Prototype of Knowledge Management System for the Higher Education Institution in Indonesia

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***Abstract*—In this paper, we propose a model of knowledge management for higher education institution in Indonesia. The model consists of five processes (i.e. capturing, structuring, storing, disseminating and implemetation) and six critical success factors (i.e. vision, culture, management support, technology, education and motivation, and maintenance). Based on the model, we develop a prototype of knowledge management system that accomodates activities and processes in higher education institutions. The prototype is designed to support organization learning and can be used as knowledge repository in the organization.**

Keywords—knowledge management system; higher education; organization learning; repository

I. INTRODUCTION

Higher education (HE) in Indonesia has three major responsibilities, i.e. teaching, research and community service[1]. To carry out these responsibilities, higher education institution (HEI) should organize teaching and learning activities, do scientific research and support students and lecturers to implement the knowledge they obtained to the community. HEIs in Indonesia are increasingly developed as indicated by the growing number of population that is willing to study in higher education.

The gross enrollment ration (GER) of HE in Indonesia is increasing[2] . The GER in 2004 was 14.62% and increased to 18.36% in 2009. On the other hand, in 2009, the number of lecturers who has master and doctoral degrees was still 57.8%. This means Indonesia needs 42.2% more number to lift up its HEI system to an ideal level. To achieve it, many lecturers have to study further for their higher academic degrees in order to improve their individual qualification. Many of them is doing their study while teaching. As a consequence, the assignment of teaching classes is not evenly distributed among lecturers. Some lecturers have to teach too many classes that could lessen the effectively of learning process. This problem must be solved in order to minimize the gap in educational process.

Furthermore, HEIs consist of people with different education background, culture and experiences. Everyone has knowledge to contribute within organization. Those differences lead to different approaches in their contributions to real-wold problem solving. Everyone has difference decision making and problem solving approaches based on his/her knowledge and experiences[3]. Individuals' knowledge is not sufficient to be applied to face and solve the organization challenges and problems. The organization intelligence is not the sum of individuals' knowledge, but a combination of organization' knowledge and the sum of all individuals' knowledge, experiences and networks[4].

HEIs have to able to manage their knowledge. They need a knowledge management system (KMS) for collecting and combining different knowledge within their organization, such that knowledge can be easily learned, and effectively selected, to be implemented for a particular situation. Using the KMS a HEI can capture, filter and store all individuals' knowledge, and then use it to form organization' knowledge. This paper proposed a prototype of knowledge management system for HEIs, especially in Indonesia.

This paper is further structured as follow. Section II describes the need of KM in HEIs in Indonesia. Section III proposed a model of KMS. Section IV presents prototype of the proposed KMS. Finally, section V concludes the paper.

II. THE NEED OF KM IN HIGHER EDUCATION INSTITUTION IN INDONESIA

Higher education in Indonesia is regulated by the Directorate of Higher Education (DIKTI) of the Ministry of Education and Culture. Currently, Indonesia has 3,452 HEIs[1] and 411,203 lecturers[2] across the country. In order to achieve a better quality education, DIKTI progressively improves its service, by supporting many developing development, such as accreditation system, quality assurance system, research and community service grant, certification, scholarships and training program.

The result however cannot instantly obtained. DIKTI and HEIs need more time to run all those program. Yet, it is challenged by the increasing number of students enrolled in

1 http://evaluasi.dikti.go.id/database/pt

2 http://evaluasi.dikti.go.id/stat/dosen1

HEI each year. It is indicated by unbalanced ratio between lecturers and students. The number of lecturers who has minimum qualification is still below the expected standard.

As an implication, the HE responsibilities are not fully delivered yet. Many lecturers focus on two main activities. First, they have to study further for the academic qualification. Second, they have to teach classes since their HEIs need them for the daily teaching activities. Both those activities are currently becoming the main focus.

In addition, in a learning process the problems are often arisen, such as in delivering course materials in the parallel classes, the differences of lecturers' point of view, etc. This causes the knowledge among students is not evenly distributed.

In Indonesia, knowledge management (KM) is not envisioned as a strategic support to reach organization visions or goals. Most HEIs do not embracing KM in their organizations. This adds to the complexity and problems of national education quality [5] .

III. THE MODEL OF KM

The main goal of KM is to store knowledge into a repository such that the knowledge can be used and/or updated later in the future. Organization knowledge is gathered from business processes and daily activities, such as learning in classes, student mentoring, scientific researches, information sharing, and management meetings. During these activities, knowledge is captured and then is managed in a structured process called as KM cycle.

The KM cycle needs supporting components in order to be effective. These components are critical factors for a successful KM system. In Figure 1, we proposed a KM model:

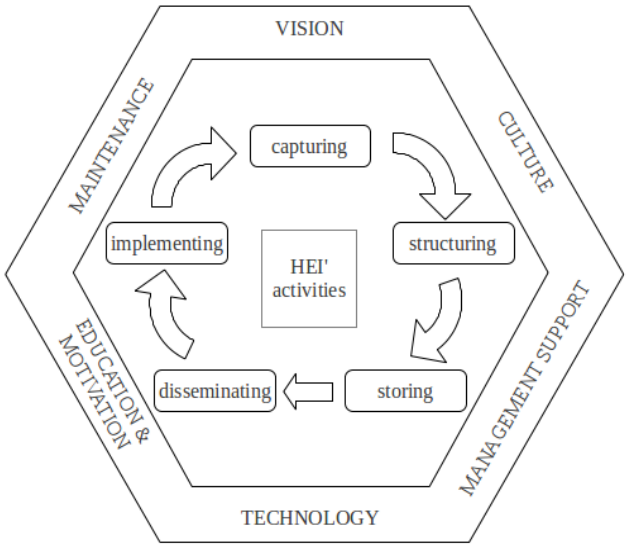


Figure 1. Model of knowledge management system (KMS in HEIs Activities)

A. HEIs Activities

Three main activities of a HEI are teaching, research and community service. Teaching activity includes in-class learning, student mentoring, curriculum development and information sharing. Research activity includes fundamental/applied research, scientific-paper writing and book authoring. Community service is done so that community can get direct benefits of the HEI. This can be done, among others, by conducting seminars and workshops and implementing research results.

B. Knowledge Management Process

A number of literatures presented various but similar approaches to a KM cycle. We summarize KM cycle in Table I.

TABLE I. KM CYCLES MAPPING

KM Cycle	References
Capturing	Identify [7] Generate [6] Capture [10] Create [9] Obtain [8]
Structuring	Organize [10] Formalize [11] Synthesize/reconstruct [8]
Storing	Store/storage [6], [12] Refine [10], [11]
Disseminating	Sharing [11], [12] Distribute/Diffuse/Disseminate [6], [7], [9] Retrieve [13] Transfer [10]
Implementation	Apply/Application [11], [12] Utilization [13] Employment [9]

- Capturing the knowledge – Relevant knowledge is captured from HEI activities
- Structuring the knowledge – The knowledge is structured, e.g. categorized, indexed, contextualized, and mapped into formal method.
- Storing the knowledge – The knowledge is stored in a KMS based on the structuring methods
- Disseminating the knowledge – The knowledge are distributed and spread among users. Users can access and retrieve knowledge according to their privileges.
- Implementing the knowledge – The last process is implementing the knowledge. Managers have a strategic role to establish the system by giving facilities, policies and incentives.

C. *Critical Success Factors*

Several factors are necessary to run a successful KM cycle. These factors are critical aspects in an effective KMS. In Table II, we summarize these factors.

TABLE II. CFS FOR AN EFFECTIVE KMS

Critical Success Factor	References
Vision	Organization' goal [14] Strategy [15–17] Outcomes [13]
Culture	Culture [18–20]
Management support	Leadership [18], [20], [21] Top management support [19], [21] Organization' structure [16] Role and responsibility [18], [20] Control [6]
Technology	IT/IS/Infrastructure [16], [20], [22]
Education and motivation	Training [15], [16], [21] Motivation/incentive [19], [21], [23]
Maintenance	Measurement [17], [25], [26] Benchmarking [23], [24]

1) Organization Vision

A vision represents organization's goal and must be implemented with good strategies. The organization must have strong belief about its future and prepare a set of strategies to reach it [27] . In a HEI, the vision usually represents good teaching activities, optimizing research and community service. A HEI is also responsible for its lecturers' contribution to scientific fields that can be done by motivating the lectures to always improve their knowledge.

2) Culture

It is a big challenge for the organization to develop good organization culture. Everyone in the organization has different social, experience and educational background that must be directed to one organization vision.

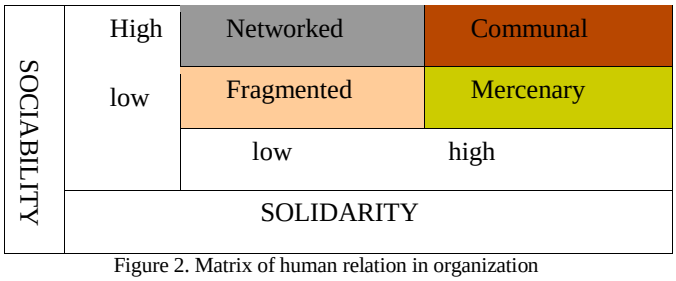


Figure 2. Matrix of human relation in organization

Two types of human relation within an organization are solidarity and sociability [28] aspresented in Figure 2. To establish the communal type, an organization needs support from all its stakeholders about the understanding of togetherness in the organization. It need a culture change in order to change the work ethos [7], [8] , so that it allows continuity of the organization system. The climate of transparency is also an essentially to build the experiences and effective learning tools [29] .

3) Management support

Management should give full support in the establishment of a KMS. Managers should also facilitate the execution of the KMS. The support can be good leadership, organization structure, and re-arrangement of users' role and participation.

Managers have a strategic role in leading the organization and directing people to achieve the organization's goal. In this case, a manager has to ensure that tasks are executed correctly. A manager must be capable to predict possible changes of requirements and to establish a strong commitment among his/her staff to conduct the changes [30] .

The culture transformation needs strong leadership and commitment, and also clear directions, goals and courage to face the challenges [31] . The support of management is needed for establishing the KM system. The managers provide facility to execute the system well, such good leadership, organization structure, top management support and arranging the role and participation of all user.

HEIs are considered as places where people are not hesitant or afraid to share their knowledge [32] . The flat structure of a HEI organization gives a space for people to share their knowledge and experience for developing a conducive learning process [5] .

4) Technology

Technology acts as an enabler for the execution of business processes. In KM, knowledge is captured and proceeded by and trough the technology. Information technology (IT) has role in disseminating information and knowledge and making interconnection among knowledge workers [33] . IT allows publishing, organizing, visualizing, contextualizing, searching, mining, and distributing knowledge to be done cheaply [11] .

5) Education and motivation

People are the main component of a KMS. They must be provided with adequate education and be motivated to use the KMS. Education, such as training, seminar and help desk, is needed to minimize the gap between knowledge workers and the system.

In an organization, a person is happy and motivated to share knowledge if he/she would be appreciated by his/her manager. Hence, a manager must provide an incentive system to motivate his/her staff and make them happy to share their knowledge. Motivation can be categorized into intrinsic and extrinsic motivation [34] . Intrinsic motivation comes from the person itself, such as wishing to share and hoping better for the organization.

Extrinsic motivation is encouraged from outside, such as job promotion, credits and money.

In KM, both intrinsic and extrinsic motivation should be structured to accommodate an incentive system in order to appreciate persons who spend their time for generating new knowledge and sharing with others [35].

6) Maintenance

A KMS must be maintained continuously based on the organization's requirements. System maintenance can be carry out as internal business reengineering [22] to get significant results by measuring the system [17] or continuous improvement that is based on surveys and benchmarks [23] tothe other KM systems.

IV. THE APPLICATION PROTOTYPE

We have developed a prototype of KMS that consists of 19 application modules. The application modules are collected and arranged to accomodate current trends. Those modules are micro blogging, blog, wiki, domain/work group, practice, forum, document storage, information (announcement), recorded webinar and/or video collection, profile management, messaging, knowledge mapping, searching and tag cloud, user credits and user service (criticisms, suggestions, questions and feedback form). Tabel III shows steps in a KM cycle, their activities and application modules of our KMS prototype to support those activities.

TABLE III. THE CYCLE, ACTIVITY AND APPLICATION MAPPING

KM Cycle	Activity	Application Module
Capturing	Experiences Data entry Report Seminar/workshop/ discussion	Blog, Wiki, Document, Domain&practice and, Discussion
Structuring	Categorizing the document Classify the person per field (role&responsibility)	Blog, KMAP, Domain&practice
Storing	Archiving the document Using the database File repository	Major application module use database, Document
Disseminating	Sharing Discussion Announcement Seminar Internet portals	Each application module is shared through Internet
Implementing	Policy Evaluation Control Credit	Guidance, User feedback, Domain authentication, Credit

A. *Usecase Diagram*

The system is intended to be used by three types of users (actors) with 20 use cases as shown in Figure 3. The first actor is administrator who administers user credits and domains, evaluates system based on suggestions and criticisms, and evaluates system usability.

The second actor is champion who is a leader of community of practices. This actor administers user domains, handles invitation and domain requests, evaluates member contents and disseminates information.

The third actor is member who is a regular user of the system. An administrator or champion can be a member in one or more domains. A user can access and post contributions in the system.

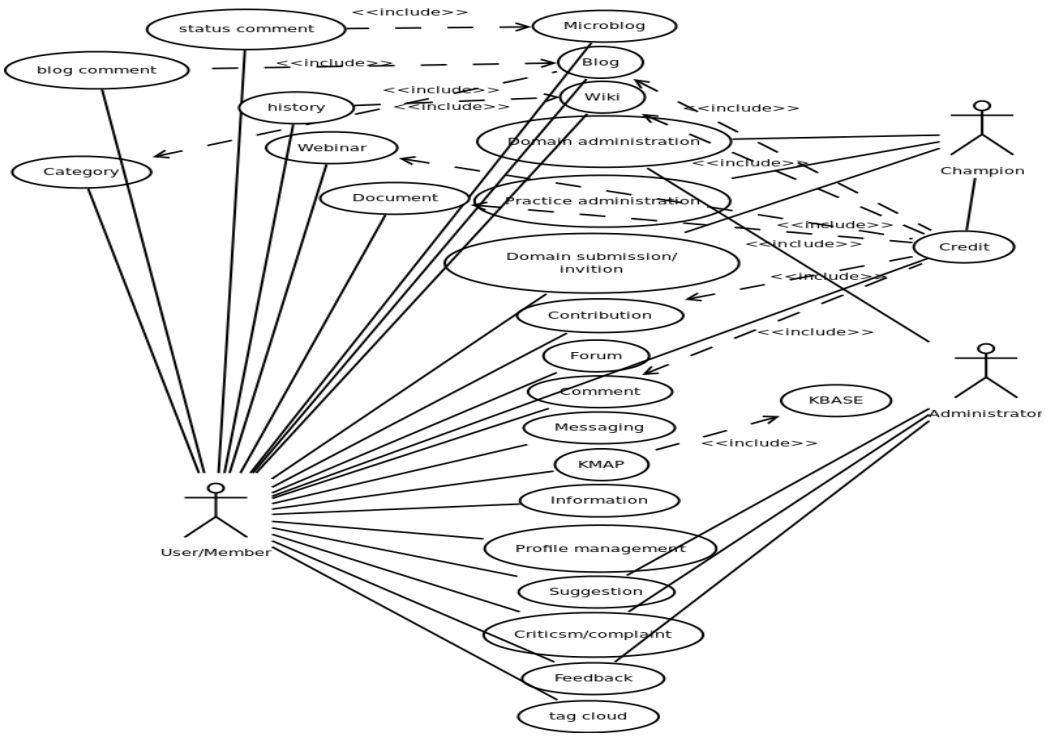


Figure 3. Usecase diagram of KM

B. *Application Interface*

The prototype of our KMS is a web-based application that supports collaboration among user through interconnection (internet). Figure 4 shows screenshots of the Blog. This application modul provides the users to post their knowledge into categorized subjects are provided.

Figure 4. Blog

Figure 5 shows the domain and practice. These application module provides users to build domains and practices. The domains will be verified by administrator to ensure that the domain is owned by the correct champion.

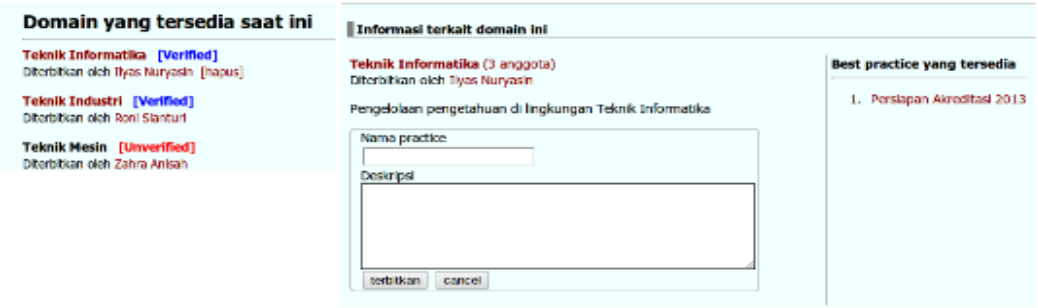


Figure 5. Domain and practice

Figure 6 shows a KMAP module. The module arranges the users by their qualifications. It is useful for knowledge mapping in the organization.

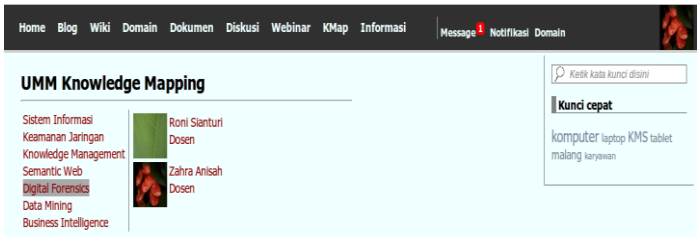
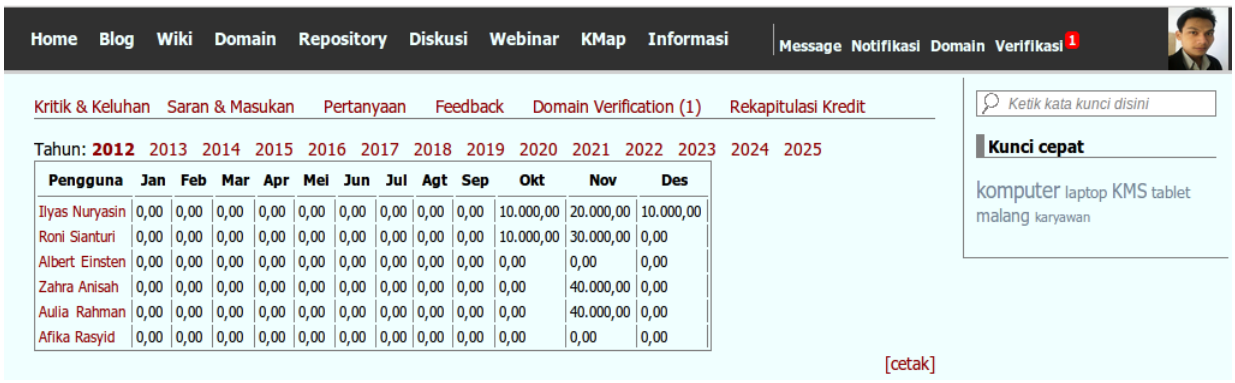


Figure 6. Knowledge Mapping (KMAP)

Figure 7 shows the report of user credit. The credit is accumulated by system based on the user own contributions. The module is used as a report to the manager for making user incentive draft.



Pengguna	Jan	Feb	Mar	Apr	Mei	Jun	Jul	Agt	Sep	Okt	Nov	Des
Ilyas Nuryasin	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10.000,00	20.000,00	10.000,00
Roni Sianturi	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10.000,00	30.000,00	0,00
Albert Einsten	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Zahra Anisah	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40.000,00	0,00
Aulia Rahman	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40.000,00	0,00
Afika Rasyid	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Figure 7. User Credit

V. CONCLUSION

The KMS prototype has been implemented in a HEI in Indonesia. The prototype is designed to support basic collaboration and information exchange, i.e. capturing, structuring, storing and disseminating knowledge.

VI. ACKNOWLEDGMENT

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