Distr.: LIMITED

E/ECA/DISD/CODI.2/10
31 August 2001

UNITED NATIONS
ECONOMIC AND SOCIAL COUNCIL

Original: English

ECONOMIC COMMISSION FOR AFRICA

Second Meeting of the Committee
on Development Information (CODI)

Addis Ababa, Ethiopia
4-7 September 2001

Knowledge Management for Decision-Making: Tools, Institutions and Paradigms

Introduction

This paper reviews the field and practice of knowledge management (KM) and elucidates KM's corporate, national and regional perspectives. It outlines policy implications for African development in the evolving globalised knowledge-based economy. It attempts to place KM in the context of the proposed African Virtual Library and Information Network (AVLIN) as a suitable platform for e-learning and exchange of knowledge objects, including digital content and innovative ideas.

Why Knowledge Management?

It is generally accepted that the modern economy of a typical developed country is knowledge-based, and with globalisation, this will become the norm in all sections of the world. For example in 1950, unskilled workers made up 60% of the American workforce, but by 2000 this portion of the workforce had fallen to 15%. More and more value is placed on knowledge than on raw human power. Mervyn King, Chairman of the Board of Governors of The University of the Witwatersrand Foundation in the institution's annual report for 2000 illustrated the trend as follows:

" In 1974 a 30-year old person with a high school diploma in America earned an average of $34 963 and in 1998, $29057. The average earnings in 1998 of a college graduate amounted to $40 000 and with an advanced degree, $70 000" (King, 2001). This clearly shows that each level of increase in knowledge produces a geometric increase in wealth. The rise of knowledge management is due to this upsurge in value being placed on what people know.

There is also the realisation that performance and competitive strength have become dependent on:

- quality of knowledge applied in business processes;
- value created for clients and customers;
- world class quality products and services;
- operational leverage achieved by the use of ICTs;
- the effectiveness of an organisation's system of harnessing its knowledge base; and
- the ability to reduce the adverse impact of high turnover of corporate memory.

Knowledge management is not new. From time, humans have generated, shared and passed on knowledge from generation to generation, mainly for survival. However, the great advancement and spread of information and communication technologies (ICTs) has made it possible for large amount of data and information to be rapidly gathered, processed, stored and shared. To futher this advance, researchers have tried to use computers to generate knowledge through further transformation of information but have had only very limited success. Why? Because the acquisition of knowledge involves very high level cognitive processes.

Is Knowledge Management not Just another Management Fad?

Holtham (1997) opined that KM was a fad and that, like other management fads, it will burn out before 2000-2001. Current trends have proved him wrong. According to a survey conducted by Harris Research Center in the UK in 1998, only 2 per cent of the respondents considered knowledge management to be a fad (KPMG, 1999). The concept is proving to be an effective glue that holds all other management concepts together and its application is spreading into all manners of organisations and levels of governments all over the world.

What is Knowledge Management Really?

From the very diverse definitions of KM, we have found the definition by Uit Beijerse the most pertinent to our story. Roelof P. uit Beijerse (1999) defines knowledge management as "*the strategy-driven motivation and facilitation of people, aimed at reaching the organizational goals*". In practice, it is the application of both classical and creative management principles to the development, gathering, utilisation, processing, preservation and sharing of organisational knowledge base in such a way as to efficiently achieve results that match organisational strategic objectives. It is rather a multidisciplinary performance management approach that "involves creating and sustaining a knowledge culture - a culture where knowledge and information are valued and where knowledge creation, sharing and utilisation are a natural and instinctive part of business process" (TFPL, 1999).

The Data-Information-Knowledge-Wisdom Continuum in Decision-Making.

While the sequence data -> information -> knowledge -> wisdom represents an emergent continuum in human cognitive processes, the progression along the continuum from data to information, to knowledge, and finally to wisdom does not occur in discrete stages of development (Bellinger, 2001). Figures 1 and 2 below illustrate this inherent progression.

But what distinguishing attributes can be ascribed to these concepts? Data are a set of neutral values or facts. They are neutral because they can apply to anything and all things. Because of the neutrality of data, they are easily processed, transformed into information and stored on a variety of media using a variety of tools, including computers. The application of computers in data processing brought about advances that result in massive generation of and dissemination of information , and hence the information explosion.

A piece of information is an aggregation of data relating to specific natural or social entity or entities that conveys meaning, and stimulates understanding and action through its recognizable pattern. This property makes information useful for decision making.

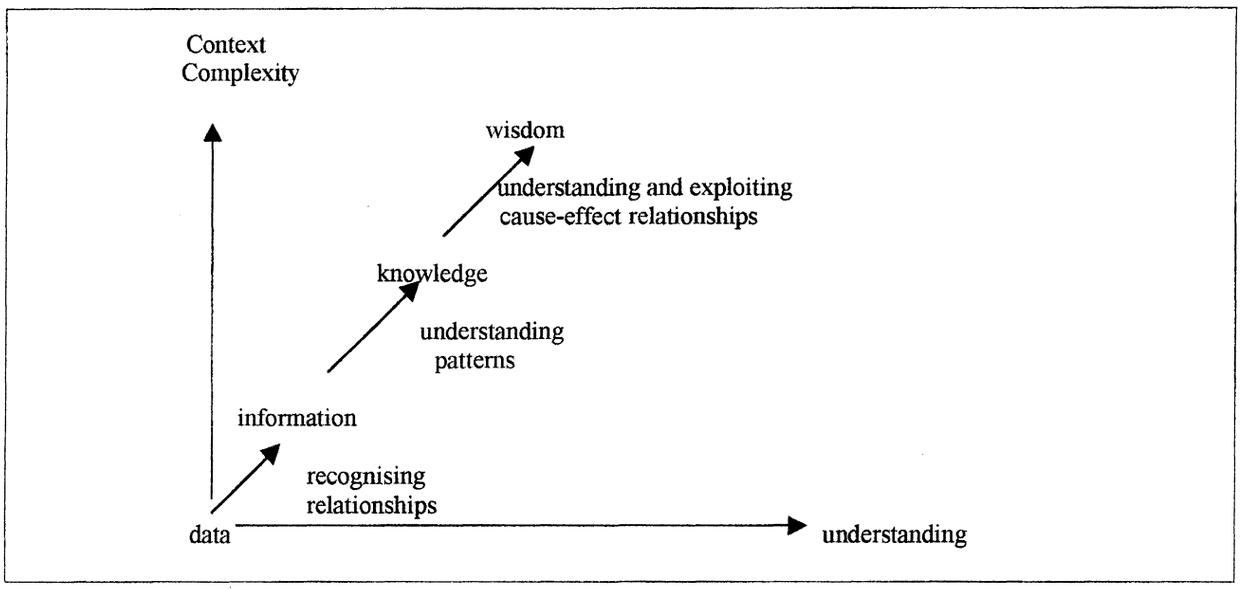

Figure 1: Data - information- knowledge- wisdom continuum. (Developed after Bellinger, 2001)

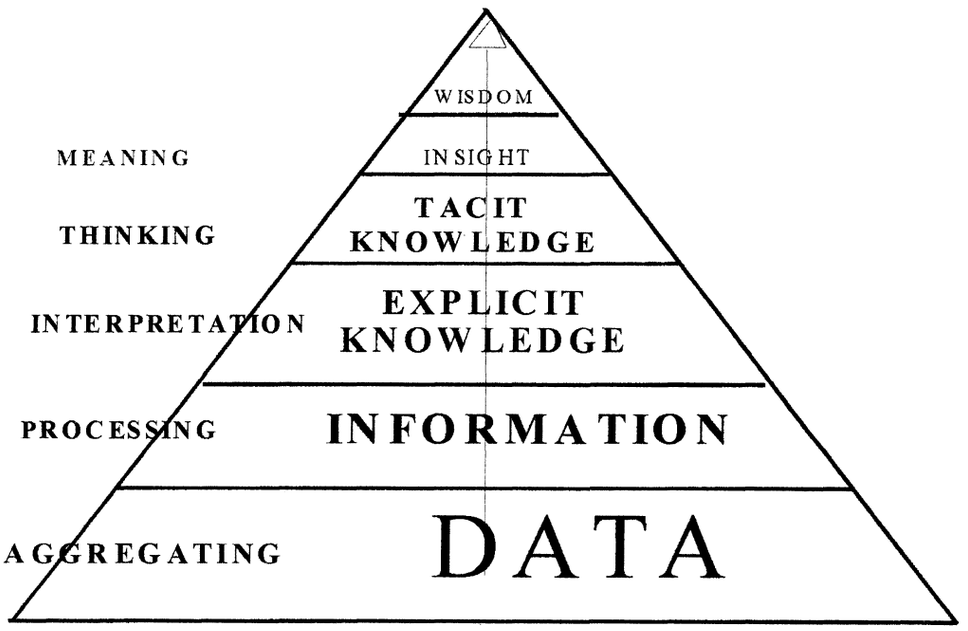

Figure 2: Data - information-knowledge-wisdom pyramid. (Source: Clarke and Rollo, 2001)

Knowledge is the capacity to recognize natural or social patterns, and the understanding of their nature as well as the cause and effect relationships inherent in those patterns. In this context, a pattern is the way in which something is arranged, how it develops, happens, works, etc. The acquisition of knowledge is enhanced by the social process of communication, which results in the state of informedness. Knowledge can be explicit or tacit. Explicit knowledge is knowledge that is expressed formally using a system of symbols or language, and can therefore be easily stored, communicated and shared. Explicit

knowledge include published materials and manuals of rules, routines and procedures. Since explicit knowledge has been codified, it remains with the organisation even after its inventors or authors leave the organisation (Choo, 2000). On the other hand, tacit knowledge resides in the brains of the people, unstructured, undocumented (Davenport *et al.*, 1998). Storey and Barnett (2000) observe that attempts to codify tacit knowledge may only produce knowledge which is: useless because it is too difficult to explain, trivial, redundant, irrelevant to a wider audience, naïve, or inaccurate.

Nations and organizations gather, process and store data and information in the hope that their constituents will interpret and use them to gain knowledge (or be in a state of informedness) in the matters that relate to their goals. The basic assumption underlying this practice is that knowledge inevitably leads to the right or appropriate response to emerging or changing patterns in the environment.

Wisdom is the capacity to *consistently* use knowledge *rapidly* and *effectively*.

From these definitions, one can see a progression from simplicity to complexity in the continuum formed from data to information to knowledge and to wisdom. And with complexity increases the value.

If wisdom has the ultimate value, why then do nations and organizations choose to manage information and knowledge rather than concentrating on development of wisdom proper? If we take the example of the American workforce given above, in which it is estimated that 85% of the workforce are knowledge workers, we can see why institutions and nations see more value in managing knowledge. Through effective management of knowledge (workers) an organisation is able to achieve its goals, as knowledge workers drive the process of creativity and innovation in an enterprise. While knowledge management represents the pursuit of of excellence, "wisdom management" would represent the pursuit of perfection.

Knowledge Management in Practice : Ccurrent Trends and Strategies

In most cases, knowledge management initiatives are elements of strategic management for which the highest level of management is responsible, the main goal being to achieve progressive improvement in organisational performance.

The basic impetus or driver of early knowledge management efforts is the realisation by an organisation of the importance for it to "know what it knows", and to manage what it knows in such a manner that ensures that it works more efficiently and effectively by harnessing its knowledge assets" (aiai.ed. 2001).

Knowledge management is not an end in itself but should simply be one of many means to an end. KM is important only to the extent that it enhances an organization's ability and capacity to leverage knowledge to improve business performance and results. By managing knowledge, organizations can:

- provide a better foundation for making decisions on choosing strategic options and means of implementing its chosen options;
- increase responsiveness to clients or customers and other stakeholders;
- improve efficiency of people, operations and programmes;
- improve the speed and effectiveness of innovation;

- improve the quality of products and services;
- improve the competitive position by operating more intelligently;
- enhance the continuity of the organisation;
- enhance the financial performance of the organisation;
- optimize the interaction between all the arms of the organisation;
- improve collective and individaual competencies;
- make professionals learn more efficiently and more effectively;
- improve communication and synergy between all knowledge-workers;
- make the company focus on the core business and on leveraging critical knowledge assets (Chase, 1997 ; uit Beijerse 1999).

"The value of knowledge management relates directly to the effectiveness with which the managed knowledge enables the members of the organization to deal with today's situations and effectively envision and create (its) future. Without on-demand access to managed knowledge, every situation is addressed based on what the individual or group brings to the situation... With on-demand access to managed knowledge, every situation is addressed with the sum total of everything anyone in the organization has ever learned about a situation of a similar nature" (Bellinger, 2001).

For an organisation to become a knowledge-based one, it first needs to understand that information has value, and secondly to know the value of using knowledge as opposed to mere information. Many case studies of KM in practice have been reported (Davenport *et al.* (1998), Terrett (1998), Lim and Klobas (2000), Rubenstein-Montano *et al* (2001), Bonnie; (2000). And many organizations have derived excellent benefits from their KM initiatives involving creative combinations of technology, human expertise and communication channels. Many of the projects would fit somewhere on the knowledge value chain. Davenport *et al* identified four broad types of objectives for the thirty-one KM projects that they studied. The objectives are:

- The Creation of Knowledge repositories;
- Improvement of Knowledge Access and Transfer;
- Enhanced Knowledge Environment; and
- Management of Knowledge as an asset.

Creation of Knowledge repositories:

Documents with knowledge embedded in them - memos, reports, presentations, articles are stored in a repository where they can be retrieved easily.
Three Basic types of knowledge repositories:

- external knowledge,
- structured internal knowledge,
- informal internal knowledge (to capture tacit knowledge).

Improvement to Knowledge Access and Transfer : The availability of knowledge repositories facilitate access to knowledge as well as its transfer among individuals. For example diversity of peoples' skills and areas of expertise enables employees to quickly find experts they are

looking for, or knowledge that exists in or outside a system. Several organizations have built and manage expert networks. This is a primary business for some organizations, and they provide technical expert referral service by maintaining a comprehensive database of external technical experts.

Enhanced Knowledge Environment: In an environment conducive to more effective knowledge creation, transfer and use there is a culture of receptivity to knowledge, a willingness to change behaviour relating to knowledge, and efforts to improve the knowledge management process. Example include efforts to change the organizational norms and values related to knowledge, increase awareness of the knowledge embedded in client relationships and engagements.

Management of Knowledge as an asset: Here knowledge is treated like any other asset on an organizations balance-sheet. For example, Dow Chemical is reported to have saved $4million during the first year of a new programme of organisation and management its patents. The company expected to generate more than $100 million in licensing that it might otherwise have forgone.

Two Paradigms: Process-oriented and Practice-oriented

Knowledge activities can be divided into two broad paradigmatic categories: process-oriented and practice-oriented.

Process-oriented practitioners posit that tacit knowledge can be downloaded from the brains of people through formal interviews and meetings, codified, stored and reused profitably. This school grew out of the artificial intelligence movement which branched into computerised knowledge-based systems driven by databases, in their efforts to treat knowledge as if it is just a set of data. Under this paradigm, knowledge management take the top-down, technology-focussed approach.

The other school believes that all the small, individually insignificant best practices scattered around an organisation or nation, add up to an enormous amount of knowledge, and therefore posit that knowledge management must be bottom up and must foster knowledge by responding to the inventive, improvisational ways people actually get things done. It assumes that value creating activities are not easy to pin down. And that organisations operate in an unpredictable environment. The emphasis here is on practice rather than process. Hence managers need to take practice, practitioners, and the knowledge communities seriously. That requires two steps. First, managers need learn what local knowledge exists. Then if the knowledge looks valuable, they need to put it into wider circulation through appropriate social processes. (Brown and Duguid, 2000).

Table 1: **Two schools: Process-oriented and Practice-oriented.**

Process -Oriented	Practice-Oriented
The way tasks are organised	The way tasks are done
Routine	Problem solving
Orchestrated	Spontaneous, Improvised
Assumes predicable environment	Prepares for unpredictable environment
Relies on explicit knowledge	Driven by tacit knowledge
Linear relationships	Web-like relationships

(Adapted from Brown and Duguid, 2000)

Corporate, National and Regional Perspectives and Contexts that Determine Purpose and Targets of KM programmes.

In corporate organizations, knowledge management is a strategic management approach used to concretize strategic choices. Most KM activities are therefore meant to improve internal processes and tailor organizational interactions and transactions in such a way as to channel the efforts of the management and employees to deliver on the programme objectives. What is done depend on the objectives and tasks being focused on. For example, see figure 3 below.

At national levels, KM include the development of strategies that catalyses the adoption of KM in governmental and business sectors as well as using its principles to develop a macro-social and economic management of innovation in science, technology, socioeconomic and other sector. In effects, it is the harnessing of the knowledge base to spur the inventive spirit of citizen.

At regional levels KM involves the search, selection, adaptation and advocacy as well as the dissemination of best practices on national and regional policy development and management, and catalyzing international co-operation in specific policy issues that may benefit the member states involved. A regional organization promoting knowledge programmes must seek to master diplomatic marketing of ideas. An example of a regional perspective is the European Union's strategy, for example see Europa.eu, 2001.

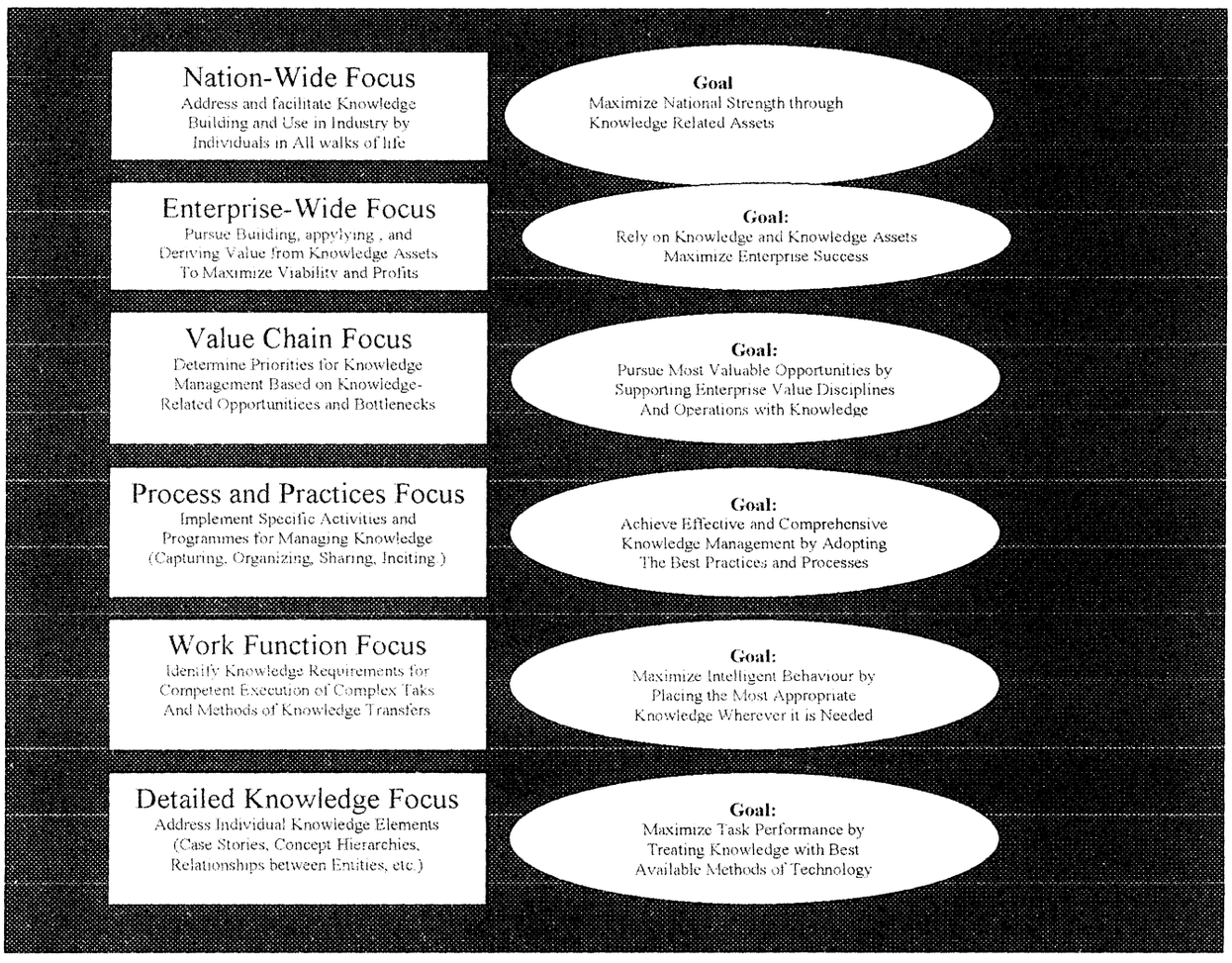

Figure 3 : Congruence between Policy/Strategic/Operational Focus and KM Goal

Institutions of Knowledge

Institutions which can be used to deliver knowledge management programmes or provide the tools include:

- Institutional and public libraries: to provide added value services at institutional levels and to local grassroots;
- Professional associations: enabling knowledge sharing all areas of a professional sector;
- Chambers of commerce and industry: linking entrepreneurs with information and best practices;
- Government agencies: engaging in macro-level knowledge activities focused application of innovation for national economic and social development;
- Research Councils and foundations: components of national innovation and knowledge system that foster continuous progress in research;

- Knowledge and information networks and exchanges: formal and informal groups that provide platforms for collaboration and exchange of knowledge;
- Virtual libraries: virtual information outfits that provide access to electronic content, services and knowledge objects over the Internet;
- Universities, schools and research centres: the foundations of national and regional knowledge and social development. The purveyors of explicit and tacit knowledge;
- Productivity organizations: promoters of the application of productive knowledge and best practices at national levels;
- Small business and entrepreneurship organizations: to spread new methods and innovative ideas to grassroots of the business community;
- Regional and international development organizations: advocates of best practices and policies on innovation and knowledge for regional development. OECD is very active in this sense.

Technological and Analytical Tools

Tools generally used in various knowledge management programmes include:

- GroupWare: Collaborative software that facilitates collaborative work over computer networks, for example, Lotus Notes;
- communications networks, especially the Internet-based ones which enable the local and wide area low-cost dissemination and exchange of knowledge and information;
- active databases, for processing and storage of live information and knowledge objects;
- digital libraries: electronic content that may include complete books and multimedia organized in easily accessible place and in an organized manner. Digital libraries are the main foundations of virtual libraries;
- bibliometrics and scientometrics: involving the use of quantitative and qualitative analysis to measure and evaluate the quality and influence of published knowledge and the contributions of individuals and countries to the body of knowledge in particular fields or professions(Garfield, E. 1979);
- information and knowledge audits: the analytical methods for determining the nature, needs, sources, direction, rate of flow and use of information and knowledge in an organization or nation;
- digital file exchanges: some sort of Napsterization of knowledge objects. A peer-to-peer (P2P) computing model popularized by Napster, that allow institutions and to collaborate on joint projects without expensive bits of equipment (The Economist, 2001; McAfee, 2000), over the Internet;
- National knowledge assessment methodology: an analytical tool that enables governments to determine the value chain of the their knowledge producing systems and how these processes and relationship influence innovation and economic development (National Research Council, 1996);

- National knowledge and innovation systems: a strategic national network of funding, research and development organizations and sets of interfacing programmes (usually set up as government agencies) that determine and promote the development of innovative ideas and their mainstreaming into the larger economy. Promoted by OECD in its member states (see http://www.oecd.org//dsti/sti);

- Institutional and national knowledge forums that could be parts of national or regional innovation systems. They are mainly brainstorming forums and think-tanks;
- Knowledge organization tools as applied in librarianship and information science: Library and information management tools used in the analysis and organization of information objects and services are easily applicable to knowledge management. Their use would be central to the success of any knowledge management programme.

Conducive Knowledge Management Environment

For effective knowledge management to take place, the organizational culture must have most of these attributes:

- Where knowledge is seem as asset and the main factor of production;
- Institutionalized information sharing culture is developed;
- Collaborative teamwork culture;
- Problem-solving rather than rule-based operation;
- Alliances, partnerships and co-competition;
- Support of intrapreneurship;
- Network and virtual organization;
- Learning, research and discovery culture;
- Risk and error tolerance;
- Promotion of creativity rather than mere adaptation;
- Emphasis on leadership roles rather than administrative position
- Strategic thinking rather than mere planning;
- Borderlessness engendered by ICT; and
- Regional integration based on instant information flow;

Role of Information and Communication Technologies

Offsey (1997) points out that: two distinct factions exist in the Knowledge Management world. In one camp are those who maintain that organizational behaviour and individual socialization determine how much knowledge passes between individuals. They generally believe that technology is not the answer, but rather a distraction from issues such as change management , culture and leadership. At the other end of the spectrum are information technology evangelists, who focus on technology as the solution to the Knowledge Management question.

While he agrees that technology is not the solution to an organization's KM needs, he says it is clearly required to enable the organization's KM processes. Without new technologies to create revolutionary change in the way knowledge workers create, communicate and manage information, a knowledge management system has little chance of improving enterprise

knowledge sharing. Most knowledge enterprise have used new technologies to facilitate the creation, transfer, and use of knowledge more effectively. Notable benefits of a KM system is the creation of awareness among staff, equity of access, 24/7 availability, and timeliness. A good KM system is one that is open and distributed, customizable, measurable and secure.

The Role of Librarians/Information Professionals in the KM Process

In this fundamentally changed professional environment librarians must use their knowledge as broadly and strategically as possibles. As Barton (2001) puts it, librarians should be able to position themselves as "architects of information policy". They should not restrict their contributions to the technical organisation of knowledge.

From comparing the range of skills frequently claimed as necessary for effective KM with those considered necessary in librarianship and information management, Hill argues that "...the recognition of the importance and value of internal information and the need for harmonization and organisation of corporate capital/information/memory/knowledge – call it what you will" at senior or board level within organizations means that "...there most certainly is a career path in information management for the information professional should he or she wish to take that route".

Loughridge points out that some commentators dismiss knowledge management as a fad; others view it as a major paradigm shift in the management and exploitation of "intellectual capital". She concluded that many aspects of knowledge management practice bear a close resemblance to well-established practices in librarianship and information management. However, the emphasis by knowledge management theorists and practitioners on the importance of knowledge elicitation and knowledge creation, groupwork and team work, greater involvement in organisational strategy development and support and IT may require greater attention to the personality, motivation and career aspirations of potential entrants to the profession in order to prepare them better for wider-ranging, multi-role careers.

The "gatekeepers" at some of the projects reported above include R & D managers, and technical librarians. Truly librarians have continued to actively participate in or champion the use of digital technologies in the development of digital/virtual libraries, and in scholarly communication, and many librarians are now employed as knowledge managers.

The role of information professionals and others involved in the processes of information/knowledge "brokering" or "leveraging" is likely to become much more complex. Library and information services can, therefore, no longer afford to be situated or operated as discrete or autonomous or semi-autonomous units simply "servicing" the rest of their organization but must increasingly participate in and contribute to the wider decision-making and strategy-formulation activities of their organizations. (Loughridge).

Libraries have always supported organizational and business endeavour in the various ages – industrial, information, and now the knowledge era. Though the acquisition, processing and dissemination of mostly explicit information, organisations have been provided with necessary information required for the ongoing functions of their business. In the knowledge-based environment, libraries must provide not just information, but "performance-enhancing information" (Priskett, 1999). In a knowledge-based environment such performance-enhancing information will be developed with knowledge that can be used for innovation and ultimate superior

business performance. It is crucial that new knowledge, both explicit and tacit must be captured, shared and made readily available for reuse.

African Virtual Library and Information Network (AVLIN). What Knowledge Management Dimensions?

The vision, and goals of AVLIN are quite laudable. The questions that come to mind are:

- What KM techniques are applicable to this project?
- Which types of knowledge repositories will be created – external knowledge, structured internal, and informal internal knowledge repositories?
- How will the project's impact on the region's development be felt ?
- How will the value created by AVLIN be measured – by simple counting bits on the databases or would there be better value measurement methods?

Obviously the economic returns on knowledge are difficult to quantify and the benefits of such a project are usually indirect. Establishing the link between knowledge and financial performance is, at best tricky (Eccles, 1991, Kaplan and Norton, 1992), but the link need be made to ensure continued strategic relevance.

Suggested success indicators for a knowledge project include:

- Growth in the resources attached to the project, including people, money, and so on ;
- Growth in the volume of knowledge content and usage (that is, the number of documents or accesses for repositories or participants for discussion-oriented projects).
- The likelihood that the project would survive without the support of a particular individual or two, that is the project is an organizational initiative, not an individual project.
- Some evidence of value-added outcome either for the knowledge management activity itself, or for the larger organization: this linkage need not be rigorously specified and may be only perceptual.

On the other hand, unsuccessful projects:

- Scrounge for resources
- Struggle to get organization members to contribute to repositories or use discussion database.
- Only one or a few lonely missionaries champion such projects (Davenport *et al.*, 1998).

Conclusion

The global Knowledge economy is now forcing nations and organizations to adopt new governance/corporate models that emphasize growth and efficiency, reduction of turnaround time, minimize knowledge lost and enhance the sharing of information across organizations

(which often means across the globe). In the preface to the Second Southern African Knowledge Management Conference, Neil Duffy and Adriaan Jooste observed that "when the hype and the dust have settled, the leading organisations of the world will be growing and leveraging their knowledge even more effectively and efficiently into the new millennium".

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