Knowledge Management System for Academic Institutions

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Abstract: Knowledge management (KM) is currently receiving considerable attention, from academics and practitioners, both and is being addressed by a broad range of academic literature. Knowledge management is not the only discipline. Rather, it is an integration of various endeavors and areas of study. This research provides a framework for characterizing the various tools (methods, practices and technologies) available to knowledge management practitioners. All approaches to knowledge management are essentially looking at methods to manage the human interaction better. In this research, at first different existing models of knowledge management system related to corporate sector and KM integration are analyzed in order to indentify the leveraging attributes of KMS. And also reveals the literature review related to both educational and corporate KMS for designing the interface of proposed Knowledge Management Model.

Keywords: Knowledge Management, Knowledge Management System, Knowledge Management Model, Academic Institutions.

Introduction

The current time frame we are living is called by several different names, such as the digital age, information age, and knowledge age etc. (Yilmaz, 2012). Knowledge can be defined as information combined with experience, context, interpretation and reflection. It is a high value form of information that is ready to apply to decision and action. The twenty-first century is a knowledge and information-based economy age, knowledge is power, knowledge of the knowledge is power, and knowledge management is the knowledge of knowledge (Lina, 2011). Knowledge Management is a new and controversial term and has many different definitions. The term Knowledge Management was first introduced in Europe Management Conference in 1986 (Allameh et. al., 2011). It is conscious integration of all human resources involved, all the academic processes and the technological advancements involved in designing, capturing and implementing the intellectual infrastructure of any organization (Ranjan et.al. 2007). Author, acknowledge that KM is the key in achieving opportunities for better decision making and competitive advantage for organizations and increase the efficiency and effectiveness of both educational and business organizations

The objective of the research is to extend the body of knowledge on KM practices in educational organizations. The research aims to assess the current status of KM practice and its value in higher education. It also considers factors that potentially influence KM in educational organizations. The objective of this research is to design Web-based Knowledge Management System (KMS) architecture for academicians and develop a prototype model of Knowledge Management System for academic institutions.

Purposes

The purpose of our research is to find out the best knowledge management model and present the best conceptual model based on the universities needs. The main concerns of our research are given bellow:

1. What and why need the system.
2. Role of Academician Authorities in the system.
3. The requirement analysis and their prospective in the development.
4. Organizational structure and identification.

New paradigms in educational organizations are needed as structure, management, and   research are all combining to make changes in education

Objectives of the Research

The objective of the research is to extend the body of knowledge on KM practices in educational organizations. The research aims to assess the current status of KM practice and its value in higher education. It also considers factors that potentially influence KM in educational organizations. The objective of this research is to design Web-based Knowledge Management System (KMS) architecture for academicians and develop a prototype model of Knowledge Management System for academic institutions. The objective can be further broken down as follows:

1. To study the concepts of developed model of knowledge management system.
2. To identity the attributes of knowledge management system
3. To develop the secure interactive Knowledge Management model for Academic Institutions

Methodology and Procedure

The research was based on primary as well as secondary data.

The first objective of the research was to study the concepts of developed model of knowledge management system. In order to fulfill this objective, both primary and secondary data sources were utilized. Concepts of knowledge management model were understood by the literature study and attributes of a KMS were also gathered from literature survey. User requirements were obtained through email and online survey conducted among faculty of selected educational organizations. A web-based KMS architecture was designed based on the inputs from literature survey, observation of KMS in practice and user requirements. A prototype Model was developed based on this designed architecture. The ISO Consolidated Usability Model (Abran et al., 2003) questionnaire was adopted partly to elicit feedback on effectiveness of the KMS. Feedback of the implemented system was obtained by conducting an email survey and also by conducting physical survey among the academicians in selected institutions.

In order to design the questionnaire for the user requirement survey focus group discussion technique was adopted. The focus group discussion was held among academics from Management Science and Computer Science & Engineering Departments of the selected institutions.

For the survey, four institutes (two computer science and two management department) were selected. The reason for confining this group discussion to Management Science and Computer Science & Engineering is that these groups of academics have strong knowledge of computer operations and browsing, and are high users of the Intranet and Internet. The discussion took place in the month of October 2017.

The focus group comprised of ten participants' viz. five academicians from Computer Science & Engineering and five from Management Science and two moderators. The discussions revolved around Research, Curriculum Development, Strategic Planning and Administrative services; these are areas identified by Kidwell et al. (2000). This discussion provided clues about the unique needs of this community.

The outcomes of the literature study and focus group discussion were:

- Suggestion to develop a Knowledge Management portal for Research first, and then to add the other components one by one.

- Contents of Research suggested were:

  - Access to research publications

  - Experimental details of previous research work

  - Research publication index

- In the context of Teaching and Research Activity, the following specifications were put forward.

  - Bibliographies of various research topics

  - Authentic databanks

  - APA guidelines for referencing

  - List of subject experts

  - Funding agencies

  - Future trends of research activities (unpublished work)

- New arrivals in the Library

- Reader's comments

- Question paper setting style

- For Curriculum Development, the following specifications were put forward.

- Links to Curriculum

- Feedback from alumni

- Administrative Services sought by the academicians were:

- Leave Rules

- Procedure of applying for attending a conference

- For Strategic planning the aid sought by the academicians was:

- UGC and AICTE guidelines.

- MHRD

- Indian Culture

The inputs gathered were used for designing the questionnaire that was used for collecting user requirements.

Sampling Procedure: Judgment sampling procedure was used for the study. The basis of judgment in selecting the academic institutes and have Intranet and Internet connections. The basis of judgment in selecting the respondent was that the respondent should be an academician, teaching higher-level Management and Computer courses in India, and should have computer operating and browsing knowledge. The websites of the selected academic institutes of India offering Computer Science and Management education were searched and the email address of the permanent faculty member of those institutes were collected from those websites. The questionnaire was sent to only those academicians who had email accounts. The reason behind selecting these two disciplines for this particular study is that both are very popular, industry oriented and the people in these two disciplines are Internet savvy.

Sample selection was restricted to academic institutions offering Management and /or Computer Science courses in India. The reason for restricting it is as follows. Elaborating on implementing of KMS in educational institutions, Thorn (2001) had stated that a wide open area of study makes it difficult to understand the implication of KM for an educational setting. From the above statement it can be concluded that a common KMS for all branches of education becomes difficult. Hence the study focused on only two disciplines.

Sample Size: To determine the sample size for the user requirement survey, similar studies were taken into consideration. The literature review showed that very few studies used survey method for identifying the requirements of the users. However, none of the studies mentioned about the sample size. Few studies were identified that used interview method to determine the user requirement in KMS architecture. For this study, a total of 120 questionnaires were sent to different academicians. Out of this, 83 usable questionnaires were obtained at the end of the survey period.

Process of deriving KMS requirement

In the KMS requirement gathering process, involve mainly three elements of university which are responsible for knowledge generation are; Students, teachers (& other staff) and Administrators. The process of deriving KMS requirement included the steps: requirement gathering → KMS requirement → evaluation of KMS requirement → prioritization of KMS requirement → design, development, and testing → deployment & implementation. This process showed in figure 1:
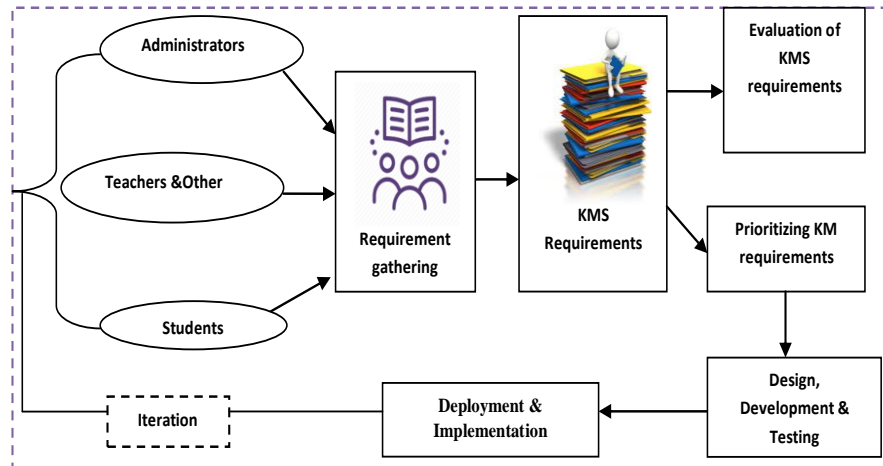
Figure 1: Process of deriving KMS requirements

Attributes of KMS Identified from Literature Review

The following are the set of KMS attributes that came up in the course of the, literature survey.

1. Authorization (Tiwana, 2000)

2. Document Management

a. Indexing (Metadata) (Satyadas et al., 2001)

b. Categorization or Classification (Satyadas et al., 2001)

3. Information Storage (Abdullah et al., 2005; Tiwana, 2000)

4. Information Retrieval (Abdullah et al., 2005; Tiwana, 2000)

5. Collaboration

a. Discussion forum (Abdullah et al., 2005; Satyadas, et al.,.2001)

b. Email (Abdullah et al., 2005; Satyadas, e·t al., 2001)

Knowledge Management System in Practice

In India Knowledge Management Systems (KMS) are already deployed in a few public and private sector organizations. To name a few we have KnowNet – the knowledge management portal of Larson & Toubro, WiseGuy - the knowledge management portal of ICICI Bank, Kalpa Vriksha- the knowledge management portal of Wipro Infotech, Infosys and BSNL also have their own KMS. KMS implemented in BSNL, Wipro, ICICI, and Oracle were also observed through internet access. The intention was that if a KMS already in practice could be observed it would help in understanding the processes and the type of interface design that the portal has, and thus use these inputs to design the architecture of a KMS for academics.

Attributes of KMS Observed

Observation of KMS in practice revealed the following. The processing features included a Server Operating System, Web Server Configuration, Backend (the database software where data will be stored), Frontend (software used to design the web interface) and Networking. The attributes identified from literature review were taken as the basis for observing the interface of the KMS. Besides these attributes, other features of the interface of these KM portals were also observed. Considering these processing and interface features, an overview of the KM portals of BSNL, Wipro InfoTech, ICICI, and Oracle are presented in a tabular form (refer to Table 1)

Table 1: Processing Features of KMS in Practice

Organizational Name	Processing Features			
	Web Server Software	Backend	Frontend	Networking
BSNL	Apache	My Sql	php script	Intranet
Wipro	IIS Web Server	Microsoft Sql Server	DotNet	Intranet
ICICI	IIS Web Server	Microsoft Sql Server 2000	Java, Jsp, Java Servlet	Intranet
Oracle	Apache	Oraclellg	Flash	Intranet

Conclusion drawn from Observing KMS

From the observations of KMS, it was found that in order to enter a KMS, authorization by means of login and password was essential. So, Authorization can be considered as an important component of KMS interface.

The processing requirements identified from the observations are:

- The interface (frontend) can be developed using php scipt or Dot Net or Microsoft SharePoint or Java or JSP or Javascript or Java Servlet or Flash.

- The database (backend) can be developed using MySql or Oracle or MS Sql Server or Sybase.

- The server software can either be IIS server or Apache server or Jetty.

Proposed KMS Model for Academic Institutions

- From the findings of the user requirement study, it was inferred that Search is the most essential feature required by academics. From literature review, it was observed that 'better search can be obtained by the use of ontology (Wu, 2005; Tomassen & Strasunskas, 2009).

- Also, from the literature and the observations of KMS in practice, it was found that sharing of resources is a unique feature of a KMS. Sharing of resources can be best achieved by client server technology.

- Considering these factors and also other inputs from user requirement study, observation of KMS in practice and review of the existing KMS architectures, three layer KMS architecture was designed which is shown in Figure 5.2. The architecture is based on both ontology and client server technology.

As a summary of the research work at higher education institution, the proposed Knowledge Management Model for system implementation was created.
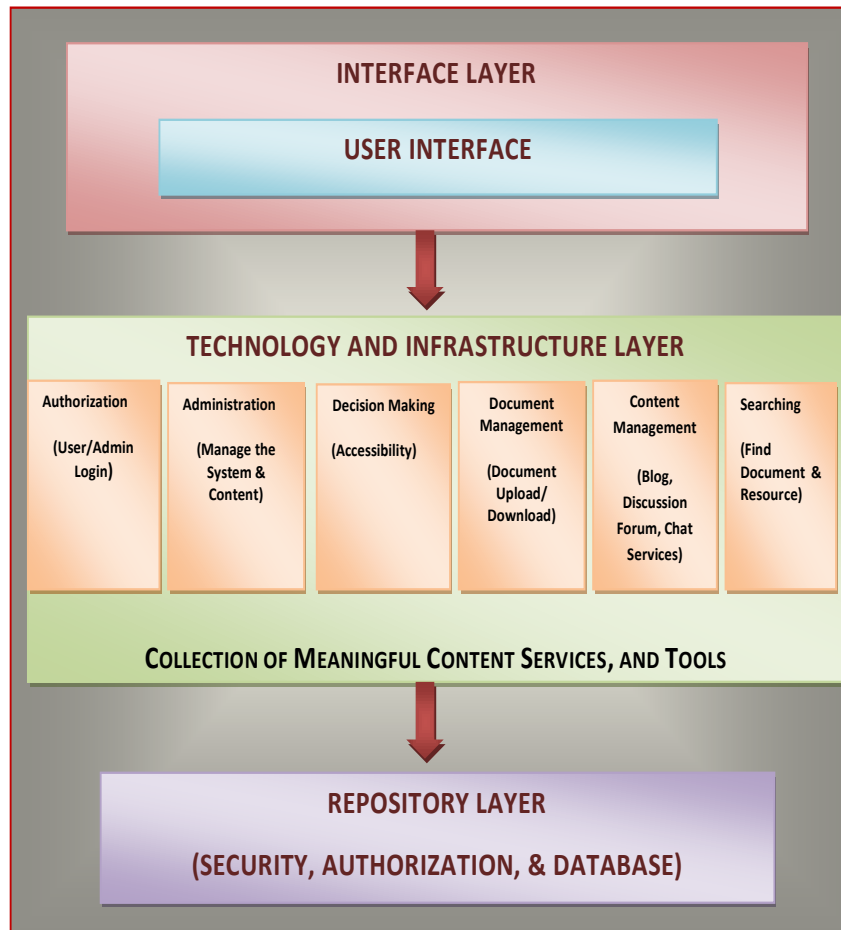
Figure 2: Knowledge Management Model

The information, knowledge and resources in the existing knowledge management system of academic institutions could be useful if the teachers and students have easy access to them. Knowledge Management Portals provides the facility to access the required information and knowledge. This knowledge management portal act as only point of online access to information and documents related to their needs as well as provide a platform to share their ideas, thoughts, and knowledge in any fields and subjects. I believed that it is important for the universities to conduct further study on web portals that will enable students to have access to much needed data and resources that are pertinent to their studies.

This research focuses on the web portals and their vital role as a knowledge management model in the higher education and universities. Generally, the web portal provides a gateway to access information as well as search, analytical and communication center for the target users. It is important for the academic institutions to have emphasis on knowledge sharing for supporting the students to access the required resources and information. The login page of developed G-KMS shown in the figure:

Functions of Knowledge Management Portal

A function is an action-oriented part of a website: for example, a shopping cart, enquiry form, or download button. Functions always relate to actions that we want our website users to perform.

The functions of developed knowledge management model are bellow:

1. **About Us –** the "About Us" page tell the user about the knowledge management system. This page also contains an introductory video related to knowledge management and researcher profile. Second section of this page contains the objective of this research.

2. **Document Management -** From the literature and the observations of KMS in practice, and user requirement survey, it was found that sharing of resources is a unique feature of a KMS. Sharing of resources can be best achieved by client server technology. In the document management function, online resources and online resources are included.

- **Online resources**
  - Link of Online journal
  - Link of Online E-books
  - Link Online references
  - Publications
- **Offline resources**
  - Journal collection
  - E-books collection
  - Reference collection

3. **Search -** From the findings of the user requirement study, it was inferred that Search is the most essential feature required by academics. From literature review, it was observed that 'better search can be obtained by the use of ontology (Wu, 2005; Tomassen & Strasunskas, 2009).

4. **Expert corner** – in this section of the portal, user can share their knowledge, thoughts, articles and research papers, and publications etc.

5. **Video Gallery** – video gallery section contains the education related useful videos. And users also search online videos as per their needs through the video gallery because this page embedded with YouTube channel.

6. **Directory of E-Journal** – in this function directory of e-journal is added, user can download the document of directory of e-journal

7. **Indian Culture** – in this section of the portal, the website of Ministry of Indian Culture is linked, from this link user can visit the site of ministry of Indian culture and get the all information about the website.

8. **MHRD --** in this section of the portal, the website of MHRD (Ministry of Human Resource Development) is linked, from this link user can visit the site of ministry of Indian culture and get the all information about the website.

9. **National Digital Library -** in this section of the portal, link (https://ndl.iitkgp.ac.in) of National Digital Library is provided. NDL India is designed to hold content of any language and provides interface support for leading Indian languages. It is being arranged to provide support for all academic levels including researchers and life-long learners, all disciplines, all popular form of access devices and differently-abled learners. It is being developed to help students to prepare for entrance and competitive examination, to enable people to learn and prepare from best practices from all over the world and to facilitate researchers to perform inter-linked exploration from multiple sources.

10. **Blog –** User can post and share the ideas, thoughts, and knowledge in any topic from this function of the portal.

11. **Discussion Forum –** Admin can post the discussion or thoughts in any topic, in this section and users can comment on that post and users also request the admin to post the discussion on their topics.

12. **Support –** this section contain two subsection feedback and contact us which are described below:

- **Feedback** – in the feedback function of the portal, a feedback form which is created in the Google form, is attached. People can fill the feedback form about the efficiency, effectiveness, liability, accessibility of the knowledge management portal, from here.

- **Contact Us** – in this section of the portal people can contact the owner of the portal. The address of the university is provided here and also reached the university through the Google map.
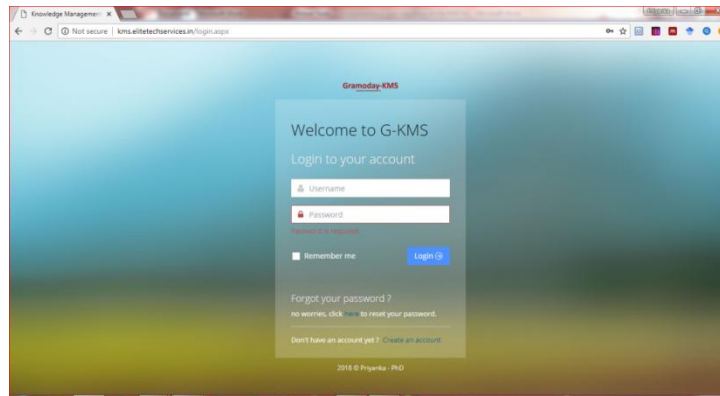
Figure 3: Login page of Gramodaya-Knowledge Management System (G-KMS)

Figure 4: Home Page/Dashboard of GKMS

Implementation of KMS for Academics

Software and programming languages used for developing a KMS were gathered from literature review as well as by discussing with the KMS experts associated with corporate KMS. Considering the availability and popularity of the software MS Sql Server, it was selected to design the database for the KMS, ASP.Net Front page for designing the Interface and for creating the ontology used in the ontology driven search engine of the portal. The languages used for the interface design were .Net with C#, JavaScript and for database connectivity asp script was used. The server software used which includes IIS Server and supports both asp scripting and MS SQL. The portal was implemented in a Windows10 based PC, loaded with MS SQL Server and Visual Studio software. Project also hosted online access by domain http://kms.elitetechservices.in. Server PC was connected to the internet via the gateway of Gramodaya University-internet connectivity.

Conclusion/Future Work

This knowledge management portal act as a single point of online access to information and documents related to their needs as well as provide a platform to share their ideas, thoughts, and knowledge in any fields and subjects. I believed that it is essential for the universities to conduct further study on web portals that will enable students to have access to much needed data and resources that are pertinent to their studies.
This research focuses on the web portals and their vital role as a knowledge management model in the higher education and universities. Generally, the web portal provides a gateway to access information as well as search, analytical and communication center for the target users. It is important for the academic institutions to have emphasis on knowledge sharing for supporting the students to access the required resources and information.
For designing a KMS for academic institutions, the architecture design in this study can be used as a framework, based on which a need based KM Model can be developed, and implemented in an academic institution for meeting academic as well as research and academic requirements. The portal was implemented in a Windows10 based PC, loaded with MS SQL Server and Visual Studio software. Project also hosted online access by domain

http://kms.elitetechservices.in. Server PC was connected to the internet via the gateway of Gramodaya University-internet connectivity.

The interface of the prototype of the proposed KMS architecture for academics was designed using C# Net and HTML5, and CSS3 for which the interface looks very interactive and attractive. Further studies may implement the prototype using PHP, Flash and other interface designing tools that will make the interface more attractive.

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