KNOWLEDGE SHARING INDONESIAN RESEARCH CENTRE: MODELS AND MECHANISMS

A Case Study: Center for Scentific Documentation and Information – Indonesia Institute of Sciences

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Abstract

The objectives and functions proposed at Center for Scientific Information and Documentation - Indonesian Institute of Sciences (CSDI-IIS), suggests an organizational form and structure for the organization which is considered here to be a networked concortium of science and technology knowledge and information services in Indonesia. The concept of CSDI-IIS extention agents is considered to provide S&T knowledge services for the public and knowledge sharing among Indonesia's researchers communities whose members depend on having timely, reliable and economical access to problem solving**.**
Usability issues should be considered during the model of research centre knowledge sharing in order to build systems which people with limited technological skills and readily use, we discuss two key forms of knowledge sharing usability, interface usability and the human-computer-interaction has helped model knowledge sharing principles to improve interface usability.

We cover the following phases :

(1).The paradigm shift is quite obvious with respect to knowledge sharing from research organizational perspective; (2). The communicative paradigm of knowledge sharing is also increasingly relevant as a means of organizing learning processes as collaborative, cooperative, exchange knowledge processes. (3). Knowledge sharing in the communicative paradigm which at least with respect to the topic, self-organizing paradigm will have major consequences for librarians work and the structure and information transfer institutions.

In this model, a hightened awareness of researchers preferences and needs more so than in the researcher interface model is proposed such as: know the researcher**,** competitive analysis, setting goals, parallel design, participatory design, coordinated design, apply guidelines, prototyping research centre "knowledge sharing", empirical testing, collect feed back from the users for the future design.

INTRODUCTION

The economic crisis in Indonesia makes the information center and library to be more acute, it is nearly impossible for research libraries to add their collections, on the other hand the recent traditional knowledge resources become more easily to find out, as an alternative to solve our problem. Currently there is no national effort to organize their traditional knowledge, including how to the transfer of knowledge through knowledge sharing among researchers and public can easily sharing, find and take advantage from their result. Most of them are finished in the cabinet of each institutions, without any appropriate knowledge exchange within and/or among them.

Knowledge sharing research objectives : researchers as a critical community and as the most creative and innovative to develop traditional knowledge via knowledge sharing community, so that CSDI should be as a knowledge center for knowledge sharing among them, CSDI also as a knowledge archive, organizer, and distributor to serve the public, knowledge sharing results will be faster, easier, and cost-effective, if they will use knowledge sharing based on Information and Communications Technology (ICT), the quality of researchers and their research result will be upgraded the utilization of research results by sharing among researchers will be increased especially "tacit knowledge sharing and processing " will facilitated so that researchers will upgrade their knowledge. For the next phases : linkage between research centers/institutions and community of business, industry and public will be increased and will produce many new beneficial impacts for national development, (*See Model I. " Knowledge Sharing Processes").*

The following table is a description of outcomes that will be reached : *Model I. Knowledge Sharing Processes, Model II. Knowledge Management Phases, Model III. Organizational Learning, Model IV. Organizational Knowledge Management System, and Model V. Sustainable Competitive Advantage.*

Knowledge Management is generally understood as a means of having better control over the production and usage of explicit and tacit knowledge in organizations of any kind, preferably business, but also public administration or research center. Using and applying "tacit and explicit knowledge " to solve the problem, also the result of communication processes, this can be called the network or communications approach to knowledge sharing.
Knowledge sharing in the communicative paradigm which at least with respect to the topic, self-organizing paradigm will have major consequences for librarians work and the structure and information transfer institutions, so that the paradigm shift is quite obvious with respect to knowledge sharing from an research organizational perspective. The paradigm shift towards communicative knowledge sharing has also consequence from an Indonesian culture perspective, the communicative paradigm of knowledge sharing is also increasingly relevant as a means of research organizing learning processes as collaborative, cooperative, exchange knowledge processes, KS also dramatically changes the way how the production and the exchange knowledge is and will be organized in scientific environment.

Definition of Knowledge Sharing (KS)

Knowledge sharing study aims to do something useful with knowledge and enhance knowledge sharing by structuring researchers in Indonesia Institute of Sciences (IIS), ICT and knowledge content : to increase innovation capacity in IIS such as creating knowledge repositories, improving knowledge access and transfer, enhancing knowledge environment and managing knowledge as an asset.

Methodology

The work in this KS study has been divided into four phases:

- reading literature and scientific articles;
- focused on collecting secondary data, which have laid foundation for the frame theory;
- contacting key researcher in the IIS organizations. After willing to participate on KS study;
- interpretation and analysis of the data from the theorical and empirical sections.

The design of KS research methodology is " *Life Cycle Model*"(*LCM*) : the traditional functional *LCM* approach to computer systems design includes six stages performed sequentially such as :

- project definition;
- system study;
- design;
- programming;
- installation;
- post-implementation.

In this *LCM*, a hightened awareness of researchers preferences and needs more so than in the user interface model is proposed such as : know the researchers, competitive analysis, setting goals, parallel design, participatory design, coordinated design, and prototyping KS system, empirical testing, collect feed back from the users for the future design.

Knowledge Sharing Procesess

A very important area of knowledge management is how to encourage researcher to share what they know. Usually knowledge is considered to be a source of power, and by not sharing, a person is increasing his or her personal value to the research organization thus making him/herself less likely to be replaced, for this reason, it is important to encourage researchers to share instead of hoarding knowledge. To solve this, it is vital to make sure that knowledge sharing is encouraged and that the researchers in possession of the knowledge understand the benefits of sharing it. Coleman suggests that" *a clearer lingkage between knowledge sharing and business benefits may motivate workers to take the time to share what they know*" .

Hence, the quest for each organization is to value constributions from its individual. By doing so, more constributions will be encouraged since it will become clear that sharing knowledge does not imply losing it. Sharing knowledge will only generate new knowledge and increase the value of the organization as well as its individuals. On this matter, Agren Olofsson and Persson point out that "*real competitiveness stems from being willing to share, and not the other way around, and that it is crucial to get this point across to the people who are supposed to do the sharing*".

Agren, Olofsson and Persson also identify the prerequisites for knowledge sharing. These prerequisites are an encouraging environment, motivation, and forums in which to share providing relevant information and making it accessible and giving the employees sufficient time to share their knowledge.

As a means to motivate researchers to share their knowledge, many organizations use incentives. However, as another side of the coin. Fitzek referring to Kleiner and Roth, brings forward another important aspect in relation to the incentive system. They state, that researchers becoming aware of being judged and measured seek to satisfy the evaluation criteria instead of improving their capabilities. The intrinsic motivation, which drives learning and knowledge transfer, is then supplanted by the desire to look successful. Yet evaluation is vital to learning as a feedback process that provide guidance and support, from explicit to combination and then get explicit to internalization, and then tacit need socialization to get tacit also externalization to explicit.

Knowledge Sharing Phases

In this kind of projects, major emphasis is put into trying to *capture knowledge* and to *treat knowledge* from the researchers IIS who create and use the knowledge. According to Davenport et al, "*there are three types of knowledge repositories : external knowledge, structured internal knowledge and informal internal knowledge*". For capturing external knowledge, competitive intelligence systems are used. These systems can filter, synthesize and add context to information from the external environment in order to make it more valuable, including this kind of knowledge, referred to as **tacit**, is not structured as a document and is therefore not easily converted.
Improving knowledge access and transfer, this kind put emphasis on activities providing access to knowledge or facilitating its transfer between researchers and users, one aspect of this is difficulty in finding the person with the desired knowledge and then effectively transferring it from that person to another. One activity of this kind is a community of practice, which can be either online-communities or face-to-face communities. A community of researchers IIS is a group of researchers sharing knowledge, learning together and creating. Community researchers IIS members frequently help each other to solve problems and develop new approaches for their field. Other examples of activities to improve knowledge access and transfer are workshops, seminars and different kinds of networks. Desktop video conferencing system, document scanning and other sharing tools are examples, which supports the communication of knowledge between researchers who would not otherwise work together, and hence, improve knowledge transfer, (*See Model II. "Knowledge Management or Knowledge Sharing Phases").*

Organizational Learning

Enhancing knowledge environment, unlike data or information, knowledge is created invisibly in the human brain and only the accurate organizational climate can influence researchers to create, reveal, share and use this knowledge. This kind of activities to establish an environment constributing to a more effective knowledge creation, sharing and use. Activities involved are trying to build awareness and cultural attention to knowledge sharing, a culture supporting knowledge environment eliminates researchers possible reluctance for sharing knowledge.

This activities are trying to change **behaviour** and **attitude** within the organization researchers need to fell part of the knowledge network and in some cases this may imply having to learn to trust colleagues in a new way. Knowledge, which previously has been kept individually, is to be shared. Therefore, part of enhancing the knowledge environment is making clear that a win-win situation will be the result, both for the organization and for the individual. Other activities make efforts to change the organizational norms and values related to knowledge and to support and promote the re-use of different kinds of knowledge, so that the new culture needs to be developed to become a natural way of working.

Many of the features in enhancing the knowledge environment of an organization, such as behavioural changes, are not developed rapidly. Researchers may need to learn how to work a bit differently than what they are used to, since sharing not always comes naturally.

To ensure an overall research organizational performance, the organization needs to manage and measure their technological, human and financial resources. One knowledge learning consists of a communication system on the organization's both intranet or internet, which is linked to a database. In this database researchers may share for instance repair tips, which they all may access from their laptops. When many researchers are traveling on the job, this means they will not have to miss out on any information that normally may have been shared among them, as a learning process.
To encourage knowledge sharing the research organizations observe and encourage active involvement. Some research organizations use incentive systems, others post lessons learned and success stories to motivate knowledge sharing among researchers. (*See Model III. " Organizational Learning").*

Research Organizational Knowledge Sharing Systems
Knowledge management is in essence an research organizing principle, which lays foundation for capturing the potential of the possessed knowledge within an organization. The knowledge content of products and services is increasing and their is a need to add competence and the knowledge surrounding the product in order to become more competitive. To make the most of the research organization's and enhance knowledge sharing it is important to acknowledge that it is about managing both technology and researchers in order to provide a beneficial knowledge-sharing environment.

At IIS, there are several ways of motivating researchers to exchange their knowledge. Top management involvement and commitment are of huge important and a prerequisite for a successful knowledge management project. Management can promote knowledge sharing by repeadtedly emphasize its importance for the whole IIS. There are also workshops and training to introduce researchers to the advantages of knowledge sharing. It is of vital importance for the researchers to understand that knowledge sharing is important. One needs to understand this, not only for efficiency's sake, but also to increase the essential humanization of social environtment. One way of encourage knowledge sharing is, when working in different systems, letting a researchers accumulate points, which can be exchanged for a variety of knowledge-related events.

Researchers are awarded with conference facilities through website, telecommunication equipment, depending on the number of shared accumulated during a year. The number of shares given to the contributor depends on the re-use feedback of the taker of knowledge, thus rewarding the usefulness of the transferred knowledge. Based on this feedback, knowledge of lesser quality can be removed from share-net, whereas high-quality knowledge can be highlighted and further developed. This process leads to a constantly improving quality of the available knowledge. The purpose of implementing knowledge sharing among research center as the research organizations is to take advantage of the available research results and improve its transfer between individuals. The majority of the participating research organizations have established some kind of technological platform to facilitate knowledge sharing. The structured document storage appears on a majority of organizations, and is usually databases with document where documents may be shared. Another common activity among research center at IIS is that have implemented systems to facilitate the communication between researchers in various locations of the IIS organization. communities of researchers, or discussion databases, in which researchers may contact other researchers and share their experiences appear frequently. To be able to locate the right person at the right time is a paramount issue when trying to take advantage of the knowledge embedded in the IIS organization. There are also face-to-face communities, workshops and seminar held in order for researchers from various parts of the IIS organization, as well as externally, to get together and share their experiences on various topics, (*See Model IV. " Research Organizational Knowledge Sharing System").*

Sustainable Competitive Advantage

The majority of the research organizations states the purpose is to increase knowledge sharing and to make the most of the collective knowledge they possess in order to meet researchers needs more efficiently. As of today, the projects are about connecting researchers in communities and networks to establish new relationships and gain experience. Databases, which store documentation to enable re-use at later points, are common, as well as researcher-directories to help locating the right person at the right time. The KS studied, are in line with Davenport's categorization. Projects that fall in the first category are projects focused on storing documents with knowledge embedded. These are stored in a repository where can easily be accessed. This type of activities stands out among the participating organizations. This involves community-based electronic discussion and lessons learned, which also appear among the studied organizations. By posting lessons learned, the researchers may see what has been generated from taking part of the stored knowledge.

In Davenport's second category are projects, which provide access to knowledge as well as facilitate its transfer. Earlier, a problematic area has been to locate the researcher who has the desired knowledge and then being able to transfer this knowledge to the researcher in need of it. By implementing system similar to directory this problem is solved. Even though the IIS organization directories of researchers take slightly different form, for instance handling complete researcher profiles, they all aim to keep track of who knows what within the IIS organization in order to provide the competence of a specific researcher at the right time and place.

Davenport's third category are activity focusing on changing behaviour and attitudes as well as research organizational norms and values. In order to fully be able to take advantage of the knowledge embedded in the organization there is the implication that individuals must feel comfortable sharing what they know. Also, apart from being willing to share what they know themselves, it is also important that they feel comfortable using somebody else's solution to a problem. When studying the participating research organizations from this perspective there are a few differences that stand out. The IIS organizations mention a lack of focus on sharing knowledge in the research organizational culture, even though it is about to change. This reluctance may stem from the idea of researcher feeling that they may easier be replaced if the do not have some kind of unique knowledge which makes them irreplaceable. There is also general encouragement to knowledge sharing, as well as efforts to introduce the benefits of knowledge sharing to researchers by having workshops and seminars. These activities are vital in order for researches to begin, and then continue, sharing what they know. *(See Model V. " Sustainable Competitive Advantage").*

From the foregoing discussion above of this paper, it is clear that a knowledge networked society will have profound impacts in different walks of life and their is a distinct possibility of the life style changing completely. The promise made to the common man by the knowledge networked society can be stated as "*A*" raised to the power of five: *anyone, anytime, anywhere, any knowledge, and any format.*

A full-fledged the knowledge networked society implies that every researchers have an access to the network. Network connectivity to home would become an essential infrastructural facility. Anywhere has implication for researchers who are accessing knowledge as well as for the knowledge resources being accessed. A knowledge networked society should pose no transborder barriers and be able to communicate knowledge in any format.

Network personal computers or simply NetPCs are based on advanced microprocessors and are specially architectured using hardware and software techniques to provide maximum efficiency under knowledge networked environment, NetPCs would support a variety of sophisticated network access protocols and navigation mechanisms in attempt to make network access as user-friendly as possible. Network computing implies powerful server machines on the network instead of powerful client or end-users systems. Multimedia PCs will have specially designed architecture and configuration to handle multimedia applications. The emphasis on multimedia PCs is to provide adequate local computing power to run multimedia applications.

Knowledge Management Techniques

Communication infrastructure and powerful personal computers tell only one half of the story of the knowledge networked society. Other important components include data, information and knowledge bases and the associated knowledge management techniques and the navigation mechanisms required for accessing these bases. In order to substantiate the view point of knowledge explosion, one tends to quote the annual publication figures such as one million journal issues, hundred thousands monographs, one million patents and tens of thousand of reports and dissertations. Apart from the current knowledge, the world has been accumulating knowledge over millions of years which are stored in different forms in different parts of the world. This knowledge, when digitized would perhaps run into several million terabytes. Perhaps, a large knowledge of the researchers would spend its time in evolving effective and efficient knowledge management techniques.

KM techniques cover knowledge storage and archival techniques as applicable to large volumes of knowledge. Advances in optical storage technology are expected to user in phenomenal increase in the capacities of compact disks. Optical disks with capacities of 50 Gigabytes and more are likely to be available in the market with the *Digital Versatile Disks* (*DVD)* and blue lasers replacing infrared lasers. Clearly, optical storage is the most promising knowledge storage for the knowledge networked society. While clear trends are visible to develop very large capacity storage devices, efforts appear to be lacking in improving the access time from these storage devices. We are still in the milliseconds domain in accessing knowledge from these devices. While storage architecture techniques like virtual storage may offer temporary solution to the problem of access time, the real solution would lie in improving the basic access mechanism for the optical storage devices.

Current knowledge software efforts are directed towards coorporate knowledge resource which needs to be managed effectively to maintain leadership in a competitive world. These efforts need to be scaled up by orders of magnitude before even the simple applications of the knowledge networked society can be managed effectively.

Knowledge and Data Mining, also called knowledge discovery in databases pertain to retrieval techniques used for handling voluminous mass of data/knowledge. Very Large Knowledge Databases Management Systems require new approaches to handling massive knowledge the future knowledge would contain. Knowledge mining ensures fast retrieval of specific knowledge items from very large knowledge databases.

Today's knowledge and data mining techniques range from online application processing tools that query multidimensional knowledge database to advanced artificial intelligence techniques like machine learning, neural networks, rule-based systems, and genetic algorithms. Knowledge storage today is centered around local knowledge databases. For a networked society, knowledge storage has to be implemented in large scale telecommunications networks. This is an area in which hardly any significant work has been done. Advances in artificial intelligence, increased use of object-oriented programming and powerful software development tools are expected to impact greater capabilities to both knowledge data mining and knowledge storage techniques.

Summary
Knowledge Management is in essence an research organizing principle, which lays foundation for capturing the potentials of the possessed knowledge within an research organization. To make the most of the research organizations resources and enhance knowledge sharing it is important to acknowledge that it is about managing both technology and people in order to provide a beneficial knowledge sharing environment. Researchers knowledge sharing projects aims to do something useful by structuring researchers, information technology and knowledge content. Some of the projects are based on IT-systems. While others put emphasis on relationships and communications based on networks. However, a majority of the **KS** projects emphasize activities for managing, sharing, creating and distributing knowledge within an organization.

I understand that the researchers participating organizations in this **KS** are storing the knowledge locally and are also sending them to the Central Servers. What we need at this time is also concurrent measures to make very useful and highly user-friendly interfaces. This will make the **KS** a friend of every one and its utility would enhance many folds. It is important that we take on this **KS** of integrating all forms of knowledge sharing into our digital form.

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