ISSN 2047-3338

Design and Implementation of Research Module in Educational KM System

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***Abstract*— Enterprise Resource Planning (ERP) technology has great impact on our business world. Many multinational companies are using ERP technology for the improvements in their productivity. Currently, this technology is being used in Higher Educational Institutes (HEI) as a replacement of their legacy system to achieve their mission and vision. In this paper a research module is designed and implemented as a knowledge management tool which can be helpful to the faculties, management and researchers of the higher educational institutions.**

***Index Terms*— ERP, KM, EKMS, Tacit Knowledge and Explicit Knowledge**

I. INTRODUCTION

KNOWLEDGE management is the new trends adopted by the many organization in 21st centuries. Knowledge management is techniques to manage the knowledge of an organization with help of Information Technology for further use and enhancement of others knowledge by sharing the knowledge. Before moving in to the knowledge management first we have to understand that what knowledge is. Knowledge is not a word, it's a part of knowledge hierarchy.

Knowledge Hierarchy

Rouse (2002) draws the difference between data, information and knowledge. Data are the results of measurements of variables, for example voltages, response times, or opinions. Information is an assembly or arrangement of data in a comprehensive from capable of communication and use, for example tables or charts of statistics or trends and Knowledge is information evaluated and organized by the human mind, so that it can be used purposefully, for example conclusions or explanations [6].

Bierly et al. (2000) adds an additional higher level i.e., wisdom in this hierarchy [5], [13].

- Data (relevance + purpose)
- Information (application)
- Knowledge (institution + experience)
- Wisdom

Backman (1997) proposes a five-level knowledge hierarchy in which knowledge can often be transformed from a lower level to a more valuable higher level [4]:

- Data Text, fact, code, image, sound
- Information Organized, structured, interpreted, summarized
- Knowledge Case, rule, process, model
- Expertise reasoning fast & accurate advice, explanation, justification of result & reasoning

Knowledge Management is the process of creating, capturing and using knowledge to enhance organizational performance [1].

Gryskiewicz propose the six principle of knowledge management:

1. Knowledge is personal.
2. Capturing knowledge does not ensure an increase in performance
3. Acceptance of Knowledge Management comes by connecting people.
4. Technology is necessary
5. Knowledge Management learning events focusing on helping individuals and team learn before.
6. A key component to the successful delivery of knowledge management solutions is going.

KM Models

In past may others proposed common models for many authors (Choo, 1998; Weick, 2001; Nonaka and Takeuchi, 1995; Wiig, 1993; Von Krogh and Roos, 1995; Boistot, 1998; Beer, 1984) have described the KM models. These KM models link the KM frameworks to key KM concepts and the major phases of KM cycle. The various models are as follows:

- The Von Krogh and Roos Model of Organizational Epistemology
- The Nonaka and Takeuchi Knowledge Spiral Model
- The Choo Sense-making Km model

- The Wiig Model for Building and Using Knowledge
- The Boistot I- Space km Model

Holsapple and Joshi (2003) present an extensive framework consisting of six steps (Acquire, Select, Internalize, Use, Generate, Generate) with supporting activities [2].

Knowledge Management Tools and Techniques

Knowledge Management (KM) Methods and Tools was compiled and agreed by the Asian Productivity Organization (APO) KM methods and tools expert team in Singapore in August 2009. It represents those methods and tools implemented by the most successful organizations around the world, within their KM implementation initiatives. These tools are categorized in two parts firstly, Non-Information Technology (IT) Methods and Tools and, secondly, as IT Methods and Tools. They are all considered important methods and tools [9].

Non–IT Methods and Tools

1. Brainstorming
2. Learning and Idea Capture
3. Peer Assist
4. Learning Reviews
5. After Action Review
6. Storytelling
7. Collaborative Physical Workspace
8. APO Knowledge Management Assessment Tool
9. Knowledge Café
10. Community of Practice
11. Taxonomy

IT Methods and Tools

12. Document Libraries leading to a Document Management System
13. Knowledge Bases (Wikis, etc.)
14. Blogs
15. Social Network Services
16. Voice and Voice-over-Internet Protocol (VOIP)
17. Advanced Search Tools
18. Building Knowledge Clusters
19. Expert Locator
20. Collaborative Virtual Workspaces
21. Knowledge Portals
22. Video sharing

II. Requirement of RESEARCH module in EKM System

Educational enterprises are big source of knowledge creation and utilization because all faculties and research scholar acts as knowledge source, students are knowledge gainer, so it is must to capture and store the knowledge of faculties and researchers, so others can able to utilize its whole knowledge. We can classify knowledge mainly in two categories [3], [7], [10]:

Explicit: which are stored in hard document form and can easily store, extract and manage.

Tacit: it's just opposite to Explicit; stores in human mind and comes from lots of experience and very difficult to extract and manage.

Knowledge management systems can contribute to enhancing the different types of activities these organizations perform. Knowledge management can aid educational institutions in improving their decision-making processes, in reducing the time for designing curriculum, in research development, in improving academic and administrative activities, and in lowering operating costs [12], [8]. In the current time all university and higher Educational Institutes (HEI) are tightly involved in research activity.

Most educational institution or university does not have any tool or application is there to store the research knowledge of faculties and researchers. After the complete analysis of the requirement of research activities, it has found that a research module also include with educational-KM tool. With the inclusion of this tool, the above mentioned requirements would be completed. In the following section knowledge management tool and its design methodology has been explained.

III. Proposed Methodology

The methodology being discussed to design the EKMS tool is inspired after the complete analysis of the ERP system of the Lingaya's University, India. This tool mainly govern faculties and research schlors. Research module of EKM tool and its interactions with different modules are shown throug the following figures. As described in fig 1 we divide research mudule in four submodules, workshop,research projects, publication and reseach products. And each of sub modules further sub divide. Following table shows brief exxplaination of the each sub modules.

Table 1 shows different user types of the tool deppend on their resposiblities in the intitution, Table 2 describe workshop/ seminar module implementation in detail and Table 3 shows further extension of workshop/seminar activity. Table 4 describe research project module in detail and Table 5 exxplain student information whose involve in reserch project activity.

Table 6 describe the book writing detail which come under the publication sub-module and Table 7 explains the chapter writing in a book which is again a sub module in publication module.

Table 8, Table 9, Table 10 and Table 11 describe the research paper wirting active of publication module; table 8 shows paper detail, while table 9 explain co-authors details and table 10 and table 11 explains regarding national and international conference and journals. In the last Table 12 explain the technical report writing details.

Table 13 explain the research product detail for copyright and patent.

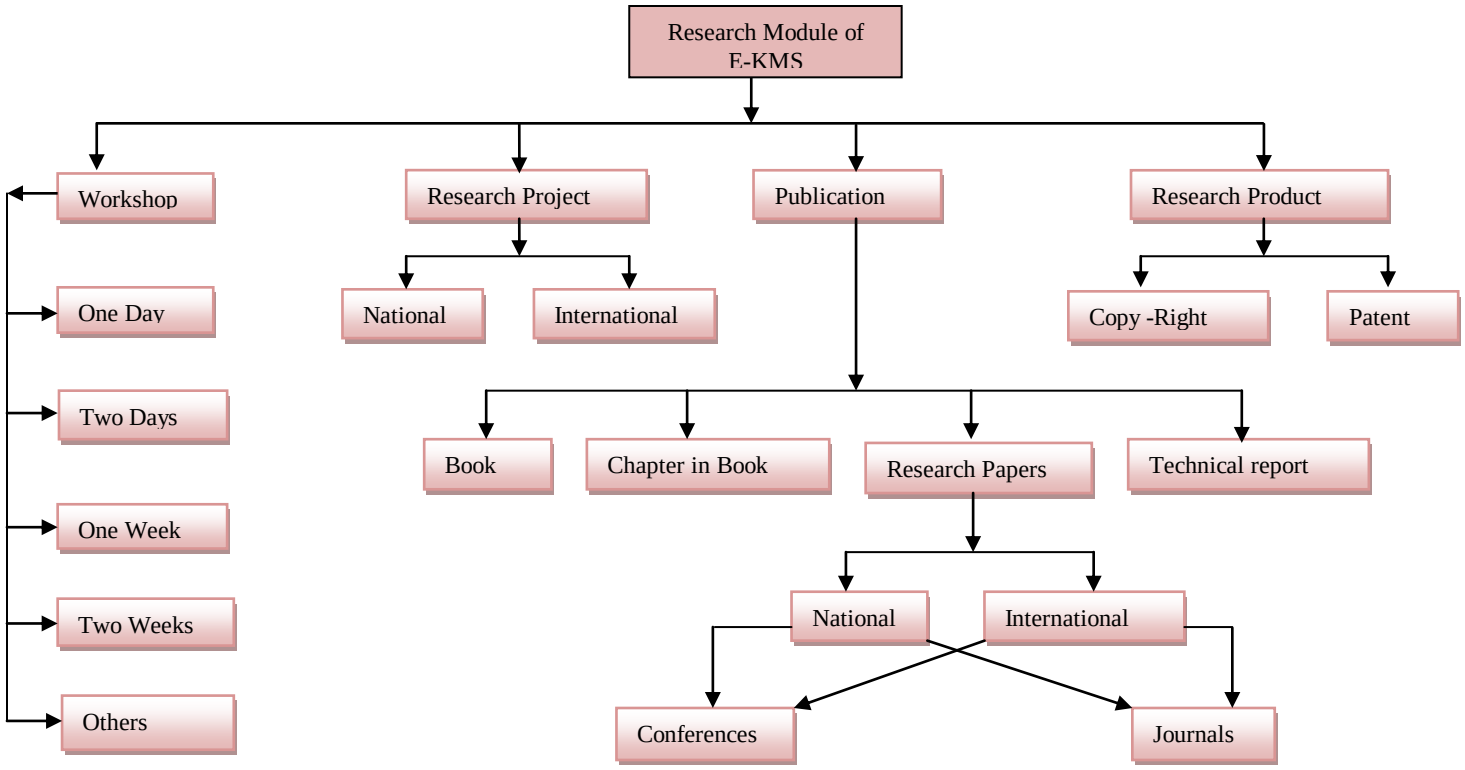

Fig. 1: Research module of EKMS

Detailed Description of Each Sub-Modules

Table 1: User type of Module

User Types	Number of Users	Scope	Job Assigned
Master User/Administrator of System	1	Overall in-charge	Administrator
Faculty	Finite numbers	With-in the Enterprise	Update and Create/Read
Research Scholar (Students)	Finite Numbers	With-in the Enterprise	Create & update (Workshop is disable for student)

1) Workshop Sub-Module

Table 2: Workshop/ Seminar Module

Fields & attribute Description			
S No	Field Name	Field Description	Type of field Used in User interface Form
1	Faculty Code	Faculty code given by Institute	Drop down Box
2	Faculty Name	Name of Faculty	Text Box
3	Faculty Designation	Designation of Faculty	Drop down Box
4	Date	Current date	Date Type
5	Workshop/Seminar Duration	When workshop was held fro & to	2 Date type Field
6	Type of Workshop	1, 2 Day, or 1 week, 2 week	Drop Down Box
7	Scope of Workshop/Seminar	Scope may be Regional, National or International	Drop Down Box
8	Details Of Workshop/Seminar	See Table No 3 (for filling per detail)	
9	Certificate	Submit scan copy of certificate	File upload box is used
10	Others	Comments	Multi Line Box

Table 3: Workshop/Seminar Detail

Detail of Workshop/Seminar			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Session	Number of Session 1,2,3 or extra	Drop Down Box
2	Recourse person	Name of Resource Person	Text Box
3	Affiliation of Resource Person	Resource Person Affiliation	Text Box
4	Topic cover	Topic cover in Current session	Text Box
5	Resource Material Type	Type of Material provided of used for current session (text, pdf, ppt, video, lecture Notes)	Check Box or Radio Box
6	Resource Material Submission	Submit the material	File Upload Box

2) Research Project Sub-Module

Table 4: Research Project

Field Description			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Faculty Code	Faculty code given by Institute	Drop down Box
2	Faculty Name	Name of Faculty	Text Box
3	Faculty Designation	Designation of Faculty	Drop down Box
4	Student Association	Yes / No	Radio Button
5	No of Students	How many student associated with	Text box
6	Student Detail	See table No 5	
7	Scope of Project	Local/National/International	Drop Down Box
8	Sponsored Body	Who is made sponsored	Text Box
9	Project Budget	Amount	Text Box
10	Time/Duration	Time for completion the project	Text Box
11	Project Description	Description of Project	Multi-Line Box
12	Document or MOU certificate	Document submission	File Upload Box

Table 5: Student Description

Student Description (If any)			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Student Roll No	Roll Number of student	Drop Down Box
2	Student Name	Name	Text Box
3	Branch	Stream	Text Box
4	Year	Studying Year	Text Box

3) Publication Sub-Module

Table 6: Book Sub-Module

Book Description			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Faculty code /Student roll no	Faculty core or Student Roll No	Drop Down Box
2	Faculty name/student name	Name of Faculty or Student	Text Box
3	Title of book	Name of written book	Text Box
4	Co-Author	Name of Co author (If any)	Text Box
5	Name of publisher	Publisher Name	Text Box
6	Price	MRP of Book	Text Box
7	Subject	Broad Area of Application of Book	Text Box
8	Scope	Regional/National/International	Drop Down Box

Table 7: Chapter in Book Sub-Module

Book Description			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Faculty code /Student roll no	Faculty core or Student Roll No	Drop Down Box
2	Faculty name/student name	Name of Faculty or Student	Text Box
3	Title of book	Name of written book	Text Box
4	Co-Author	Name of Co author (If any)	Text Box
5	Chapter Name	Title Of Chapter	Text Box
6	Page Number	Page Number in Book	Text Box
7	Name of publisher	Publisher Name	Text Box
8	Price	MRP of Book	Text Box
9	Subject	Broad Area of Application of Book	Text Box
10	Scope	Regional/National/International	Drop Down Box

Table 8: Research Paper Sub-Module

Research Paper			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Faculty code /Student roll no	Faculty core or Student Roll No	Drop Down Box
2	Faculty name/student name	Name of Faculty or Student	Text Box
3	Title of Paper	Title of paper	Text Box
4	Co-Author	Yes/ No	Radio Button
5	No of Students	How many student associated with	Text box
6	Co-Author Detail	See table No 9	
7	Published In	Journal/ Conference	Radio Button
8	Journal	See Table No 10	
9	Conference	See Table No 11	
10	Scope	Regional/National/International	Drop Down Box

Table 9: Co-author Detail

Co-Author Description (If any)			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Name	Name	Text Box
2	Affiliation	Where he/she works	Text Box
3	Designation	Designation	Text Box
4	Contact Detail	Contact Detail	Multi-Line Box

Table 10: Journal (if journal) Description

Research Paper Journal			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Name of Journal	Journal Name	Text Box
2	Volume of current issue	Current Issue Information	Text Box
3	ISBN number	ISBN number	Text Box
4	Impact factor	Impact factor (if any)	Text Box
5	Affiliation of journal	Affiliation or Sponsored Body	Text box
6	Acceptance Letter	Acceptance Letter	File upload Box
7	Web link (if any)	Website Address	Text Box
8	Scope	Regional/National/International	Drop Down Box
9	Paper submission (pdf form only)	Full Paper	File Upload Box

Table 11: Conference (if conference) Description

Research Paper Conference			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Name of conference	Conference Name	Text Box
2	Date of conference	Conference Date fro and to	Text Box
3	ISBN number of proceedings	ISBN number	Text Box
4	Place of conference	Venue of Conference	Text Box
5	Sponsored body	Affiliation or Sponsored Body	Text box
6	Acceptance Letter	Acceptance Letter	File upload Box
7	Web link (if any)	Website Address	Text Box
8	Scope	National/International	Drop Down Box
9	Paper submission (pdf form only)	Full Paper	File Upload Box
10	Certificate submission	Certificate	Text Box

Table 12: Technical Report Sub-Module

Technical Report Description			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Faculty code /Student roll no	Name	Text Box
2	Faculty name/student name	Where he/she works	Text Box
3	Publish in	Designation	Text Box
4	Name of publisher	Contact Detail	Text Box
5	Co-author (if any)	See Table No 11	
6	Scope	National/International	Drop Down Box

Table 13: Research product Sub-Module

Technical Report Description			
S No.	**Field Name**	**Field Description**	**Type of field Used in User interface Form**
1	Name Product	Description	Text Box
	Type of	copyright/patent	Drop Down Box
2	Faculty code /Student roll no	Roll No or Employee Code	Text Box
3	Faculty name/student name	Name of Faculty or Student	Text Box
4	Body	copyright/patent body	Text Box
5	Date of issued	Date if issue	Date
6	Date of applied	Applied Date	Date
7	Issued no/code	Number	Text Box
8	Copy of certificate	Certificate copy	File upload Box
9	Scope	National/International	Drop Down Box

IV. Results and Conclusion

In this paper we have shown, how the modules related to teaching and learning can be added with the educational KM tool. A case study of Lingaya's University is considered among 80 persons for whole work for finding the needs of research module in KM tool. The complete work is done through the following steps:

1. Study and analysis of need of research activity.
2. Find out different area of research activity and further subdivide them into sub-module and sub to sub-module.
3. Finally design the interface for each of module (including sub modules) for final implementation.

In this work we have included research module as knowledge management tool which could be useful to the faculty to extract, store and reuse their knowledge. It can also be helpful to the research students and others faculties.

Institute management will also be benefitted to utilize the stored knowledge in the future. Future work could be to implement two more modules practical/Lab module and lecture module in the EKM tool.

ACKNOWLEDGMENT

I acknowledge the whole management, Faculties & staff of Lingaya's University to encourage me and provide required data for this research work.

APPENDIX

See appendix A for the sample snapshot of the implemented module (Login form for Faculties).

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Appendix-A