The Synthesis Model of Knowledge Management System Using Rapid Application Software Development

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Abstract - **This research has an intention to study about elements and the Knowledge Management System (KMS), in order to bringing about a tendency of building a synthesis model of knowledge management system in the information technology services at higher education, by studying elements and process of knowledge management system from the tendency of experts and some well-known organizations in knowledge management. Then arrange and group those who are similar the most and use them to survey in 5 levels regarding opinions of the experts who manage in departments involving the career of the information technology in universities. From studying, it is realized that there are totally 7 popular elements to be using and there are 8 steps of procedure of the knowledge management which are widely using. Procedure of knowledge management from what have been studying is to be using to create a new model of a knowledge management that synthesis by mixing KMS with RAD. The KMRAD has been tested at the office of academic resource and information technology which can work faithfully. We found that the all experts are highly satisfied with the system and the extremely satisfied with the result from the users. The information technology services at higher education can use the new model to manage KMS of the information technology services at higher education effectively and quickly.**

Keywords - **Knowledge Management System, KMS, RAD**

I. INTRODUCTION

Nowadays, offices & departments in all parts including either government or municipality are all realize and give precedence to the importance of knowledge management inside the organization, much more. If any organization is able to do storage & retrieval the knowledge; for example: Know-How or the Best Practice, it is valuable to transfer and share to the others in the same organization and it shall bring about a sustainable improvement to them. Previously, we found from surveys that organizations from all around the world have a trend to grow up in the knowledge management rapidly. They realize about the importance of using the KMS as a tool in their work, which is successful in knowledge management in accordant

to various factors. KMS unique because need specific culture to success implemented [1], moreover KMS is unique in term of the users.

The Information and Communication Technologies is the factor that encourages of ease and comfort in the knowledge management and make it becomes concrete. The ICT becomes a powerful tool that organizations use to manage knowledge effectively. They can search, store and use knowledge comfortably and quickly. Especially, it eradicates obstacles about distance and time in conveyance and dissemination the knowledge. There are 4 difficulties found in research of Desouza [2] that interviewed users of the KMS regarding to the obstacles in appliance of the Knowledge Management System are consisting of:

- Difficulty of the system to indicating of which person is a professional that can convey and disseminate knowledge to the others.

- Difficulty of the system to catch up knowledge from persons or Tacit Knowledge and how to convey and disseminate knowledge to the others in the organization and let them learn and accessible.

- Lack of activation from executives.

- Incorrect push or drive from the executives, previously the executors could feel about the pressure and lack of motivation to use technology.

If consider from the information we got, there are various steps that we can use the KMS to help improving the system. To insinuate the information technology services into the KMS, we have to choose for a suitable element the most, or which elements should use other method of management or process to handle. This is for ability to build a technology environment that is beneficial for building a sustainable knowledge in the organizations.

From what have been mentioned above, researchers are interesting to study about process of building the KMS has which elements and many popular processes, which standard should be suitable to use in any organization that serve especially in the information technology services.

II. BENEFIT OF RESEARCH

To analyze elements and processes of the knowledge management system in the organizations for synthesize model of knowledge management system using rapid application software development.

III. RELATED WORK

Result of the research of Quaddus and Xu [3] which studied about factors that affect to using the KMS of officers in companies in Australia is including; organizational culture, support from the executives, advantages that each person shall get and image of the KMS itself.

Su Huishuang and Tian Shuo [4] analyzed process of knowledge management of big organizations via multi-dimension of methods by using purposes and behaviors according to human factor in theory of Wuli, Shili, and Renli. This work presents simple theory and principal to encourage an effective KMS in big organizations in order to achieve process of wanted knowledge collecting.

Junming Hou and group [5] studied about how to manage the knowledge by building ontology for co-designation. By presenting to use the ontology in knowledge management, which has a cooperation of the whole organization (experts, knowledge engineers and executors of the system), it provides a flawless result in artificial intelligence and including presenting ideas to apply semantic web.

Hanlie Smuts [6] and group studied about framework of the KMS and found a problem that obstructs is a difference in each organization. Each organization has a different process to improve the KMS then cause of a confusing to anyone who will improve it and also gets confusing when choose for a good practice.

IV. METHODOLOGY

This research has been studied from other researches both local and overseas. And we used questionnaire to measure the priority from opinions of those experts.

A. Materials and Methods

Study about Knowledge Management System (KMS) and rapid application software development (RAD).

- Collect elements of the KMS from experts both local and overseas, totally 16 persons, and then compare of whether similar or different in order to consequent the elements to be using in the KMS.

- Study about process of knowledge system improvement from 18 experts (both local and overseas) then compare and conclude of which is popular in using in order to measure priority of the process of KMS.

- Learn from opinions of expert about elements of the KMS which is using the most.

- Create knowledge management System model by mixing KMS and RAD.

B. Materials and Methods

This is the statistics [7] used to evaluate the result for sample survey due to find out the average ($\bar{x}$).

$$\bar{X} - \sum_{\frac{i-1}{N}}^{N} X_i$$

When $\bar{X}$ = Average

$\bar{X} - \sum_{\frac{i-1}{N}}^{N} X_i$ = Total Value

N = Number of Population Standard Deviation

$$\text{S.D.-}\sqrt{\frac{n\sum_{i-1}^{n} fx_i^2 - \left(\sum_{i-1}^{n} fx_i\right)^2}{n(n-1)}}$$

When S.D. = Standard Deviation

X_i = Information of Each Quantity

F = Frequency

N = Number of Sample Survey

Evaluation by bringing information surveyed from opinions of the experts concerning priority of elements and processes of the KMS, which is in 5 levels, and presents the information analysis that the researchers indicate standard of how to interpret the meaning of survey like this.

TABLE I
MEANING OF SURWAY

Average Points	Priority of Elements and Processes of KMS
4.50-5.00	Highest
3.50-4.49	High
2.50-3.49	Neutral
1.50-2.49	Less
1.00-1.49	Least

C. Results

1) Elements of Knowledge Management

From collecting elements of the Knowledge Management System of 16 experts and popular organizations from both local and overseas, comparing be consequence according years of publishing that information by overall table [8] like this.

TABLE II
ELEMENT OF KMS

Researcher / Elements	APQC(1995)	Lee(1997	Carla O' Dell(1998)	Xerox(1991)	Siemens(2001)	SPRING(2001)	Siriraj (2001)	Lotus(2002)	Danai (2002)	True (2003)	Awad,E.M.&Ghaziri (2004)	SCS (2004)	Vijarn (2004)	Ben(2005)	Calaburese and Orlando (2006)	Sivanit (2008)	
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	16
2	✓			✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	12
3	✓		✓	✓	✓	✓	✓			✓						✓	8
4	✓	✓			✓			✓				✓				✓	7
5								✓		✓	✓	✓	✓	✓		✓	7
6	✓	✓	✓				✓		✓						✓		6
7	✓				✓	✓	✓		✓						✓		6
8				✓	✓		✓			✓					✓		5
9				✓						✓							3
10				✓			✓			✓							3
11			✓														1
12									✓								1

Studying from point of view of the experts and popular organizations in KMS and take them into priority, it is found that the first 3 elements using in the knowledge Management System are; ICT 21%, process of KMS 16% and evaluation 11%, consequently.

It is noticeable that all the experts and popular organizations are using the ICT, which is 21% of all elements. It shows that the information technology and communication are primary main factors to development the Knowledge Management System.

Other elements which are high using are; process of knowledge management system 16%, Evaluation 11%, Source of knowledge 10%, Executors 9%, Organizational culture 8% and Strategic leadership 8%.

Less using elements are; training 7%, management and behavior 4%, prize 4%, structure of organization 1%, and vision 1% as shown in the Fig. 1.

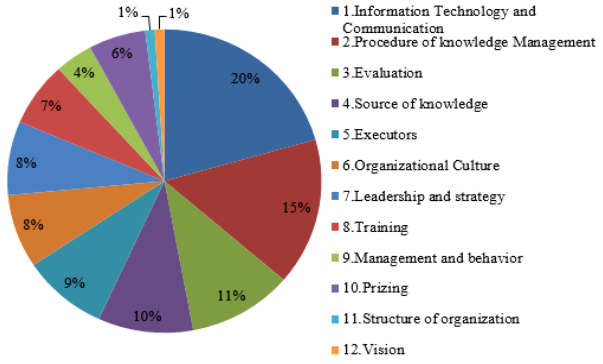

Fig. 1 Showing Percentage of Elements of the KM

Researchers brought 16 elements in Knowledge Management System collecting from both local and overseas comparing to choose totally 12 elements for using then choose the 7 most using elements and let the experts give opinions about the importance of each element in order to confirm the point of view, having a result as follows.

TABLE III
RESULT OF SURWAY

Elements of KM	Levels of Opinions	
	$\bar{x}$	S.D.
Leadership and Strategy	4.88	0.35
Process of Knowledge Management	4.75	0.46
Executors	4.63	0.52
Information Technology and Communication	4.50	0.53
Source of Knowledge	4.38	0.74
Organizational Culture	4.13	0.64
Evaluation	3.75	0.71

From the analysis of all 9 experts on their levels of opinions in table III, found that priority of the elements and process of the KMS got points from the experts during 3.75-4.88 with following details.

- Leadership and Strategy has average point ($\bar{x}$) at 4.88% which is highest important in the KMS.

- Process of Knowledge Management System has average point ($\bar{x}$) at 4.75% which is highest important in the KMS.

- Executors have average point ($\bar{x}$) at 4.63% which is highest important in the KMS.

- Information Technology and Communication has average point ($\bar{x}$) at 4.50% which is highest important in the Knowledge Management System.

- Source of knowledge has average point ($\bar{x}$) at 4.38% which is high important in the KMS.

- Organizational Culture has average point ($\bar{x}$) at 4.13 which is high important in the KMS.

- Evaluation has average point ($\bar{x}$) at 3.75% which is high important in the KMS.

2) Procedure of Knowledge Management

Knowledge to be using in order to be successful and meet the target, it is necessary to have process or procedure to manage systematically, which consists with sub-procedures in accordant to each other. Therefore, it can use knowledge from various sources and develop to be innovations. The experts and famous organizations provide procedure of KMS [8] which is different knowledge, comparing in the table IV.

TABLE IV
COMPARISON OF KMS'S PROCEDURES

No	Procedure	Wiig	Marquardt	KPMG	Liebowiiz	Trapp	Goh	Protst and Orther	Vall	Kucza	Turtan and Other	Awad, E.M. & Ghaziri	Kosol	Phiroj	True	Office of National productivity	Twanna	Chalee and yanawan	Total
1	Knowledge Using	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓		✓	✓	✓	14
2	Knowledge Building	✓	✓	✓	✓		✓		✓	✓	✓		✓		✓		✓	✓	13
3	Knowledge Sharing & exchanging	✓	✓		✓	✓		✓	✓	✓					✓	✓	✓	✓	11
4	Knowledge Indication				✓	✓		✓		✓		✓			✓	✓	✓	✓	10
5	Knowledge Seeking		✓			✓	✓	✓	✓			✓	✓			✓		✓	10
6	Storage and retrieval of knowledge		✓		✓				✓	✓	✓		✓			✓		✓	9
7	Conveyance and dissemination of knowledge	✓		✓		✓		✓			✓		✓	✓					8
8	Knowledge Development				✓	✓		✓	✓				✓						6
9	Organization and indication of knowledge								✓	✓		✓				✓			5
10	Knowledge Collection				✓		✓			✓					✓				4
11	Knowledge Selection				✓						✓	✓							3
12	Knowledge Evaluation					✓					✓								3
13	Knowledge Improvement					✓	✓								✓				3
14	Knowledge Compilation								✓							✓			2
15	Building groups of cooperation													✓					2
16	Strategy											✓		✓					2
17	Follow Up/Checking										✓	✓							1
18	Knowledge Control					✓													1
19	Target of knowledge					✓													1
20	Structure of a KMS team											✓							1
21	Technology Indication											✓							1

From using procedures of the KMS collecting from researches of both local and overseas, totally 18 researches, to compare due to show all the 21 procedures. And there are 8 procedures which are the most famous to be using, asking the experts to give their opinions. Here is the result.

TABLE V
EKPERTS'S OPINIONS

Procedure of the KMS	Levels of Opinions	
	$\bar{x}$	S.D.
Knowledge Sharing (KSh)	4.78	0.44
Knowledge Creation (KC)	4.67	0.50
Knowledge Exchanging (KE)	4.67	0.50
Knowledge Development (KD)	4.56	0.53
Knowledge Using (KU)	4.56	0.53
Knowledge Seeking (KS)	4.22	0.44
Knowledge Indication (KI)	4.11	0.33
Knowledge Retrieval (KR)	4.11	0.78

From the analysis of the experts on the 8 steps of KMS, the result is shown in table V can be concluded like this.

- Knowledge Sharing has average point ($\bar{x}$) at 4.78% which is highest important in the KMS.

- Knowledge Creation has average point ($\bar{x}$) at 4.67% which is highest important in the KMS.

- Knowledge Exchanging has average point ($\bar{x}$) at 4.67% which is highest important in the KMS.

- Knowledge Development has average point ($\bar{x}$) at 4.56% which is highest important in the KMS.

- Knowledge Using has average point ($\bar{x}$) at 4.56% which is highest important in the KMS.

- Knowledge Seeking has average point ($\bar{x}$) at 4.22% which is high important in the KMS.

- Knowledge Indication has average point ($\bar{x}$) at 4.11 which is high important in the KMS.

- Storage and Retrieval of Knowledge has average point ($\bar{x}$) at 4.11 which is high important in the KMS.

3) The New KMS Model

The research model consists of 8 steps of knowledge management system to create the new model.

The conventional knowledge management uses a concept of "Knowledge Cyclic" to share knowledge. This model share knowledge that support the information technology services at higher education.

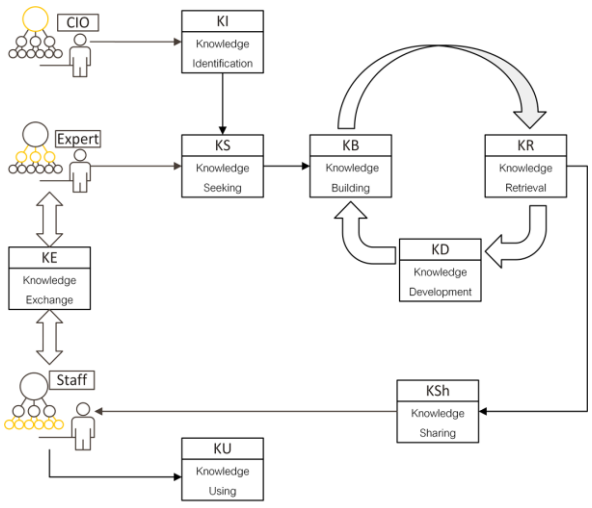

Fig. 2 "Knowledge Cyclic"

4) Rapid Application Development

Rapid application development (RAD) is both a general term used to refer to alternatives to the conventional waterfall model of software development as well as the name for James Martin's approach to rapid development [9]. In modern Information Technology environments, many systems are now built using some degree of Rapid Application Development.

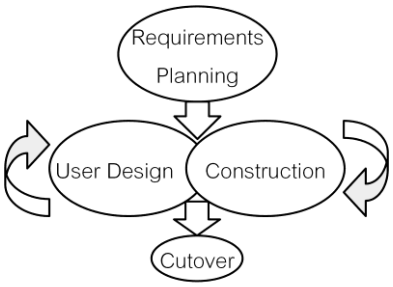

Fig. 3 "RAD Model"

The James Martin approach to RAD divides the process into four distinct phases.

- Requirements planning phase combines elements of the system planning and systems analysis phases of the SDLC.

- User design phase, during this phase, users interact with systems analysts and develop models and prototypes that represent all system processes, inputs, and outputs.

- Construction phase, focuses on program and application development task similar to the SDLC.

- Cutover phase, resembles the final tasks in the SDLC implementation phase.

5) KMRAD Model

The new KMS Model synthesis by mixing Knowledge Cyclic and Rapid Application Software Development (RAD).

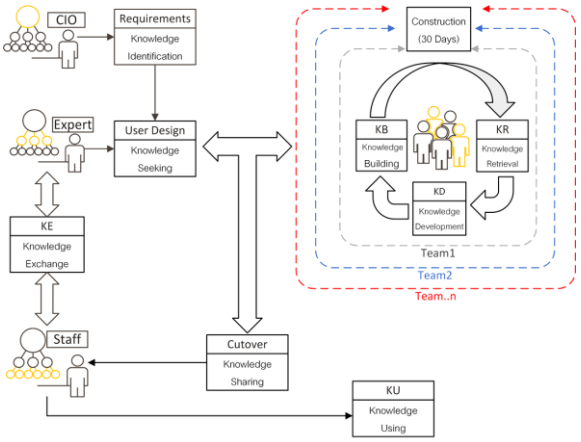

Fig. 4 KMRAD Model

The key relevance of this research is how to develop Knowledge Management System quickly, KMRAD model can be suitable to completion of the experiments.

The KMRAD model will be enable administrative and university members to perform their operations and accomplish their task and processes in a more quickly and efficient model, through the rapid application development features provided by system.

V. CONCLUSIONS

Those model mentioned shall be using in a concrete development of knowledge management system in departments who serve concerning ICT of universities, for example, computer department, office of academic resources center.

This study is expected to provide researchers and implementers of KMS's another approach. The new framework of the KMRAD has been developed and testing and is ready for the experiments for the information technology services at higher education.

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(Arranged in the order of citation in the same fashion as the case of Footnotes.)

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