A Case Study of Knowledge Management Implementation for Thai Invention Development in the Field of Engineering and Industrial Research

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Abstract: From the results of the invention contest held by the National Research Council of Thailand (NRCT), a variety of issues were encountered from the participant projects such as the issues of efficiency, safety, intellectual property, further development and learning. Since Knowledge Management is the key strategy to resolve the problems mentioned above, therefore this research aims to create the web application for representing the knowledge of invention in the area of Engineering and Industrial Research. The survey was conducted in order to evaluate the web content. Based on the survey results, the evaluation of web content was high in user satisfaction. The user feedbacks were also collected and analyzed in order to make the website as useful as possible.

1. Introduction

Although many of the participant projects in the NRCT contest were useful, there were many issues regarding; efficiency, safety, intellectual property, further development and learning. The problems possibly caused by lacking of basic knowledge in invention development. The basic knowledge is globally dispersed and not suitably collected. However, the problems can be eliminated by creating an online community which will facilitate the inventors in sharing their knowledge with each other.

In many countries, Knowledge Management has consistently been applied to improve the organization operation and reduce the lack of knowledge sharing problem. For instance, the library in Malaysia [1], the logistics system in Germany [2], The Parliament in Finland [3] as well as in Thailand. Knowledge Management has been implemented in many infrastructures of Thailand such as: farms, rural development, public sector, higher education, schools, businesses and ICT. The widely used web log is an example of Knowledge Management application [4]. The objective of this study is to apply Knowledge Management to invention development in the field of Engineering and Industrial Research, which can help the inventors to develop new inventions more efficiently in the future.

2. Literature Review

2.1 Knowledge

According to Davenport and Prusak [5, 6], the relationship between data, information and knowledge is shown in Figure 1. The lowest level of the pyramid is "data", which collected from operational functions. The middle level is "information", which derived from a collection of data. And at the top level is "knowledge", after we apply our experience or judgment to the meaningful information, we get knowledge. Knowledge can be categorized in to tacit knowledge and explicit knowledge.

Tacit knowledge refers to knowledge that individuals in an organization have such as personal beliefs, experience, skills, intuition, perspective, etc.

Explicit knowledge concerns a group of societies. It can be expressed in formal and systematic language and can be shared in the form of data, scientific formulae, specifications, manuals, and etc.
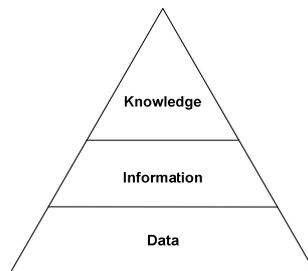

Figure1. The knowledge structure

2.2 Knowledge Management Model

Nonaka and Tekeuchi [7] proposed the model which focuses on the importance of sharing the individual knowledge and know-how among knowledge workers in Japanese firms. This model is called knowledge spiral model as shown in figure 2.
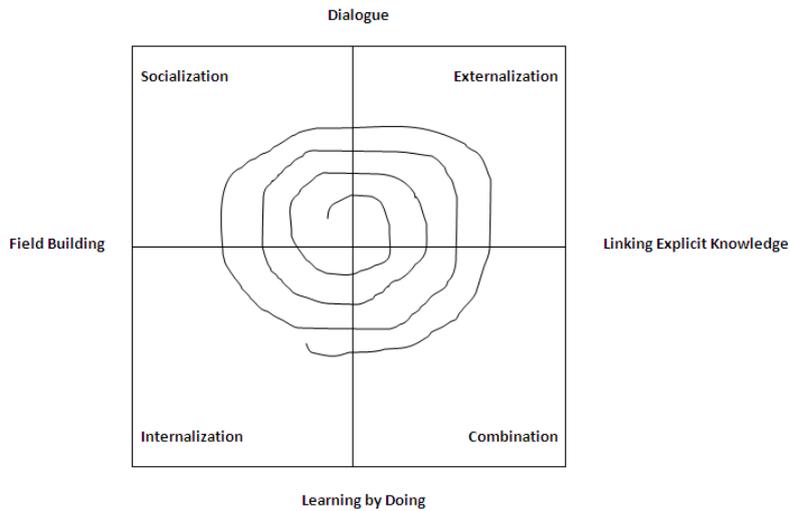
Figure2. The knowledge spiral model

This model has two views: Types of knowledge and Participant of knowledge. The types of knowledge are tacit and explicit knowledge. The participant of knowledge focuses on participative stakeholders of the knowledge.

Davenport [8] mentioned that Knowledge Management is the procedure that drives knowledge from organizations' daily processes. It involves how the knowledge is created, how it is obtained from employees, how it is accessed and distributed, how it can be transferred to other people in the organization and how it is applied to the business process.

Chih-Hung referred to OVUM structure [8] in his research as an environmental model for knowledge exchanging and integrating. The model is composed of 4 processes as shown in Figure 3.
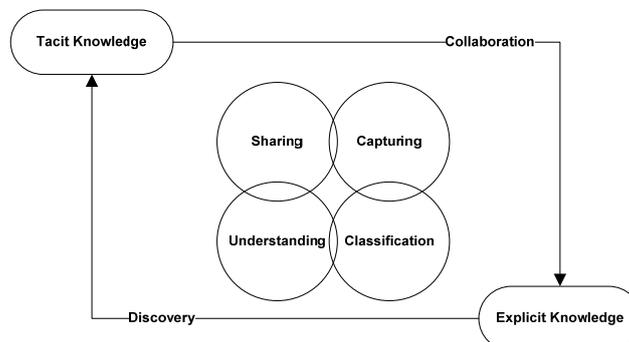

Figure3. The OVUM model

- *Sharing process:* to share the personal tacit knowledge to other people
- *Capturing process:* to capture the essential tacit knowledge to explicit knowledge
- *Classification process:* to place the explicit knowledge in the appropriate place that can be accessed easily
- *Understanding process:* to extend the actual meaning of explicit knowledge and then share the innovated knowledge with others

3. Implementation

3.1 Implementation Procedures

This research gathers the knowledge from various sources such as inventors, websites, documents, interviews, etc and develops the invention knowledge repository. The Thai invention development website was carefully designed and developed by using those gathered knowledge and information. See figure 4.
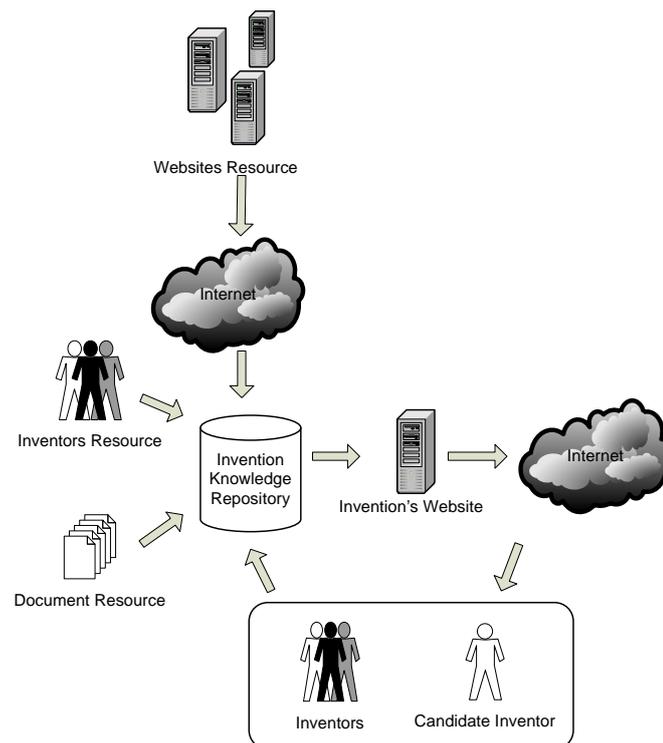
Figure4. The structure of KM for Thai invention development

The KM for Thai invention development is composed of 4 processes as follows:

1. Sharing basic knowledge is the process to share personal experience by gathering basic knowledge and issues of invention from the inventors.

2. Capturing the knowledge is the process to capture basic knowledge collected from inventors and other sources.

3. Classification of gathered information and knowledge are brought to create the website functions and contents to facilitate all interested users who access the website.

4. Understanding of knowledge is the process to generate innovation from the inventors' explicit knowledge and creativity which collected from mails sent to NRCT or over the phone calls. The information will be updated to the website constantly.

3.2 Prototype Establishment

The first step was to collect the inventors' basic knowledge and issues from the survey data of Rattanabundit University, interviewed inventors from the Invention Association and NRCT committee. The second step was to capture the basic knowledge from the NRCT committee and Internet. After that, the classification process was organized by creating the website that can be accessible for inventors and other people at anytime and anywhere over the Internet. The URL of the website is: http://invent.nrct.go.th. The website's home page is shown in Figure 5.

Figure5. KM Prototype for Thai Invention Development

The last step was to gather the innovated knowledge from inventors. The contact information of NRCT was provided on the website for inventors to send their creative feedbacks which will be useful for the future development.

4. Evaluation of the Prototype

4.1 Evaluation Procedures

The website was presented to the audience on February, 2008 in the Inventors' Day held by NRCT at Hall 9 of Impact Trade and Convention Center, Muangthong Thani. The prospected users were asked to fill up the questionnaires.

There were 75 persons consisting of 41 students, 23 users and 11 inventors who responded to the questionnaires. The aim of the survey is to evaluate the contents of the website corresponding to the project's objectives.

4.2 Evaluation Result

The evaluation result is shown in Table 1. The result of the survey indicates that the users strongly satisfy with the developed NRCT's website. Some of the interesting comments and recommendations from the users were also collected and summarized as follows:

- The contents should be up-to-date and have more details in each topic.
- The backward button should be provided in order to go back to the previous page easily instead of using back button from the web browser.
- The website should provide enough information about the characteristics of inventor.

Table1. The contents evaluation result

	Topics	Percent of User Satisfaction				
		very high	high	normal	low	very low
1	Are the contents benefit?	32.00	57.33	9.33	1.33	0.00
2	Is web site being the appropriate channel for knowledge publishing?	36.00	49.33	13.33	1.33	0.00
3	Can contents motivate the systematic invention development?	18.67	65.33	13.33	2.67	0.00
4	Can contents illustrate examples which lead to study and practice?	32.00	48.00	18.67	0.00	1.33

5. Conclusions and Future work

This research proposed a case study of KM implementation for Thai invention development in the field of Engineering and Industrial research, which aimed to reduce the weaknesses found in most Thai inventions. Although the user satisfaction was high according to the survey, but there were some points that need to be improved. First, some of the provided functions in the website should be improved. Second, it was very difficult to gather and organize information from the mailing or phone call. It is a time-consuming task and inconvenient process. Therefore, the web forum should be developed in the future in order to provide convenient way to the users in posting their questions, comments, feedbacks and suggestions regarding the invention development in the fields of Engineering and Industrial Research.

Acknowledgement

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