Knowledge Management in the 21st Century

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Abstract:

The development of knowledge management in 21st century has become the key concern for librarians and libraries. This paper will review the development of knowledge management and will compare the differences between information and knowledge as well as between information management and knowledge management. It will also examine the role of librarians/libraries in knowledge management and suggests that librarians/libraries in the digital and knowledge age should be in charge of knowledge management in their respective organizations in order to leverage the intellectual assets and to facilitate knowledge creation.

Keywords: *21st Century, Librarians, Management, Knowledge management*

1. Introduction

The concept and name--"Knowledge Management"--was started and popularized in the business world during the last decade of the 21st century. It was the business world that first recognizes the importance of knowledge in the "global economy" of the "knowledge age". In the new knowledge economy, the possession of relevant and strategic knowledge and its unceasing renewal enables businesses to gain competitive advantage. The applications of knowledge management have now spread to other organizations including government agencies, research and development departments, universities, and others.

The management of information has long been regarded as the domain of librarians and libraries. Librarians and information professionals are trained to be experts in information searching, selecting, acquiring, organizing, preserving, repackaging, disseminating, and serving. However, professionals in information technology and systems have also regarded information management as their domain because of the recent advances in information technology and systems which drive and underpin information management. One of the clearest evidences of this is that the positions of "Chief Information Officer" (CIO) in many organizations are generally held by information technologists instead of librarians. In fact, most of the work of CIOs has to do with developing and managing the IT infrastructure and systems, not the managing of information per se.

With the growing interest in knowledge management, many questions have been raised in the minds of librarians regarding: the difference between information and knowledge; between information management and knowledge management; who should be in charge of information and knowledge management; would librarians and information professionals with appropriate education and training in library and information science be most suitable for the position of "Chief Knowledge Officer" (CKO) in their organizations; and what libraries can do in implementing knowledge management.

This paper attempts to answer these critical and pressing questions from the librarians' perspective.

2. Is there a difference between information and knowledge?

Daniel Bell defines knowledge as "a set of organized statements of facts or ideas, presenting a reasoned judgment or an experimental result, which is transmitted to others through some communication medium in some systematic form." As for information, Marc Porat states, "Information is data that has been organized and communicated."

Stephen Abram sees the process for knowledge creation and use as a continuum where data transforms into information, information transforms into knowledge and knowledge drives and underpins behaviour and decision-making. Below are simple definitions of Data, Information, Knowledge, and Wisdom—all of them are available within every organization:

- **Data**: Scattered, unrelated facts, writings, numbers, or symbols.
- **Information**: Selected, organized and analyzed data.
- **Knowledge**: Information combined with user's ability and experience that is used to solve a problem or to create new knowledge.
- **Wisdom**: Forward looking and thinking based on one's values and commitment. The differences between **information** and **knowledge** can be summarized as:
- Information is visible, independent from action and decision, different in format after processing, physical product, independent from existing environment, easily transferable, and duplicable.
- Knowledge is invisible, closely related to action and decision, different in thought after processing, spiritual product, identified with existing environment, transferable through learning, and not duplicable.

In the business world, two types of knowledge have been noted. They are **explicit knowledge** and **tacit knowledge**. Jan Duffy defines **explicit knowledge** as "knowledge that is documented and public; structured, fixed-content, externalized, and conscious" and **tacit knowledge** as "personal, undocumented knowledge; context-sensitive, dynamically-created and derived, internalized, and experience-based; often resides in the human mind, behaviour, and perception." This set of definitions can be applied to all other human endeavours and intellectual activities.

3. The rise of knowledge management

As early as 1965, Peter Drucker already pointed out that "knowledge" would replace land, labour, capital, machines, etc. to become the chief source of production. His foresight did not get much attention back then. It was not until 1991 when Ikujiro Nonaka raised the concept of "tacit" knowledge and "explicit" knowledge as well as the theory of "spiral of knowledge" in the Harvard Business Review that the time of "knowledge-based competition" finally came. In his latest book, Building Organizational Intelligence: a Knowledge Management Primer, Jay Liebowitz stated:

"In today's movement towards knowledge management, organizations are trying to best leverage their knowledge internally in the organization and externally to their customers and stakeholders. They are trying to capitalize on their **organizational intelligence** to maintain their competitive edge."

"The thrust of knowledge management is to create a process of valuing the organization's intangible assets in order to best leverage knowledge internally and externally. Knowledge management, therefore, deals with creating, securing, capturing, coordinating, combining, retrieving, and distributing knowledge. The idea is to create a knowledge sharing environment whereby **sharing knowledge is power** as opposed to the old adage that, simply, **knowledge is power**."

4. Some definitions of knowledge management

Because knowledge management is still a relatively new concept and viewed differently by different writers from different focuses, its definitions vary. In her article, "What is knowledge management?" Jennifer Rowley offers her definition below:

"Knowledge management is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the organization's objectives. The knowledge to be managed includes both explicit, documented knowledge, and tacit, subjective knowledge. Management entails all of those processes associated with the identification, sharing and creation of knowledge. This requires systems for the creation and maintenance of knowledge repositories, and to cultivate and facilitate the sharing of knowledge and organizational learning. Organizations that succeed in knowledge management are likely to view knowledge as an asset and to develop organizational norms and values, which support the creation and sharing of knowledge."

Rowley's definition was based on the four different types of perspectives on knowledge management identified by Thomas H. Davenport et al in their study of a number of knowledge management projects. From the analysis of the projects' objectives, Davenport et al were able to categorize them into four broad types of perspectives:

1. To create knowledge repositories, which store both knowledge and information, often in documentary form. These repositories can fall into three categories:

- Those which include external knowledge, such as competitive intelligence.
- Those that include structured internal knowledge, such as research reports and product oriented marketing materials, such as techniques and methods.
- Those that embrace informal, internal or tacit knowledge, such as discussion databases that store "know how".

2. To improve knowledge access and transfer. Here the emphasis is on connectivity, access and transfer.

- Technologies such as video conferencing systems, document scanning and sharing tools and telecommunications networks are central.

3. To enhance the knowledge environment so that the environment is conductive to more effective knowledge creation, transfer and use. This involves tackling organizational norms and values as they relate to knowledge.

- Increase awareness on sharing knowledge embedded in client relationship and engagements.
- Provide awards for contributions to the organization's structured knowledge base.
- Implement decision audit programs in order to assess whether and how employees were applying knowledge in key decisions.
- Recognize that successful knowledge management is dependent upon structures and cultures.

4. To manage knowledge as an asset and to recognize the value of knowledge to an organization. Others, however, sought to take a process view to define knowledge management.

For example, Jan Duffy defines it as "a process that drives innovation by capitalizing on organizational intellect and experience." Gartner Group defines it as "a discipline that promotes an integrated and collaborative approach to the process of information asset creation, capture, organization, access and use."

Below is a set of knowledge management processes proposed by P. Galagan:

- Generating new knowledge.
- Accessing knowledge from external sources.
- Representing knowledge in documents, databases, software and so forth.
- Embedding knowledge in processes, products, or services.

- Transferring existing knowledge around an organization.
- Using accessible knowledge in decision-making.
- Facilitating knowledge growth through culture and incentives.
- Measuring the value of knowledge assets and the impact of knowledge management.
- From both the project perspectives and the operational processes described above we can gain a general understanding of the current scope and contents of knowledge management.

5. Knowledge management in libraries

While the business world is changing in the new knowledge economy and digital age, libraries of all types are undergoing drastic changes also. The new role of libraries in the 21st century needs to be as a learning and knowledge center for their users as well as the intellectual commons for their respective communities where, to borrow the phrase from the **Keystone Principles**, "people and ideas interact in both the real and virtual environments to expand learning and facilitate the creation of new knowledge."

As a learning organization, libraries should provide a strong leadership in knowledge management. Unlike those business organizations whose goal for knowledge management is for competitive advantage, most public, academic, and research libraries, with the exception of company libraries (which may be known or called corporate libraries, special libraries, or knowledge centers), have a different orientation and value. Instead of competition, internal use only, and little sharing of knowledge with others outside, the most important mission of public, academic, and research libraries is to expand the access of knowledge for their users. Charged by this mission, libraries should aim their knowledge management goal high. Below are examples of what libraries can do to improve their knowledge management in all of the key areas of library services.

5.1 Knowledge resources management

Because of the exponential growth in human knowledge in a variety of formats, libraries need to develop their resources access and sharing strategies from printed to electronic and digital resources in concert with their mission and charges. Restricted by limited funding, technology, staff, and space, libraries must carefully analyze the needs of their users and seek to develop cooperative acquisition plans to meet these needs. The changing concept from "ownership" to "access" and from "just in case" to "just in time" should be the goal of a sound resources development strategy.

An integrated online public access catalog (OPAC) with both internal and external resources as well as printed and other formats of knowledge should be developed and maintained. Useful websites and knowledge sources should be regularly searched and selected from the Internet and included in OPACs by hard links. A system for the reviewing and updating of these resources should be performed.

Going beyond explicit knowledge, libraries should also develop means to capture all that tacit knowledge that is of importance to their users, their organizations, and to the internal operation of libraries. The web site of each library should serve as a **portal** for all sources of selective and relevant knowledge and information whether explicit or tacit, whether on site or remote, and in all formats.

The term "portal" has been defined by Michael Looney and Peter Lyman as "a means of gathering a variety of useful information resources into a single, one-stop Web page, helping the user to avoid being overwhelmed by **infoglut** or feeling lost on the Web."

In the current digital and networked knowledge age, the size of information resources on the Web is growing exponentially. No one really knows exactly how many Web pages are on the Internet because new Web pages are added every second. The latest statistics of Internet hosts numbered

close to two billion and is growing fast at the speed of 25% from 1/2001 to 1/2002. Most of the frequently used Internet search engines have also expanded their index sizes by leaps and bounds. For examples, according to the November 11, 2004 report of the Search Engine Watch, **Google** claimed to have indexed 8.1 billion Web pages; **MSN**: 5.0 billion Web pages; **Yahoo**: 4.2 billion Web pages; and **Ask Reeves**: 2.5 billion Web pages. In a 1999 study by Lawrence and Giles, each search engine may cover only 15% of the Web resources at any given time. Combined coverage of search engines is estimated at 42 percent of the relevant resources. It is also very frustrating that many of the results found--in the tens of thousands of hits--are irrelevant. One has to comb the large number of findings in order to find the few relevant pieces of information. Still, information on the Web can be very useful if only we can employ advanced artificial intelligent tools to surf the Internet and to select, find, arrange, classify, and automatically deliver the needed information to each user based on his/her special interests and needs. Many such new knowledge management systems are under development and testing and hold promise for greatly enriched knowledge resources, improved user services, and the more efficient use of knowledge for creation and decision-making.

Universities and research organizations are themselves knowledge reservoirs. These highly valued intellectual assets, regardless of whether they are explicit or tacit, should be inventoried, archived, indexed, frequently updated, and made accessible in digital form.

In addition, the traditional, time- honoured methods of cataloguing and classification are barely adequate to handle the finite number of books, journals, and documents, but are inadequate to deal with the almost infinite amount of digital information in large electronic databases and on the Internet. Using the Dublin Core metadata and the Cooperative Online Resources Catalogue (CORC) has been a new approach to capture Web information by cooperative efforts. Other new methods such as data mining, text mining, content management, search engines, spidering programs, natural language searching, linguistic analysis, semantic networks, knowledge extraction, concept yellow pages, and such techniques in information visualization as two-dimensional or three-dimensional knowledge mapping, etc. have been a part of recent developments in knowledge management systems.

5.2 Resources sharing and networking

Libraries have had a long tradition of resources sharing and networking. These have been greatly expanded by the rapid development of computer, telecommunication, networking, and digital technologies since the 1960s. In the U.S. it is very common for libraries to be a member of several consortia at the same time for various types of cooperative work and resources sharing. The best examples of these are the OCLC Online Computer Library Center and Ohio LINK (Ohio Library and Information Network).

The CORC project of OCLC should be especially useful for libraries to cooperatively capture digital resources of all types, describe them in a standard format, and make them easily searchable by users.

The successes of most of these examples in resources sharing and networking are largely the result of the full cooperation and participation of all member libraries without selfishness. Large and major libraries must take the lead in such an endeavour. Supports in policies and funding from the government or parent organizations are also critically important. Experiences indicate that all libraries, regardless of size and specialties, have been benefited by library cooperation and resources sharing.

5.3 Information technology development

To facilitate the implementation of knowledge management, a well-designed and operational knowledge management system should be in place. Latest information technology should be used as an enabler. In this regard, the library director should consider him/her self as the chief knowledge officer of the entire organization and should work together with the CIO, heads of the planning department, the computer and information technology center, the human resources management department, the finance department, etc. to design and develop such a system. Such a knowledge management system should be built on existing computer and information technology infrastructures, including upgraded intranet, extranet, and Internet, and available software programs to facilitate the capture, analysis, organization, storage, and sharing of internal and external information resources for effective knowledge exchange among users, resource persons (faculty, researchers, and subjects specialists, etc.), publishers, government agencies, businesses and industries, and other organizations via multiple channels and layers. In recent years, many of the newly developed information technologies for database and information/document management can be utilized in knowledge management; such as, data warehousing, data mining, text mining, content management, knowledge extraction, knowledge mapping, groupware, and information visualization, etc. It was observed by Hsinchun Chen that "since the mid 1990s, the popularity of search engines and advances in web spidering, indexing, and link analysis have 12Knowledge transformed IR systems into newer and more powerful search tools for content on the Internet."

5.4 User services

The utmost goal of knowledge management is to provide users with a variety of quality services in order to improve the communication, use and creation of knowledge. As much as possible these services should be tailored to the interest and needs of each user. Information about each user can be obtained by analyzing the records of user registration, surveys, circulation and interlibrary loans, frequently asked reference questions, and the use of e-journal and digital resources, etc. User satisfaction and needs should be collected through periodic users' surveys. The findings should be used for the planning and redesign of library services. It is very important, however, that user's privacy should always be protected.

Some of the manual services such as "new publication alert" and "selective dissemination of information," which libraries have been providing, can now be done automatically by employing the "**push technology**" with great efficiency and convenience. Each library user can also set up his/her virtual "**My Library**" enabled by library systems and networks for collecting and organizing resources for personal use and to stay informed of new resources provided by the library.

The Library and Information Technology Association (LITA) has defined My Library-like services as the number one trend "worth keeping an eye on." It further stated that "Library users who are Web users, a growing group, expect customization, interactivity, and customer support. Approaches that are library-focused instead of user-focused will be increasingly irrelevant."

5.5 Human resources management

A great amount of expert knowledge is possessed by library staff and users, both in and outside the libraries. In university and research communities such expertise is abundant and should be inventoried, indexed, and updated regularly and be made searchable and accessible through electronic databases created and maintained by libraries. The knowledge and accumulated experiences of library staff members form the intellectual assets of any library and should be valued and shared. An organizational culture for sharing of knowledge and expertise should be established with appropriate rewards and incentives. Those staff members who share their tacit knowledge and experiences through writing, publishing, lecturing, tutoring, or mentoring should be appropriately

recognized and rewarded. An organizational culture which emphasizes cooperation, sharing, and innovation can only be established by strong leadership and commitment from the library director and a shared vision by the library staff. As a learning organization, libraries should allocate annual funding to provide continuing education and staff training to all staff members. Knowledge must be renewed and expanded to prevent it from becoming stagnant.

Libraries should also encourage the transfer of knowledge and experience from experienced staff to new staff members. A mentoring system should be in place to help newcomers to learn from experienced library staff. Informal seminars and brownbag sessions where staff can interact and exchange "**lessons learned**", "**best practices**" and other specific experience and knowledge should be scheduled at regular intervals and at convenient times. Special interest groups and chat rooms can be created through intranet. Since many valuable experiences have been accumulated over time, libraries should pay attention to favorable working conditions and environment, which will contribute to better staff retention.

6. Conclusion
In the business world, knowledge management has been regarded as strategically important for organizations to gain a competitive advantage over their competitors, to add value to their products, and to win greater satisfaction from their customers. In the library world, there is a lesson to be learned from the business world. Knowledge management is as important for libraries as for the businesses minus the competitive, proprietary, and moneymaking concerns. In fact, libraries have had a long and rich experience in the management of information. Many of such knowledge and skills of librarianship can be applied to knowledge management.

For any library to succeed in implementing knowledge management will require a strong leadership and vision from the top administration, which can influence the organization's knowledge sharing efforts in a positive way. As libraries enter the knowledge age of the 21st century, we should not take a back seat in the development of knowledge management. Instead, armed with our professional knowledge and experiences, we should be in the driver's seat.

Information technology and systems can provide effective support in implementing knowledge management. Librarians should work together with IT professionals and others to develop the appropriate knowledge management systems.

Furthermore, knowledge management should never be viewed as a way to control the process of knowledge creation. In his book, Enabling Knowledge Creation, Georg Von Krogh et al made a strong argument for supporting knowledge creation rather than controlling it. In the process of knowledge creation, every library should strive to be an enabler and facilitator by mobilizing all its efforts and resources.

The best knowledge creators are academics. Knowledge creation is best performed by universities. As a learning and knowledge organization, universities should empower their libraries to develop campus-wide knowledge management systems. It is now time for libraries to reposition themselves in the central stage of and as a leading player in knowledge management.

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