

*Knowledge Engineering Analysis for Developing Knowledge Management System:  
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Abstract

Research and development are crucial to every university aiming at being the world-class educational institute internationally accepted. The College of Arts, Media and Technology is an academic unit of Chiang Mai University, situated in the northern part of Thailand, aspires to reach this goal by combining the best in education with the global-standardized research, encouraging its staffs and students to conduct researches in an inspiring environment yielding high-quality research results and innovation creations in order to become the university of research and world-class research university.

In the age of knowledge-based economy, knowledge is one of the most crucial factors in the world today. For any organization, knowledge is also considered a core asset in the process of value creation. As a result, the skills to create and utilize knowledge are definitely the core competitiveness. Knowledge Engineering can be used to identify opportunities and bottlenecks in organizational development, distribution and resource application.

From the examination of bodies of management using Knowledge Engineering via CommonKADS as a tool, it was found that 10 necessary bodies of knowledge to researchers and lecturers. The three bodies of knowledge with the most importance were the submission of research projects to outside funding sources, the budget for national and international academic presentation and the budget for academic publications. After analyzing these bodies of knowledge with CommonKADS, the result was the Knowledge Modeling diving knowledge into 3 levels of utilization called Task Knowledge, Inference Knowledge and Domain Knowledge. The necessary bodies of knowledge for researchers can be used in designing knowledge management system to be the center of education, knowledge creation, knowledge forum, knowledge storing, knowledge sharing and knowledge distribution for both tacit knowledge and explicit knowledge. In addition, this knowledge can be further developed to support the knowledge management and the organization's operation in the future.

**Keywords:** Knowledge Management, Explicit Knowledge, Knowledge Engineering, CommonKADS, Knowledge Modeling, Knowledge Management System

## 1. INTRODUCTION

Chiang Mai University (CMU), situated in the northern part of Thailand, aspires to reach this goal by combining the best in education with the global-standardized research, encouraging its staffs and students to conduct researches in an inspiring environment yielding high-quality research results and innovation creations in order to become the university of research and world-class research university. The College of Arts, Media and Technology (CAMT) is an academic unit of CMU publishing more and more academic and research publications every year. During the year 2007–2011, there were 195 publications, most of which belonged to the Ph.D. students from the Knowledge Management Department. In the past, the number of published research publications from the staffs has been small. Most research projects have been delayed. The research budgets from outside funding sources have been limited. Moreover the staffs have been unaware of the rules and procedures regarding the research conducting. On the other hand, most staffs have been inexperienced, lacking in knowledge, skill, aptitude and experiences for research conducting.

In the age of knowledge-based economy, Knowledge is one of the most crucial factors in the world today. For any organization, knowledge is also considered a core asset in the process of value creation. As a result, the skills to create and utilize knowledge are definitely the core competitiveness (Guodong Ni, et al., 2010).

Knowledge Management (KM) is one of the key progress factors for any organization which can be used to obtain explicit and tacit knowledge to facilitate the access, sharing and reuse of knowledge, while at the same time, create new knowledge and organizational learning (Nada Matta and Davy Monticolo, 2010) and reuse knowledge to improve its competitiveness (N. Zhang and W. F. Lu, 2007). An effective KM can assist in managing research projects more efficiently in terms of time, cost and output quality (B. Lgel and S. Numprasertchai, 2004). As a result, CAMT needs to manage knowledge and fully utilize the existing knowledge and assets.

Knowledge Engineering (KE) can be used to identify opportunities and bottlenecks in organizational development, distribution and resource application. Consequently, KE is a key factor in corporate knowledge management (Guus Schreiber, et al., 2000). In addition, KE is also considered to play a major role in stimulating expertise and at the same time, provide organizations with computational structures and build useful knowledge bases. In other words, KE's process can directly detect internal information processing mechanisms and processes of human experts (Christine W. Chan, 2002). KE process is has its base structure and lies of Knowledge base construction, Conceptual modeling, Operationalization and validation, Requirements analysis, and Refinement and maintenance (Alun Preece, et al., 2001).

CommonKADS is one of the KE methods focusing on the analysis and the synthesis of knowledge. This framework is used in Knowledge Capture, Knowledge Analysis, Knowledge Modeling and Knowledge Utilization. CommonKADS are divided into 3 levels, namely, Task Knowledge, Inference Knowledge and Domain Knowledge.

## **2. OBJECTIVE**

The purpose of this research is to study and identify the bodies of knowledge necessary to CAMT researchers and lecturers which can lead to the improvement of Knowledge Management System (KMS).

## **3. RESEARCH METHOD**

The interviews were conducted with the Associate Dean for Research and International Affairs Department and staffs at CAMT with the KE method by using CommonKADS as a tool to test Knowledge Audit which helps clearly identify each body of knowledge along with knowledge best suited with organization's mission by 4 Organization Models, Task Model and Agent Model. In addition, the results from the interview called the understanding of researches and creative projects of staffs were used as a part of this interview as a verification of the results.

## **4. RESULTS**

According to the research body of knowledge, it was found that the research team of the Research and International Affairs Department was the core unit that drove and managed the researches of CAMT. There were 10 necessary bodies of knowledge to researchers and lecturers: (1) the knowledge in rules, regulations, announcements and protocols of CMU and CAMT (2) the analysis and planning of operations to achieve the key performance indicators (3) the intellectual property rights laws (4) the database for national and international researches (5) the information technology (6) the tax and the protocols regarding research funds received from government sections (7) the contracts and the terms for funding sources (8) the researcher's ethics (9) the CMU educational quality assurance (10) the annual performance agreement. All 10 bodies of knowledge were inappropriately formatted, misplaced, unready for utilization and poor in quality. Additionally, the website promoting the research department's information and announcement was uninteresting, unappealing and out-of-date, resulting in its unpopularity among users.

The three bodies of knowledge with the most importance were (1) the submission of research projects to outside funding sources (2) the budget for national and international academic presentation and (3) the budget for academic publications. After analyzing these bodies of knowledge with CommonKADS, the result was the Knowledge Modeling diving knowledge into 3 levels of utilization called Task Knowledge, Inference Knowledge and Domain Knowledge as can be seen in figure 1-5.

Figure 1 Critical Tasks of the Research Unit

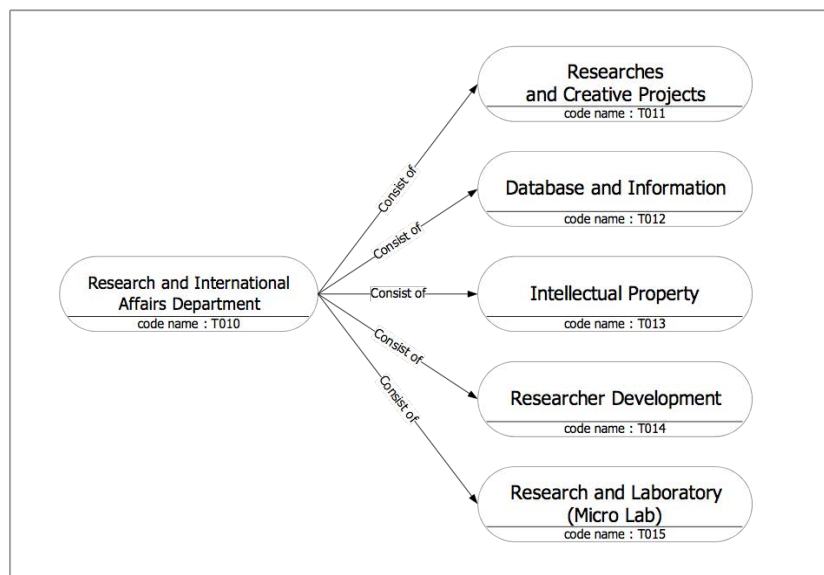


Figure 1 showed the 5 critical tasks of the research unit of the Research and International Affairs Department as followed: (1) Researches and Creative Projects (2) Database and Information (3) Intellectual Property (4) Researcher Development (5) Research and Laboratory (Micro Lab). Each task consisted of knowledge involved. The three bodies of knowledge with the most importance were under Researches and Creative Projects.

Figure 2 Inference Level Knowledge, Researches and Creative Projects

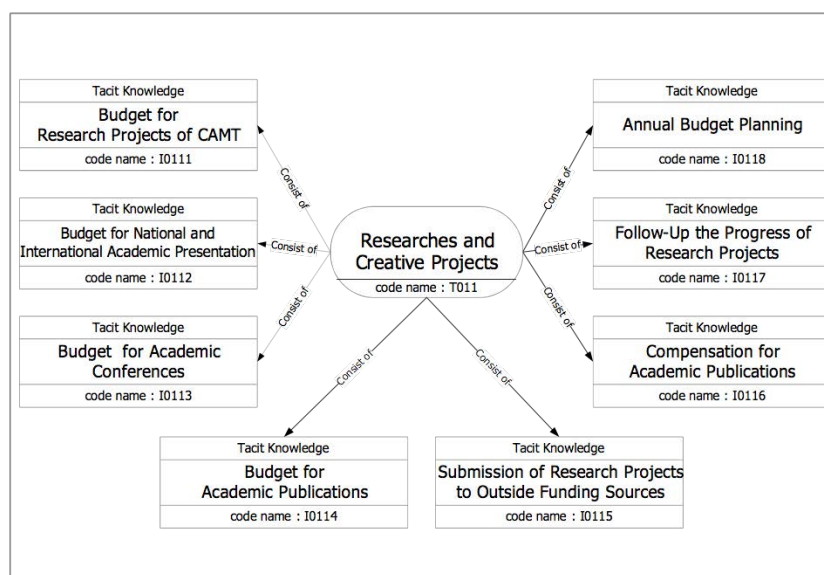


Figure 2 showed the 8 bodies of knowledge for the researches and creative projects as followed: (1) the budget for research projects of CAMT (2) the budget for National and International Academic Presentation (3) the budget for academic conferences (4) the budget for academic publications (5) the submission of research projects to outside funding sources (6) the compensation for academic publications (7) the follow-up on the progress of research projects (8) the annual budget planning.

Figure 3 Inference Level Knowledge, Submission of Research Projects to Outside Funding Sources

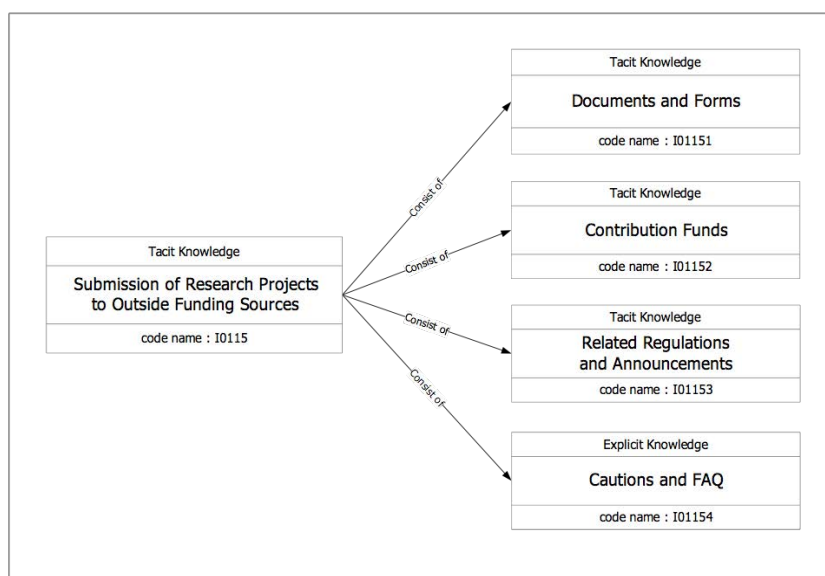


Figure 3 showed the 4 bodies of knowledge for the submission of research projects to outside funding sources as followed: (1) the documents and the forms (2) the amount of contribution funds (3) the related regulations and announcements (4) the cautions and the frequently asked questions (FAQ)

Figure 4 Inference Level Knowledge, Budget for National and International Academic Presentation

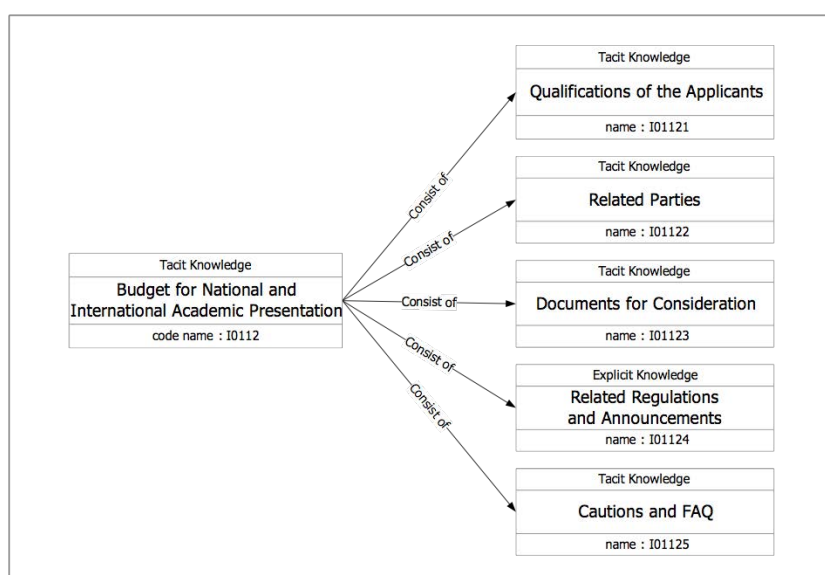


Figure 4 showed the 5 bodies of knowledge for the budget available for national and international academic presentation as followed: (1) the consideration of the qualifications of the applicants (2) the related parties (3) the documents for consideration (4) the related regulations and announcements (5) the cautions and the frequently asked questions (FAQ)



Figure 5 Inference Level Knowledge, Budget for Academic Publications

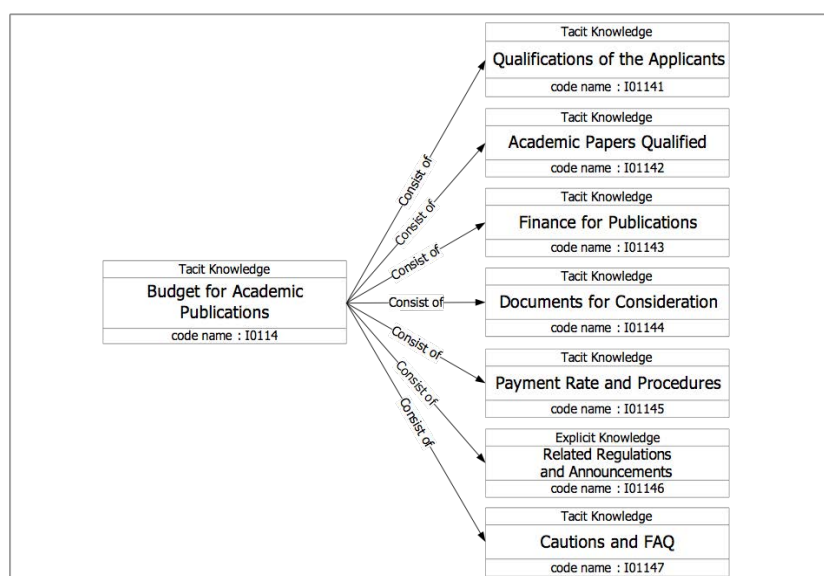


Figure 5 showed the 7 bodies of knowledge for the budget for academic publications as followed: (1) the qualifications of the applicants (2) the academic papers qualified (3) the consideration to finance the publications (4) the documents for consideration (5) the payment rate and procedures (6) the related regulations and announcements (7) the cautions and the frequently asked questions (FAQ)

## 5. CONCLUSIONS

The knowledge of the researchers and the lecturers regarding researching was at the intermediate level. The research unit should encourage the knowledge transfer of the 10 bodies of knowledge. The three bodies of knowledge with the most significance to researchers and lecturers were (1) the submission of research projects to outside funding sources (2) the financial aids for academic publications and (3) the budget available for national and international academic affairs. This study can be used in designing KMS to be the center of education, the knowledge creation, the knowledge forum, the knowledge storing, the knowledge sharing and the knowledge distribution for both Tacit Knowledge and Explicit Knowledge. In addition, this knowledge can be further developed to support the knowledge management and the organization's operation in the future.

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