

**KNOWLEDGE MANAGEMENT and KNOWLEDGE SHARING in INDONESIA  
IINSTITUTE OF SCIENCES (LIPI) : FACING LOT OF CHALLENGES TO  
DISSEMINATE SCIENTIFIC KNOWLEDGE for the SOCIETY**

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**Abstract**

*The purpose of this an article is to gain a better understanding of how some factors are critical for the successful application of knowledge management and knowledge sharing. Knowledge Management and Knowledge Sharing with a new paradigm covers a wide range of functionalities and support different sets of activities. Therefore, to achieve knowledge management and knowledge sharing, this work limits the field of investigation to that knowledge sharing models, devoted to the formalization and sharing of best practices and experiences within the organization.*

*Usability issues should be considered during the model of 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 with a new paradigm :*

- (1).The dimension shift is quite obvious with respect to knowledge sharing from an organizational perspective,*
- (2). The communicative dimension 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.*

*Also the development of knowledge management and knowledge sharing among cross- research center in Indonesia Institute of Sciences is relatively new. What ever their progress, usually the implementation of knowledge management and knowledge sharing encountered three constraints that are administrative, technical and cultural ones.*

**Introduction**

Indonesia Institute of Sciences (LIPI) has been a referred centre for science and technology in Indonesia. This institute has a scientific capability to produce numerous scientific discovery and services. Some of products have been utilized by stakeholders, namely industries, and government institutes for the benefit of the people. However this system should be strengthened and improved by efficient and effective science communication programmes : such as science briefing, industry relation, public advocacy, press release, etc. Knowledge based resource management plays important role in this endeavour. The Centre for Scientific Documentation and

Information, The Centre for Innovation, Bureau for Cooperation and Popularising Science and technology work together to bring science to the people for their better life.

The Indonesia Institute of Sciences which is in Indonesian is called as Lembaga Ilmu Pengetahuan Indonesia, abbreviated by LIPI as a research institution which is owned by the Government of the Republic of Indonesia. It carries a main task to assist the President of the Republic of Indonesia in developing science policy in Indonesia. The coverage of LIPI task are organizing research and development, providing guidance and services to scientific and technological enterprises and conducting strategic and fundamental research in science and technology.

LIPI has 28 research centers ranging from hard sciences to social sciences, 3 supported centers, 4 bureaus which are responsible for any administrative matters, 20 technical implementation units and a number of research stations. The location of those units are scattered in the Indonesia archipelago, from Sumatra island until Irian Jaya island.

### **Literally means Café for Scientific Knowledge**

In the field of library and information sector, LIPI conducts Warintek Programme (Café for Scientific Knowledge) in Iptekda scheme during the fiscal years of 1998-1999. The pilot project is located at Palembang, South Sumatra. Later, the first Warintek was established in Palembang and it was derived from the phenomena of that improving intense remote communication amongst society in the field of production, trade, research, education and cultural aspects. The aim of establishing Warintek are to support society understanding on the importance of information, to encourage Warintek users having ability to seek information when they need and to locate, evaluate information and to use information effectively. Warintek Pilot Project in Palembang provides catalogue on selected databases and internet lines.

The existence of Warintek is critically important in the situation where technology changes very fast and the availability of information in different formats exists. If people have no information access point, their condition probably could be worsen.

Warintek tries to facilitate its users such as teachers, local research, and development unit and units SME's to access information with affordable price. Furthermore, LIPI can share its knowledge more effective because Warintek will able to support its local stakeholders. So far, Warintek programme which is a kind of cyber café, is considered successful.

Because this programme is considered successful, the Ministry of Coordinating Science and Technology is offering small Warintek program to be a national scaled programme. The argument is the program is inline with the National Strategic Policy on Science and Technology Information accessibility and utilizing the advance of global information infrastructure. Then, Warintek is launched by the Ministry of Coordination Science and Technology.

In the development of Warintek, there is a need to launch Warintek 9000. The 9000 indicates the amount of Warintek will be in the year of 2008. This ambitious programme is aimed at supporting the better quality of bureaucrats, administration services, improving local government integrated management information systems, improving human resources development, etc.

Through the above examples, it is indicated that information access in Indonesia leans on the availability of infrastructure supported by information (content), information resources, policy and legal aspects.

### **Knowledge Sharing**

Drucker (1993) described knowledge, rather than capital or labour as the only meaningful resource in the knowledge society, and Senge (1990) has warned that many organizations are

unable to function as knowledge based organizations, because they suffer from learning disabilities. Strategies to investigate knowledge management would be to increase the level of social interaction that occurs in the organization, as only some of which may be technologically assisted, Earl and Scott (1999), Bontis (2001).

To some extent, every human process issues is a key success factor. Every one has been important since people first formed organizations to accomplish tasks too big to be performed by individuals working alone and every one will continue to be a challenge as long as people work together.

#### Definition

Although Knowledge Management concepts have been around for a long time, the term “*Knowledge Management*” seems to have arisen in the mid-70s. Nicholas Henry (1974) uses “*knowledge management*” in a manner that resembles our current understanding of the expression.

Defined broadly “*Knowledge Management is the process through which organizations extract value from their intellectual assets*” (Kaplan, 2002).

“*Knowledge Management*” caters to the critical issues of organizational adaptation, survival and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies and the creative and innovative capacity of human beings” (Malhotra, 1997).

#### the term of Knowledge Sharing

Knowledge sharing aims to do something useful with knowledge and enhance knowledge sharing is made in two paradigm : one paradigm is to manage existing knowledge, which includes developing of knowledge repositories ( memos, reports, articles, reports), knowledge compilation, etc. Another paradigm is to manage knowledge-specific activities, that is, knowledge acquisitions, creation, distribution, communication, sharing and application (Stenmark, 2001).

Knowledge management consists of the administration of knowledge assets of an organization and sharing and enlargement of those assets.

#### Knowledge Sharing Processes

For the next phases : best practices should be shared within the company’s network, though it is understood that in current, networked. Companies today live in knowledge ecologies where one company feeds knowledge into another. Therefore, the firm’s openness to external experts and the sharing of ideas.

A very important area of knowledge management is **how to encourage people 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 organization thus making him/herself less likely to be replaced, for this reason, it is important to encourage people to share instead of hoarding knowledge. To solve this, it is vital to make sure that knowledge sharing is encouraged and that the people in possession of the knowledge understand the benefits of sharing it. Coleman suggests that” *a clearer linkage 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 contributions from its individual. By doing so, more contributions 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 people 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 people 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**

*Knowledge Sharing Phases*, that model an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise’s information assets. These assets may include databases, documents, policies, procedures, and previously uncaptured expertise and experience in individual workers.

In this kind of projects, major emphasis is put into trying to *capture knowledge* and to *treat knowledge* from the researchers LIPI (Indonesian Institute of Sciences) 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 LIPI is a group of people sharing knowledge, learning together and creating. Community researchers LIPI 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.

### **Sharing Knowledge Effectively**

Many input that LIPI got from working in partnership with CSIRO. A lesson that is learned from CSIRO is no matter how good the researches LIPI does, it becomes less meaningful if it is not share. An important advice from CSIRO is that LIPI needs to strengthen its science communications activities. An effective marketing communications strategy in every year must be developed and evaluated at the end of the year. LIPI has to address its work to various

audiences through the appropriate means or channels. Among the audiences are stake holder, personnel, government, industry, media and public.

To respond to the advise, LIPI have to look at its strengths, weaknesses and what it had been done in the past. This institute has a scientific capability to produce numerous scientific discovery and services. Some of its products have been utilized by stakeholders, namely industries, and government institutes for the benefit of the people. Good work of the public relation office contributed to its success. However that work of the public relation office contributed to its success. However that work is not enough. Therefore this system should be strengthened and improved by efficient and effective science communications programmes, such as science briefing, industry relation, press release, etc. to respond to the development of every aspects in the world as a whole.

Beside providing assistance for small and medium scale industry, LIPI also builds relations to large scale industries. Working with industry means using industry to be the mediator between research and the people who get the benefits from the research. Industry will facilitate to change the research to become a product used by the people. Communications to the industries is maintained through informal personal approach between LIPI's executives and top executives of industries, industry briefing, regular meetings between LIPI and industries, meeting with industry associations, industry visit, forum industry and information to industry. So far, LIPI starts to develop co-operation in the filed of research and development activities with engineering industry for preparing a pilot plan for oleo chemical industry and national food industries, pharmaceutical industries, cosmetics industries, herbal medicine industries in the filed of product development. LIPI also provides services for industries which services on measurement, standard, and testing quality.

LIPI realize that sharing its knowledge using media means sharing the knowledge to people as a whole as media can reach people even in a remote distance.

Sharing knowledge from research institution to the outside world is a must and important in order that outside world know what the institutions does and the fact that they are one entity, that is the unity between the supplier (producer) and the user. In a simple way, it can indirectly be transmitted in the form of marketing communications of the institution.

There is always an excellent co-operation inside as organization to perform a great task, that is the contribution of the related units responsible to perform the task. Within LIPI, the Centre for Scientific Documentation and Information (PDII) is responsible for providing S&T information.

## **Organizational Learning**

*Organizational Learning (OL)*, specialists point out the heavy investment in IT by institutions to transfer information and knowledge and make them available at the institutional level. OL specialist point out that technology approach is a purely mechanistic solution to information issues. They should consider these solutions as naively promoting software and hardware packages to resolve KM problems. OL experts claim that information technology has never addressed the tacit knowledge, which includes not only the actions, expertise, and ideas of staff, but also the values and emotions of staff. OL emphasizes that the efficiency and effectiveness of knowledge workers depends mostly on how workers communicate and collaborate in their efforts and expose themselves to communities of practice within the institution as well as outside the institution.

In terms of a general model for KS and OL, a descriptive model is proposed integrating explicit knowledge, tacit knowledge, and the infrastructure. Explicit knowledge and tacit knowledge have a symbiotic relationship whereby tacit knowledge contributes to explicit knowledge. Some examples of explicit knowledge are found in the following: commercial publications, organizational business records: web, groupware: intranets, databases, and self-study material.

Similarly, some examples of tacit knowledge are reflected in: face to face conversation, both formal and informal: telephone conversations, both formal and informal, the knowledge that individuals possess in their heads as well as in their desk drawers and file cabinets.

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 contributing 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 feel 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 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 organizations observe and encourage active involvement. Some organizations use incentive systems, others post lessons learned and success stories to motivate knowledge sharing among researchers.

## **Organizational Knowledge Management and Knowledge Sharing Systems**

*Organizational Knowledge Management/Sharing System*, most of the concrete applications of knowledge management described to date consist of creating and supporting communities of shared interest and information need. Current knowledge management thinking is almost entirely about establishing the structure and the climate to enable and encourage those who have knowledge to share it.

Knowledge management is in essence an 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 there is a need to add competence and the knowledge surrounding the product in order to become more competitive. To make the most of the 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 LIPI, there are several ways of motivating researchers to exchange their knowledge. Top management involvement and commitment are of huge importance and a prerequisite for a successful knowledge management project. Management can promote knowledge sharing by repeatedly emphasize its importance for the whole LIPI. There are also workshops and training to introduce users 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 environment. One way of encourage knowledge sharing is, when working in different systems, letting a researcher 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 LIPI is that have implemented systems to facilitate the communication between researchers in various locations of the LIPI 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 LIPI organization, as well as externally, to get together and share their experiences on various topics.

### **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 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 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.

The majority of the organizations states the purpose is to increase knowledge sharing and to make the most of the collective knowledge they possess in order to meet users 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 PDII 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 PDII 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 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 organizations from this perspective there are a few differences that stand out. The PDII-LIPI organizations mention a lack of focus on sharing knowledge in the 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.

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 architected 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.

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.



## **Constraints**

Knowledge Management and Knowledge sharing encountered various constraints when they implemented the electronic documents or shares. Those constraints are as follow :

- a. Manpower. Electronic documents need computer-literate- staff while some of the research center staffs belong to techno-phobia category (most of them).
- b. From cultural point of view. Access to Internet is still very low, less than 50% of the LIPI population. The users still use the printed matters because it is more convenient than the electronic ones. However, behind this resistance also the technology awkwardness among users to sharing their knowledge including the researchers.
- c. Policy for publishing point of view. The constraints originated from those who are afraid of plagiarism owing to the accessibility of the electronic documents and the heavy burden of electronic activities. The pros argued they by the electronic documents, the result increased the institutions research's prestige as well as has social value for the society.
- d. Copyright infringement. Many research centers especially head of research center still afraid of copyright infringement caused by the easy character of the electronic form.

## **Summary**

Knowledge Management and Knowledge Sharing are in essence an organizing principle, which lays foundation for capturing the potentials of the possessed knowledge within an organization. To make the most of the 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. Knowledge Sharing and information technology projects aims to do something useful by structuring people, 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 knowledge sharing projects emphasize activities for managing, sharing, creating and distributing knowledge within an organization.

I understand that the researchers participating organizations in this knowledge sharing and creating knowledge 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 knowledge sharing a friend of every one and its utility would enhance many folds. It is important that we take on this knowledge sharing of integrating all forms of knowledge sharing into our information technology form.

Figure 1. A Conceptual form Digital Library and Knowledge Sharing Systems

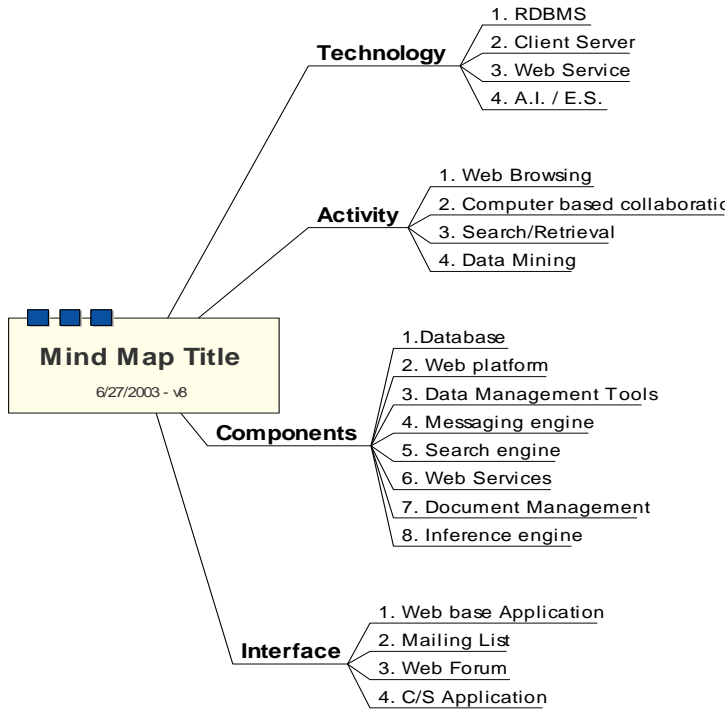


Figure 1.

- Technology
  - a. Technology Database Relational (RDMBS)
 

RDBMS systems should be *portability* and *scalability*
  - b. Client Server.
 

Client server approach which used to *web based client server (PHP)* and *conventional client server (Delphi, VB, etc)*
  - c. Web Service
 

Client server technology is used by team.

Artificial Intelligence / Expert Systems as a tools for building the systems.

- Activities
  - a. Web Browsing
 

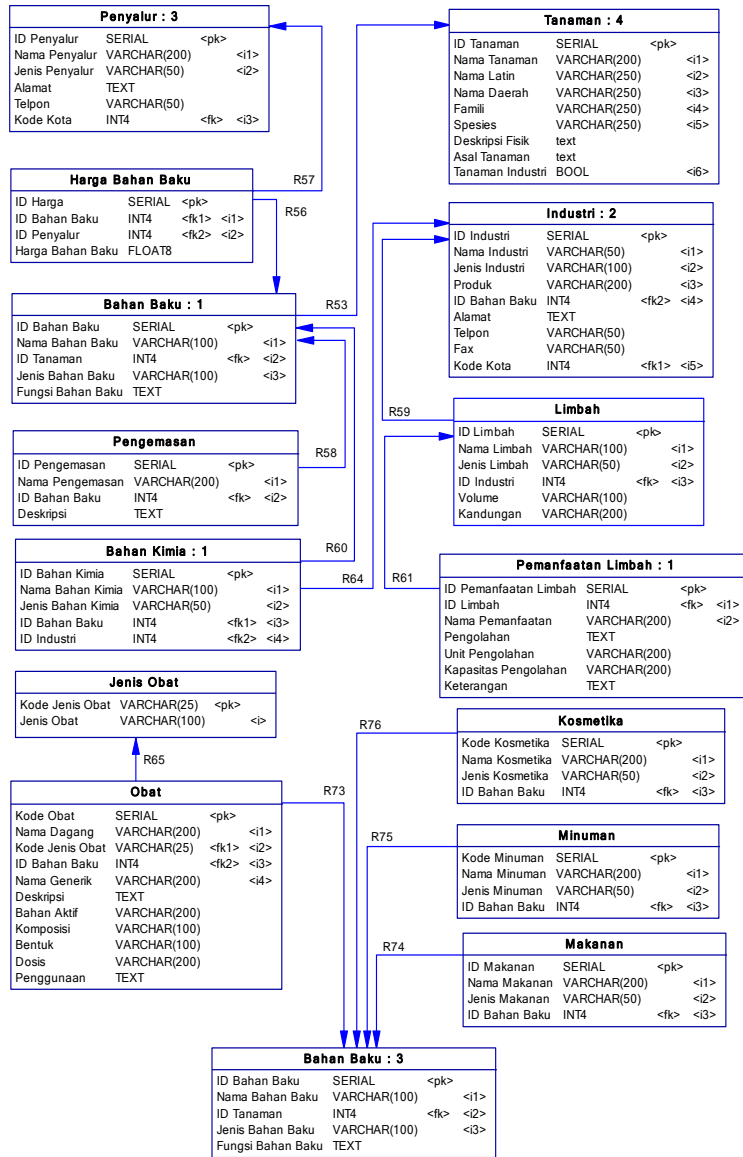
To make an *interface web*.
  - b. Computer based collaboration
 

To make collaboration such as : *mailing list*, discussion forum is based on *web* and *GDSS*

c. Search/Retrieval

**Cluster Off Farm**

Page 1



d. Data mining

- Components
  - a. Database
  - b. Web Platform
  - c. Data Management Tools
  - d. Mesagging Engine
  - e. Search Engine
  - f. Web Service
  - g. Document Management
  - h. Inference Engine
  - i. etc

■ Interface

- a. Web based application
  - b. Mailing List
  - c. Web Forum
  - d. C/S Application
- etc

Figure 2. Example about Cluster off-farm

Figure 3.

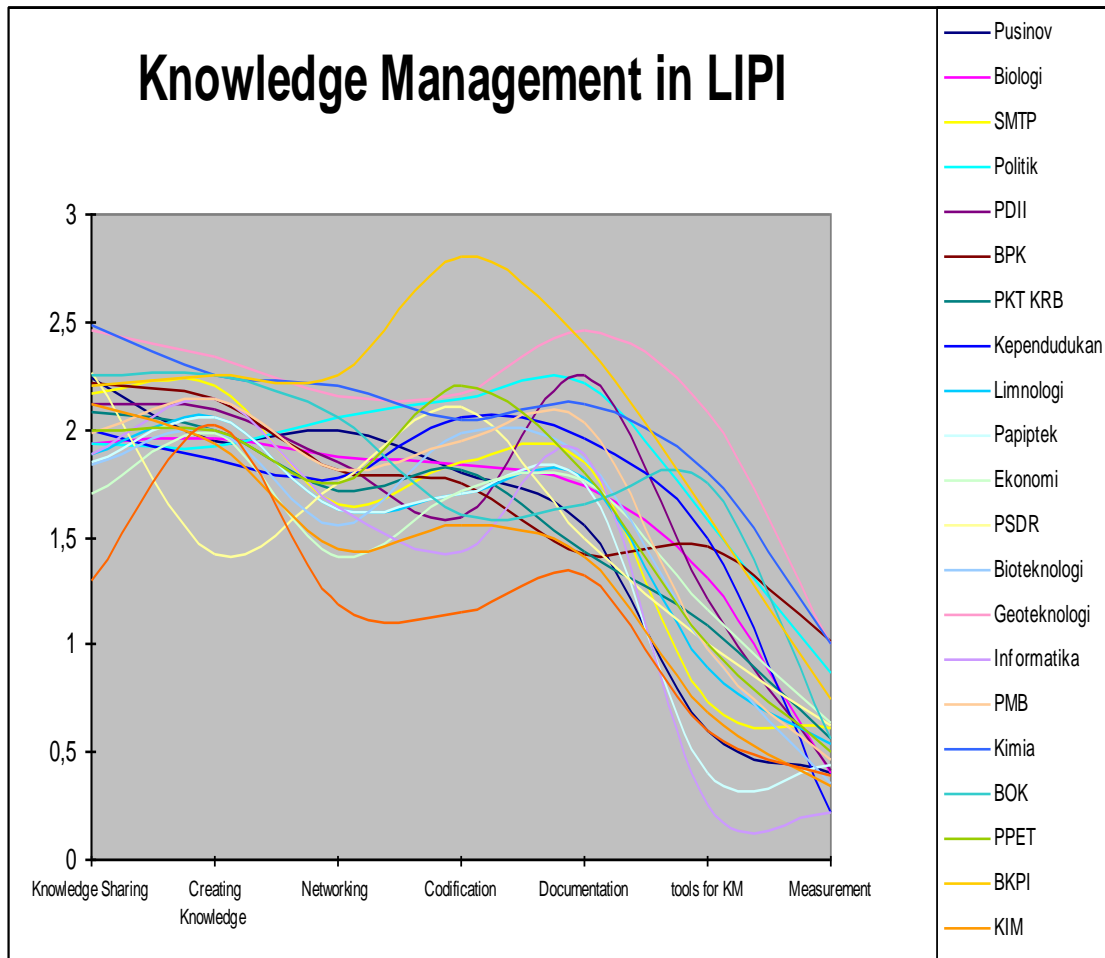
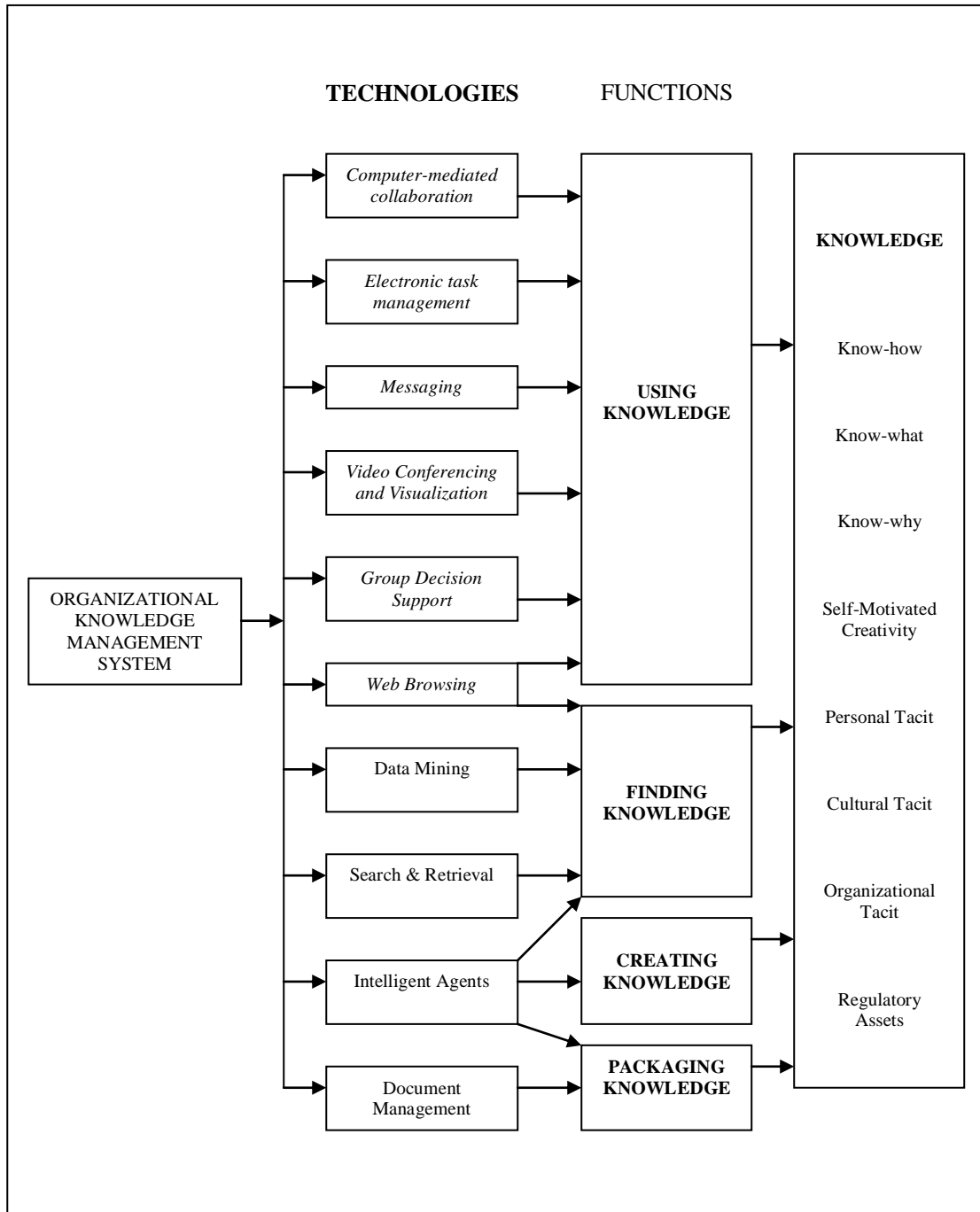


Fig 4 . **Knowledge Management System Perspective** ( adapted from :Meso & Smith, Journal of KM Vol 4, No.3,2000



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