The Development Of Knowledge Management System For Public Higher Learning In Collaborative Environment Using Lotus Notes Software

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ABSTRACT

In higher learning institution sectors, collaboration tools of Knowledge Management Systems (KMS) explore the opportunity to create, gather, access, organize, distribute and disseminate the knowledge to their community of practice for many purposes such as learning process, R & D and others. This paper describes the theoretical concept and approach of knowledge management system (KMS) that could be implemented in Public Higher Learning Institution (PHLI) by showing how the framework of knowledge management system model is developed using Lotus Notes software. The achievement of this KMS framework is an added value for any PHLI that needs to implement the KMS, which can help them to achieve their aims and objectives. The emphasis also will be given to the activities that may be of concern for each stage in the KM life cycle by including the critical success factors (CSF) to ensure that KMS initiatives will deliver competitive advantages to the organization.

Keywords

Knowledge, Critical Success Factor, Knowledge Management, Knowledge Management System and Lotus Notes.

1.0 INTRODUCTION

Knowledge management has been a buzzword in a range of subject disciplines for many years, and has lately been applied into higher learning institution. With the growth of this concept, there has also been a need to develop ways of understanding knowledge processes within this context and to select knowledge management systems that can help in knowledge creation, storage and sharing. In terms of definition, knowledge management is the systematic, explicit, and deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets (Wiig, 1997).

Knowledge management is a discipline that provides strategy, process and technology to share and leverage information and expertise that will increase our level of understanding to more effectively solve problems and make decisions (Satyadas, *et. all*, 2001). The objectives of knowledge management are to make the organization act as intelligently as possible in terms of viability and overall process, and to realize the best value of its knowledge assets.

A PHLI environment seems to be by its nature especially suitable for the application of knowledge management principles and method. The main reasons are, this institution usually posses a business activities of modern information infrastructure, the professors and teachers generally require sharing of their knowledge with others, and the students need to acquire knowledge from reliable sources as fast as they could. In the education industry, knowledge management can be defined as a systematic process that creates, captures, shares, and analyzes knowledge in ways that leads to generations and contribution of new knowledge amongst its community of educators and students.
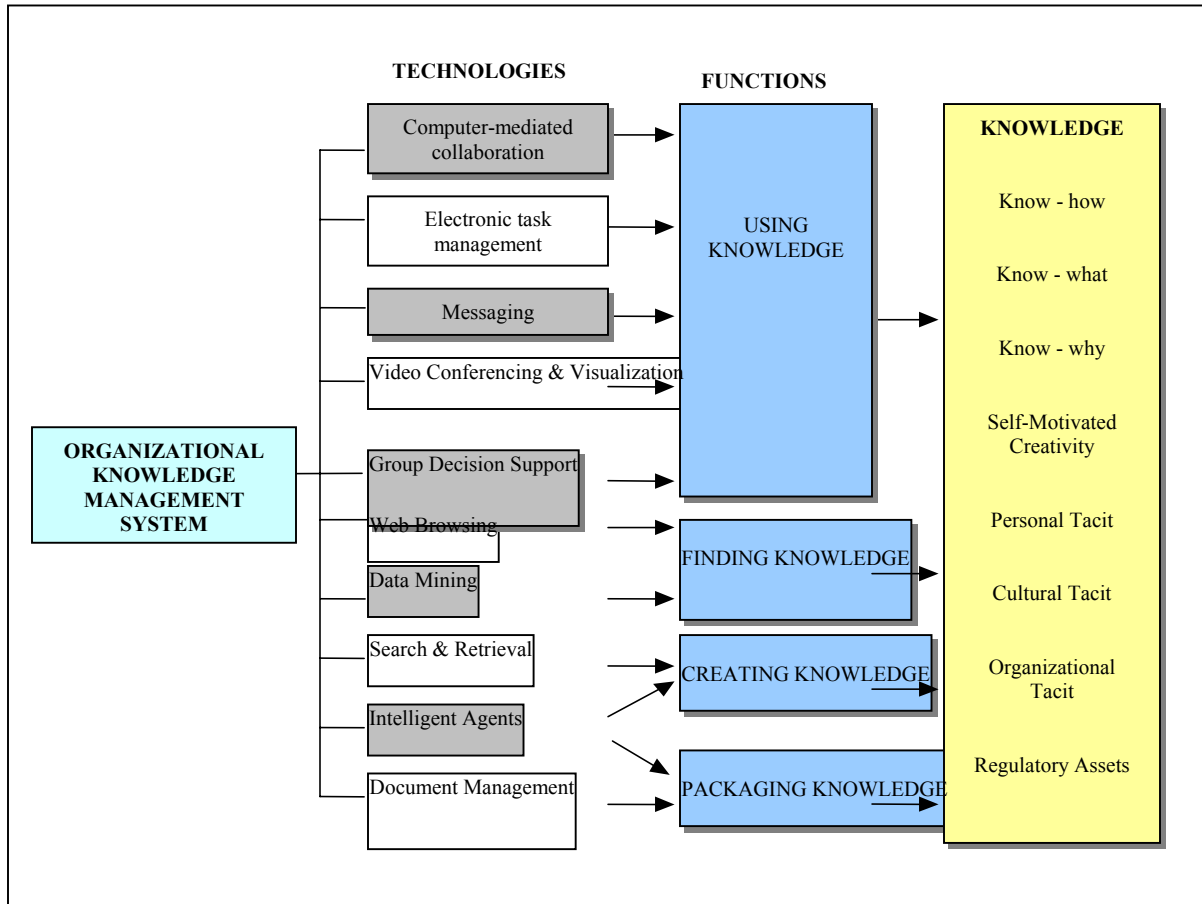
Figure 1: The technical perspective of a knowledge management system

From a theoretical standpoint, Knowledge Management Systems (KMS) refer to the information systems adopted and designed which efficiently and effectively leverage the collective experience and knowledge of employees to support information processing needs as well as enabling and facilitating sense making activities of knowledge workers (Wickramasinghe, 2002). KMS can include of any type of information, including both quantitative and qualitative. Qualitative information may be in the structured or semi structured text format and often takes the form of reports from prior project leaders on what they have learned during the project. Figure 1 simplifies the technical aspect of a knowledge management system (Meso, 2000). A well designed of KMS should be considered four core features to allow the system to bring expected to the organization. The four core features are:

- Infrastructure, Content and Portal
- Collaboration & Learning
- Social Capital and Expertise
- Communities, Business Intelligence and Integration

2.0 THEORETICAL ASPECT OF KNOWLEDGE MANAGEMENT

There are six theoretical aspects that will be discussed in this paper. They are: framework, technology, process, methodology, life cycle, and people.

2.1 Knowledge Management Framework

There are ten knowledge management frameworks that have been identified. Table 1 summarizes and compares these tens knowledge management frameworks.

2.2 Knowledge Management Technology

Knowledge Management System is also defined as the collection of technologies that can collect, sort, store, and share the knowledge throughout the

organization. Based on that definition, the technologies that can be used in the development of KMS are:

- *Intranets* – secure internal networks, to provide an ideal environment for sharing information accessed using a standard browser.

- *Information Retrieval Engines* – search engines are an absolute necessity and are the integral part of KMS.

- *Groupware* – to facilitate knowledge sharing via e-mail, online discussions, databases and related tools. Its collaborative features can result in the creation of stores of untapped knowledge.

- *Database management systems* – computer databases are common repositories of information. KMS can be constructed to incorporate the information that is stored in the organization and accessible by all.

- *Data warehousing and data mining* – Data warehouses are centralized repositories of information. Data mining refers to specialized tools that allow the organization to convert increasingly complex sets of data into useful information.

- *Document management system* – A collection of tools that facilitate electronic document management, including storage, cataloging, search, analysis and routing.

- *Push Technologies* – Delivering of appropriate knowledge to individual based on specific criteria.

- *Collaboration* – expert modeling and decision make analysis that lead to more collaboration, information expertise and insight sharing among knowledge workers.

- *Visualization and navigation system*-Relationship between knowledge elements and holders of knowledge.

Table 1. Comparative Summary of the Descriptive Framework
(Adapted from Holsapple and Joshi, 1999)

Dimensions Authors	Focus	Origins	Knowledge Resources
Wiig, 1993	Identify management influences on the conduct of KM	Not indicated	
Leonard –Barton, 1995	Manage interaction between organization's technological capabilities and knowledge development activities	Field research	-Employee knowledge -Knowledge embedded in physical systems
Anderson & APQC, 1996	Pride a basis for benchmarking the conduct of KM within and between organization	Consulting experiences	
Choo, 1996	Describe the working of knowing organization	Synthesis of past research	
Van der spek Spijkervet, 1997	Characterize a conceptualize-reflect-act-retrospect cycle for governing the conduct of KM	Not indicated	
Sveiby, 1997	Characterize and measure intangible assets (especially knowledge)	Consulting experiences	-External structures -Internal structures -Employee competencies
Petrash, 1996	Characterize and measure intellectual capital	Practical organizational experiences	-Human capital -Organizational capital -Customer capital
Nonaka, 1996	Characterize knowledge creation through interaction of tacit & explicit knowledge and among individual, group and organizational entities	Not indicated	
Szulanski, 1996	Identify barriers to transferring best practices within an organization	Synthesis of past research and empirical study	
Alavi, 1997	Using technology to accomplish KM at KPMG Peat Marwick	Case study	

2.3 Knowledge Management Process

Knowledge process comprise of knowledge creation, knowledge storage, knowledge distribution and knowledge application, as illustrated in Figure 2. The act of creating knowledge coincides with the act of working through the learning spiral of conceiving, acting and reflecting. Reflection is key to knowledge creation. Organizations must develop the infrastructure to capture, store and disseminate the knowledge created from experience. Knowledge management allows organizations to leverage lessons learned to be more effective in the future. In addition, a knowledge management system must help users to get their work done easier and more efficiently.

2.4 Knowledge Management Development

Knowledge management development involves four steps (Kotnour, *et. all*, 1997).

- Determine the organization's knowledge needs. The aim of this step is to determine the core competencies or focused knowledge needs of the organization (Drucker, 1993). The knowledge needs, are driven by the nature of the business the organization is in and desires to be in.

  At an organizational level, the knowledge needs are a function of the organization's product and services and the processes by which the products are produced. At an individual level, the knowledge needs are a function of the things a worker is responsible and accountable for and the decision to be made and actions to be taken.

- Determine the current state of organizational knowledge base or memory. The aim of this step is to determine where and how the organization's current knowledge is assimilated and disseminated. Using the previously identify knowledge needs, the existing sources of knowledge or organizational memory are identified and evaluated for the ease of use and ability to provide accurate, relevant, and timely knowledge.

- Determine the gaps in knowledge and barriers to organizational learning. The aim of this step is to determine why the organization is not creating and applying knowledge that is accurate, timely and relevant. The output of this step is a list of improvement opportunities for the organization learning process.

- Develop, implement and improve proactive "knowledge management strategies" to support organizational learning. The aim of this step is to develop proactive strategies to support the creation, assimilation, dissemination, and application of the organization's knowledge.

2.5 Knowledge Management Life Cycle

Knowledge evolution cycle consists of five phases (Rus and Lindvall, 2002):

- Originate/create knowledge-members of an organization develop knowledge through learning, problem solving, innovation, creativity, and importation from outside sources.

- Capture/ acquire knowledge- members acquire and capture information about knowledge in the explicit forms.

- Transform/organize knowledge—in written material and knowledge bases.

- Deploy/ access knowledge –organizations distribute through education, training program, and automated knowledge base system or expert networks.

- Apply knowledge- KM aims to make knowledge available whenever it is needed.

Based on consolidation of literature reviewed on Knowledge Management (Choo, 1998a; Choo, 1998b; Davenport, 1998; Davenport, *et all*, 1997, 1998; Leonard Barton, 1998; Myers 1996; Nonaka, 1995), a knowledge management lifecycle as shown in Figure 3 is developed. This knowledge life cycle is depictes in a simplified way, a strict sequence of identifying, creating, transferring, storing, (re)-using, and unlearning of language (Rosemann and Chan, 2002).
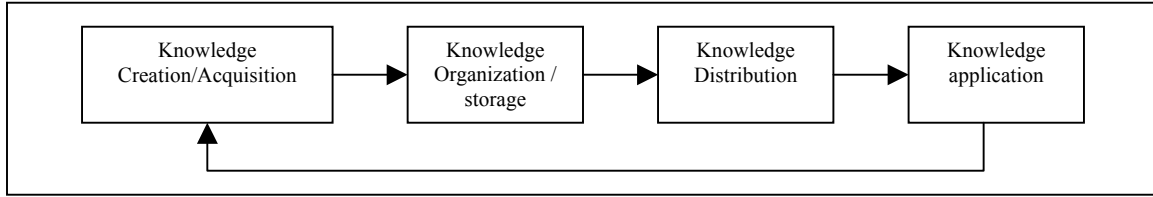
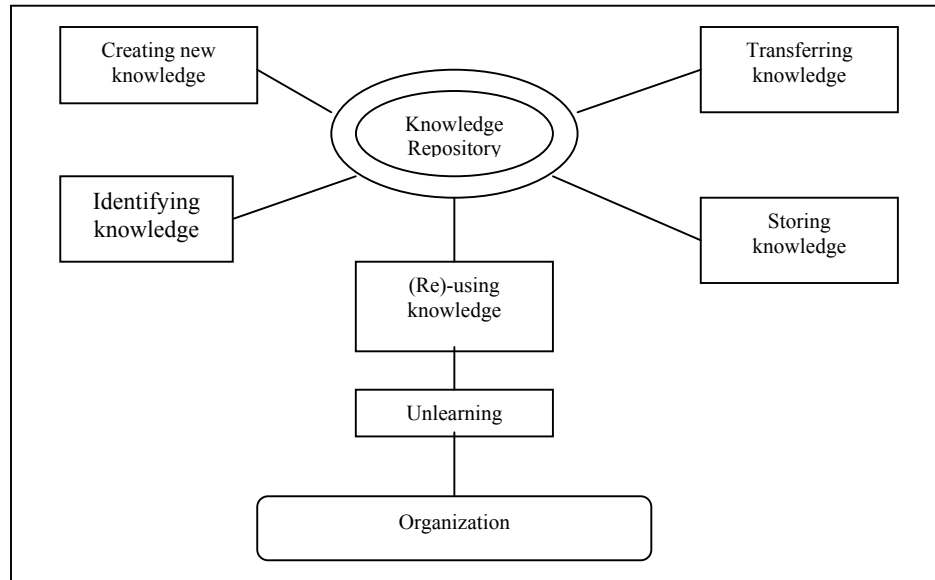*Figure 2: Knowledge Management Process*

Figure 3: The Knowledge Management Life Cycle

2.6 People in the Knowledge Management Organization

Knowledge won't be well managed until some group within a firm has clear responsibility for the job. Among the tasks that such a group might perform are; collecting and categorizing knowledge, establishing a knowledge-oriented technology infrastructure, and monitoring the use of knowledge. A task group will comprise of chief knowledge officer (CKO), Chief Learning Officer (CLO), KM evangelists, Chief Information Officer (CIO), Chief Task Officer (CTO), the program manager, and the chief knowledge architect (CKA) (Satyadas, 2001).

3.0 A PROPOSAL OF KMS IMPLEMENTATION IN THE PUBLIC HIGHER LEARNING INSTITUTION (PHLI)

There are three basic possibilities of how the PHLI could be exploiting the knowledge management ideas and principles. Firstly is the management of knowledge in term of student courses and others related with the academia program. Secondly is how to manage knowledge for decision support, to improve the internal document management and exploitation, to increase the level of information and knowledge dissemination. Lastly is how to make use the qualitative of change in the educational process itself. Generally, collaboration in PHLI could involve people as listed below.

- Academician or lecturers - their roles are as teachers and become designers of learning experiences, processes, and environments. They concerned with identifying and then transmitting intellectual content and more focused on inspiring, motivating, and managing an active learning process by students.
- Researchers – process or generates new ideas by doing research
- Administrators- managing all aspects of the public higher learning institution task such as a financial management, security, students' registration and others.

- The student – They study, accept, review the knowledge at public higher learning institution.
- The sponsors- the agent who sponsors the students or researchers in completing their studies or research works.

They are working together, hand –in-hand, in their institution to achieve their aim and mission. In this case, there are three important goals of the knowledge management system implementation in the public higher learning institution. The goals are to serve the community, faculty, and administration of the public higher learning institution. Below is some descriptions about the goals:

- Community

One of the most important objectives is to support and encourage interaction between the public higher learning institution and local community. Both individuals and community-based organizations may want to investigate an issue, drawing upon the expertise of public higher learning institution faculty and staff. Public higher learning institution involvement includes diverse activities such as public presentations, guidance, research projects, and educational outreach. The use of the Internet is an obvious deployment strategy for the community and any underlying database design should support intuitive browsing and topic-based search capabilities. In fact, the Internet can extend the notion of "local" community to include a geographically dispersed intellectual community interested in the research and educational materials generated by public higher learning institution.

- Faculty and Staff

The public higher learning institution faculty and staff have a somewhat different set of objectives. The public higher learning institution is developing its research presence through graduate education, grants and funding, technology transfer, and scholarly publications. In a very real sense, this mirrors some of the requirements that face organizations such as consulting companies and industrial research laboratories. How can the public higher learning institution researchers find collaborators, facilities, and grant proposals that might support new projects. The Internet is allowing professional societies and other academic organizations to build online intellectual communities.

- Administration

From an administrative perspective, the public higher learning institution would like to promote community involvement and research activity. While these activities are not completely aligned, a knowledge management system could enable key administrators to gain insights into ongoing activities. Administrative capabilities should support the development of policies that encourage new projects and activities in line with the strategic directions set for the university. For example, community contacts and project outcomes could be collected and used to foster new community outreach initiatives.

The need to develop and maintain a knowledge management system (KMS) is common to many knowledge-intensive organizations. While the term "knowledge management" has become overloaded with different meanings, there is a need to develop specific strategies to capture and organize knowledge assets or expertise. Public higher learning institution is a knowledge-intensive organization that could benefit from knowledge management efforts.

There are seven steps of critical success factors (CSF) to knowledge management process in the public higher learning institutions. The steps are:

- **The identify stage** determines which core competencies are important to academic success. Every department needs robust knowledge about its pedagogical needs and expectations from its members, services and administration. An understanding needs to be developed to settle its place in the pedagogical world and in other organizational and environmental aspects such as research endeavors and consulting services offered by the department.

- The **collect** stage deals with acquiring the internal and external knowledge, educational skills, fundamental theories and human experience needed to create the selected core responsibilities and knowledge domains.

- The **select** stage takes the continuous stream of collected, formalized knowledge and assesses its value. Initially, one framework should be selected as the basis for organizing and classifying knowledge to be stored in the Knowledge Bank or Repositories.

- Departmental memory resides in three different forms: in human minds, on paper and

electronically. The **store** stage takes the nuggets of knowledge and classifies them and adds them to the departmental memory. Much of this knowledge can be represented in electronic form as expert systems. This is where even tacit, intangible knowledge assets are transformed to tangible one.

- The **share** stage retrieves knowledge from the departmental memory and makes it accessible to the users. Individuals, teams and departments often share ideas, opinions, gossip, knowledge & expertise in meetings held in person or through groupware.

- The **apply** stage reclaims and uses the needed knowledge in performing tasks, solving problems, making decisions, researching ideas and learning. To reclaim just the knowledge, requires that the system understand the user's purpose and context. To receive the knowledge at the right time requires a proactive system that monitors the user's actions and behavior and determines his/her purpose.

- The **create** stage uncovers new knowledge through many avenues, such as observing students, student feedback and analysis, research, experimentation, creative thinking and automated knowledge discovery and data mining.

The features and a model of system configuration of Knowledge Management System (KMS) are also shown as in Figure 5. Among the functionalities at public higher learning institutions are:

- Electronic on-line document sharing including sharing of files, workflow diagrams, tools, procedures, manuals, best practices, and lessons learned etc. It is how students, lecturers, administrators, researchers and sponsors in the communities can share the ideas or communicate the new knowledge, learn and then can use it effectively.

- Correspondence Handling And Tracking System (CHATS) for the management of all correspondence, complaints, enquiries etc. Here, students can communicate with their lecturers or sponsors regarding their studies or financial problem and other matters without having to arrange for the meeting and having to wait for quite a long time to meet face to face. Students also can discuss with each other

synchronously, and they can grab the result of their discussion as fast as can.

- Extensive collaboration tools such as group and individual calendars, task and resource management, "to-do" lists, email, discussion boards, and on-line surveys. It is really important for the people in the public higher learning institution to plan, manage and collaborate with each other. As for example, with the discussion board, the administrators can discuss with the academicians about the structuring of the courses, examination date, the date of students registration, SSB, SSM and others.

- Various security features to ensure that information are only available to the people who need it. The password and login is only for the authenticated person in the public higher learning institution. Only people who have that password can access the databases or the information, such as only the students who are registered or in the class of a certain lecturer who are available and authenticated to access those lecturers databases and website.

- Information retrieval through Search And Advanced Search to allow you to find any information simply and easily. Here, we can see that most of the public higher learning institution own their website and inside the website, it is provided with the searching tools. By typing words to be search in the searching box, it will bring us the information that is needed. It is useful for the students and researchers especially in completing their task.

- Flexible views so that each user can tailor the portal to meet their own requirements

- Easily implemented within a company or community due to its Internet architecture. Public higher learning institutions nowadays have their intranet and can link to other information and institutions via the intranet. Knowledge management system that will be implemented must make sure that it can be link to others. For example, Lotus Notes is one of the knowledge management software that can be easily implemented in the public higher learning environment.

4.0 RESULTS AND DISCUSSION

Public higher learning institutions do have a significant level of knowledge management

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activities, and it is important to recognize these, and use them as foundations for further development, rather than to invent a whole new paradigm. Public higher learning institutions and their staff must recognize and respond to their changing role in a knowledge-based society. In order to assess the challenges that higher education institutions face in embedding knowledge management, we use Davenport's four types of knowledge management objectives as a lens through which to view higher education institutions: the creation and maintenance of knowledge repositories; improving knowledge access; enhancing knowledge environment; and, valuing knowledge.

The knowledge management system of the public higher learning institution, need its own framework. Current frameworks are not suitable to the public higher learning institution because it does not emphasis the role of human, technologies and the content development itself. Public higher learning institution consisted of human who manage it, administrative, conductive research, and teaching and studying; consisted of the

technologies which is needed by the human to convey and distribute their content which is ideas, knowledge. It consists of the content development, which is the knowledge management process.

The proposed model of knowledge management framework for the PHLI is shown in Figure 4 below. In this case, a prototype system by using Lotus Notes software has been developed as shown at Appendixes 1. This appendix will show the role of technologies in order to acquire and disseminate all kind of knowledge in the PHLI. In this case, the system set up was based on PHLI in a selected university in Malaysia.

As a general concept or overview of KMS functionality as well its components in PHLI environment, it could be viewed as shown in Figure 4 and Figure 5 below. This KMS development took into consideration the technical perspectives as stated in discussion in the literature review. Especially those was related to technologies, its functionality and the knowledge (tacit and explicit) or content development and as well as its implementation.
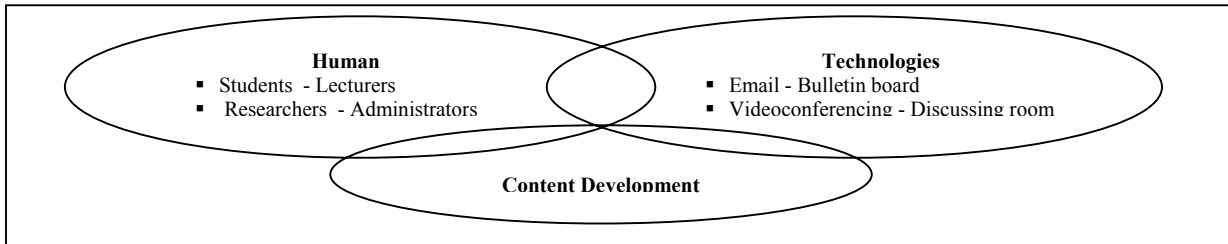

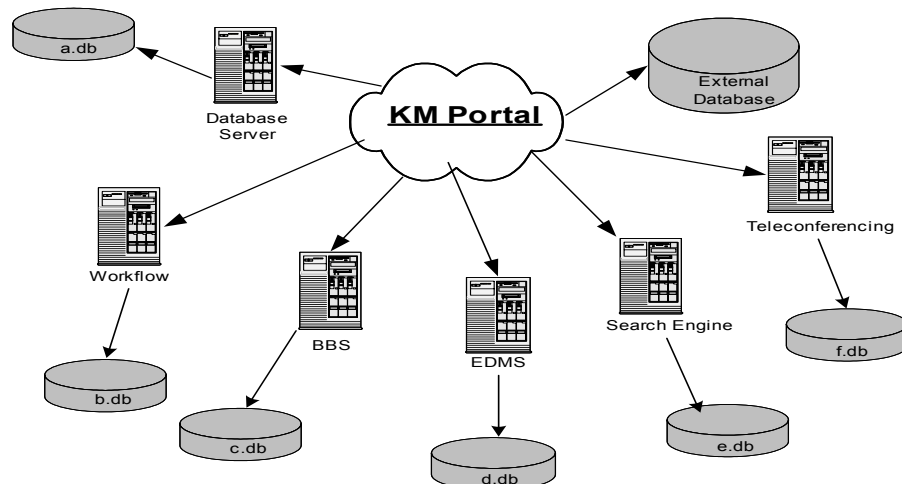*Figure 4: The System Components of Knowledge Management Framework for The PHLI*

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Figure 5: The System Configuration of KMS and Its Functionality For PHLI

5.0 CONCLUSION

As a conclusion, it seems that Knowledge Management System could be implemented in public higher learning institution with the base of knowledge management framework that has been proposed. In order to develop a successful of KMS, the public higher learning institution must ensure the proper requirement steps of implementation of knowledge management system is ready and try to adapt as much as possible of the technologies that are suitable for. It will need to ensure that the public higher learning institution can gain the benefit from the implementation so that they will not waste time and money.

They also must focus the importance of the collaboration environment, whereby the students, academicians, researchers and the administrators could be working together, sharing the knowledge among themselves and with others. Therefore, they also need to identify the problems of implementing the knowledge management system in order to make sure that they will always beware of the problems that arise and they can try to find the solution to overcome those problems. Here, it is suggested that the proper plan must be adapted along with implementation in order to maintain the effectiveness of the institution.

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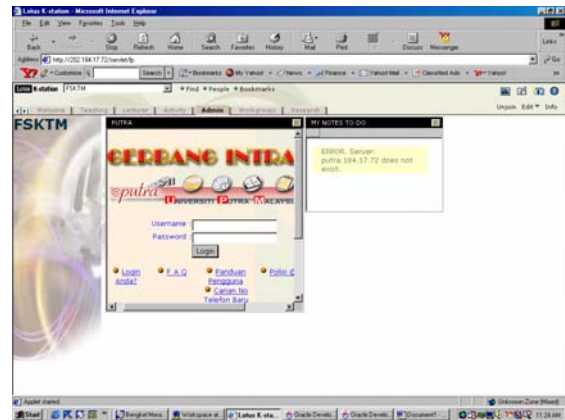
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Appendix 1: *The Example Interface Design of a prototype KMS using Lotus Notes at PHLI*

Example 1. Main menu of KM System for PHLI as a central of desktop control

Example 2: An Interface of KMS for a portlet linkage for knowledge dissemination

Example 3 An Interface of KMS for a portlet linkage for community's communications

Example 4: Another Interface of KMS for a portlet linkage project planning
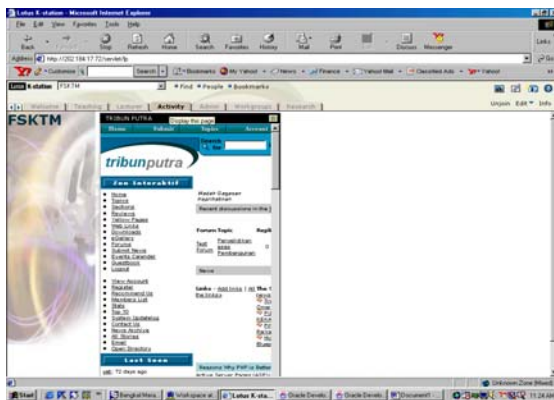
Example 5: An Interface of KMS for a portlet linkage for project control
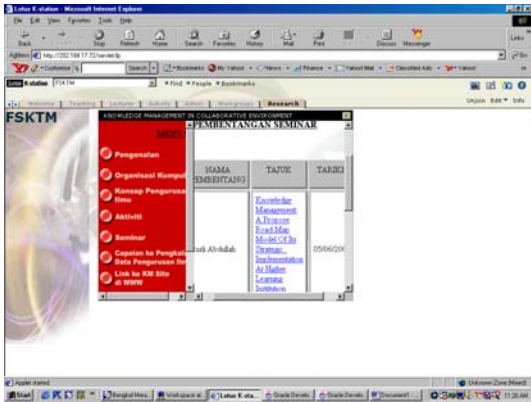
Example 6: An Interface of KMS for a portlet linkage for system integration