management programs. Equipped with this kind of mentality, organizations tend to turn knowledge management into a “one-fold” phenomenon and believe the “best” way of managing knowledge is to convert it into ones and zeros and store it in the database for future usage through the help of latest technology. However, as noted by Tiwana, technological impact is only less than 35 percent of the whole KM effort²⁷.

It has been suggested that KM is different from information management (IM) in that “the latter focuses on finding the stuff and moving it around, while the former is also concerned about how people create and use the stuff.”²⁸ We believe this “information processing view” is just a simplistic representation of knowledge management. Under this trend organizations would inevitably over-emphasize the approach of converting tacit knowledge into explicit knowledge. This kind of approach, in most cases, will prove to be futile because no database can replicate the years of experience of a knowledgeable individual or know which information to apply in a specific situation. Information is context-sensitive, the same assemblage of data might evoke different responses from different people. Even at different time the same assemblage of data reviewed by the same person could result in different decision-making responses. Moreover, nowadays the environment that organizations operate within is no longer experiencing incremental changes as it was before the arrival of information age, instead the change is constant and fundamental and a successful organization is required to constantly adapt itself accordingly. This is also true with government organizations. Now it is extremely difficult for organizations to “foresee” the future and its related changes. Under these conditions, the “best practice” of yesterday may turn into today’s “worst practice”, and past “core competence” may very well become today’s “core rigidities”. Although a

successful knowledge management program does unquestionably need the technology side since some of the explicit knowledge does require and is worthwhile being stored in the organizational database, in the meantime, it definitely should not become the dominant side as exhibited by the “information processing mentality”. Maybe the best that can be done, which is related to the “information processing mentality”, is to make part of the tacit knowledge explicit, and provide pointers to the experts (“the right person”) who will be able to put such knowledge into context and help those wanting to apply it.