

Knowledge Audit on the Implementation of Knowledge Management in Public Sector Research Institute in Malaysia: A Case Study

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ABSTRACT

Knowledge Management (KM) is a strategic initiative essential for any organisation to succeed. This paper discusses the evaluation of KM initiatives in the Malaysian Government Research Institute by performing knowledge audit. The evaluation was conducted to test the effectiveness of the current KM initiatives adopted by National Hydraulic Research Institute of Malaysia (NAHRIM) and to identify shortcomings that exist for the purpose of improvement. The methodology of the study involved an initial study by operating the company visit and literature on four other organisations that have successfully implemented the KM as a benchmark. Then, a survey was carried out to the employees of NAHRIM to identify their awareness; and the interviews were conducted among Top Management Officers of NAHRIM to gather their opinions towards current KM initiatives. In the final section of this paper, recommendations are presented as the results of the evaluation that has been carried out.

Keywords: Knowledge Audit, Survey, Interview, Government, Knowledge Management.

I INTRODUCTION

Knowledge Management (KM) has generated demanding interest in organisations, academic institutions as well as public sector. KM implementation is a need to ensure the sustainability and agility of the growth and successfulness of an organisation, especially for an organisation that relies on intellectual property and knowledge workers. KM is aimed to leverage organisation's knowledge assets or often referred as intellectual property (employee's core competencies, skills and experiences, organisational workflow and business processes) by providing a systematic way of capturing and making use of employee's expertise towards organisation's survival, sustainability and continuity.

Research Institute (RI) has high dependencies towards creation, usage, storing and sharing of knowledge. It requires KM to ensure sustainability of its business continuity and agility. Implementation of KM in Public Sector Research Institution is therefore, inline with the initiative by Malaysian Administrative Modernisation and Management Planning Unit, through its Knowledge Management

Blueprint (MAMPU, 2011). RI uses gigantic amount of knowledge in the form of tacit (knowledge in an individual's mind) and explicit (documented knowledge) (NAHRIM, 2014). Knowledge that exists in RI normally tacit, generated from the skills and experiences gained by Researchers through day to day job tasks basis, studies, research and development (R&D) activities, investigations, observations, experiments and so forth, especially Researchers who work in a cross-functional and cross-field environment (NAHRIM, 2014). Knowledge that they acquire, specifically by Subject Matter Experts (SME) is beneficial to organisation. Hence, effective KM and sharing is crucial to RI to fully utilise knowledge gained.

Evaluation of KM implementation in an organisation is a need to see whether it meets the expectation, requires improvement, could be an indicator for other exploration and etc. We perform knowledge audit (KA) in National Hydraulic Research Institute of Malaysia (NAHRIM) to evaluate the successfulness and weaknesses of KM implemented in this organisation. Most of the KM initiatives in some organisations ended up with failure or doesn't meet the objective merely because the organisations were not ready (Choy, Lee, & Cheung, 2004).

II PREVIOUS WORK

The implementation of KM in NAHRIM started in 2007 under the 9th Malaysia Development Plan (RMK9) through the development of an online repository system namely Pusat Gedung Hidraulik Kebangsaan (GEDUNG). Initially, GEDUNG is used for storing, retrieving, accessing and sharing of technical reports, publications and internal documents of NAHRIM. The project was initiated and coordinated by Information Technology Division of NAHRIM. Technical report overviewed by (Mohammad Fikry, Juhaimi, & Salmah, 2008) briefly explained the needs of a focal repository system to integrate the documents management related to the knowledge of hydraulic, water and the environment of water research, owned by NAHRIM and the stakeholders. From information system, GEDUNG evolved into a knowledge sharing system through the enhancement of modules and functionalities, as well as Standard Operation Procedures (SOP) performed during the implementation. The internal task force that manages the dissemination of knowledge in NAHRIM is done

by an appointed and dedicated Steering Committee that is also responsible for monitoring the information, storing and sharing the knowledge. In the initial phase of implementation, the knowledge repository system is functioning based on modules such as illustrated in Table 1.

Table 4. GEDUNG Modules. Source : (NAHRIM, 2008)

Module	Function
Coastal Engineering Information Repository	Online database for accessing documents and meta-data for coastal engineering research
Water Resources Information Repository	Online database for accessing documents and meta-data for coastal water resources research
Lake inventory	Online database for accessing documents and meta-data for lake research
Coastal Resources Risk Index (CORRI)	Online database for accessing documents and meta-data for CORRI
Laboratory and Instrumentation	Online database for accessing documents, meta-data and facilities for Hydraulic and Instrumentation Laboratory
Registry of Experts	Online database of Knowledge Workers of the organisation, or often addressed as Subject Matter Experts (SME)
Waterpedia	Online database for definitions, technical and fundamental terms, abbreviations and dictionary of water related terminology
Waternews	Current issues and archives of news for water and its environment
Water information Repository Portal	Online portal to share all of the above data, meta-data, information and knowledge to the stakeholders and public

In 2012, through the 10th Malaysian Development plan funding, GEDUNG has been revamped and rebranded (namely GEDUNG1NAHRIM) to suit the purpose of integrated knowledge repository system. The system transitioning from a proprietary tool to a collaborative tool (Microsoft SharePoint) that integrates the role of people, process and also technology equally in KM to achieve the business goals. The management of people, process and technology in NAHRIM's KM requires evaluation. Thus, we conducted a knowledge audit to assess the effectiveness of the KM. KA becomes an important tool to monitor the effectiveness of KM implementation by Researchers and Practitioners to investigate the organisations' knowledge availability and needs, its flow and usage in processes, by employees, etc (Gourova & Todorova, 2010).

III METHODOLOGY

The approaches that were used while performing the knowledge audit are visit, literature, survey and interview. The phases for this method involved :

Phase 1: Information gathering from visits to organisation and literature. This phase was to thoroughly gather the information from organisations that implement KM through visits and literature.

Phase 2: KM implementation benchmark. This phase provides a brief description of current KM practices as a benchmark for the KM implementation in NAHRIM that includes how KM was initiated in organisation (KM processes and activities, system and technologies used, knowledge used and needs, etc), and how KM contributes to development of knowledge and social learning, and recommendation for a successful implementation of KM.

Phase 3: Understanding organisation of case study on current KM implementation through survey and interview. Information gathered was to understand the current environment of NAHRIM in managing its data, information and knowledge, through an online survey to all NAHRIM's employees. This process is to identify every knowledge produce by NAHRIM, who produce and use it, how frequent is the knowledge used, and where it is stored. It is aimed to identify the following:

- Scarce (uncommon) of information;
- Lack of awareness of information elsewhere in the organisation;
- Inability to keep up-to-date relevant information;
- Any reinvention;
- Use of outdated or obsolete information; and
- Unclear path for expertise in a specific area.

Along with the survey, two types of interview sessions took place with the Top Management of NAHRIM, with the expectation to help on defining the current requirements to manage knowledge in the organisation.

Phase 4: Summarising the findings. Findings of KA results for all methods were discussed at the end of the manuscript with some recommendations.

A. Visit and Literature

The data for the initial stage was gathered through a visit that has been carried out at Multimedia Universiti (MMU) and Petroleum Management Unit (PMU), and through a literature review that was done on the other two organisations, Siemens and Malaysian Agricultural Research and Development Institute (MARDI). Comparative Analysis

Framework of KM practices is used to guide our study in this stage that involved :

- i. KM Processes and Activities;

Using the framework, we summarise the KM practices based on our visits and literature on these four organizations that is shown in Table 2.

Table 2. Summary of Initial Requirement Findings on Company Visits and by Literature

KM	iKnow Media, MMU (visit)	PMU, Petronas (visit)	MARDI (literature)	Siemens (literature)
KM Processes and Activities	<ul style="list-style-type: none"> Knowledge capture through discussion board, shareNet community Knowledge storage-knowledge banking Knowledge sharing-K-Space, Pasar Ilmu, k-cafe 	<ul style="list-style-type: none"> Knowledge capture Knowledge storage Knowledge map 	<ul style="list-style-type: none"> Knowledge capture Knowledge storage 	<ul style="list-style-type: none"> Knowledge capture Knowledge develop Knowledge reuse
KM Tools and Technologies	<ul style="list-style-type: none"> ShareNet-Siemen's KM solution, customised for academic purposes Discussion Forum Success Story Competition 	<ul style="list-style-type: none"> Expresso-discussion forum SKILLS-database of lessons learned Portals AXIS-PMU KM portal and knowledge repository Intranet 	<ul style="list-style-type: none"> MyFruit MePIS AgrobIS iSMART AnjungNet 	<ul style="list-style-type: none"> ShareNet – an intranet that facilitates knowledge transfer
KM Environment	<ul style="list-style-type: none"> KM Centre –iKnow Media Research Group –CeKIM (Centre of Excellence of Knowledge and Innovation Management) Research areas: Soft KM, KMS, Community & Disaster Capacity Building – Master and PhD in KM 	<ul style="list-style-type: none"> A dedicated corner for KM Centre A culture of knowledge sharing 	<ul style="list-style-type: none"> A culture of knowledge sharing Community of Practices (CoP) 	<ul style="list-style-type: none"> Creation of multi-community network
Knowledge Sharing Platform	<ul style="list-style-type: none"> K-Space(the centre for KM research) R&D Pasar Ilmu – Informal Knowledge Sharing Knowledge bank (repository to store knowledge) 	<ul style="list-style-type: none"> Mainly through the implementation of KMS (internet and intranet) 	<ul style="list-style-type: none"> Mainly through the implementation of KMS (internet and intranet) 	<ul style="list-style-type: none"> A network of multiple communities – creation of discussion forums over the network that allow the employees to join more than one community to share their knowledge

- ii. KM Tools and Technologies Used;
- iii. KM Environment; and
- iv. The Delivery Platform (K-Sharing)

MMU was chosen because it is one of local universities that owned an effective KM Centre. PMU successfully implemented KM since 2006 with high commitment from the staffs. Government Research-based like MARDI is similar to NAHRIM and it is actively use KM to capture and disseminate its products' knowledge while Siemens applied KM that has proven to help improving organisational performance (Nielsen & Ciabuschi, 2003)

B. Survey

An online survey was conducted and distributed to all employees to gather information on understanding the current practices of KM in NAHRIM specifically on managing its data, information and knowledge. Survey questionnaire is divided into four sections:

Section 1: Demographic Information. This section is to collect information on the respondents about the gender, age range, position, division/research centre, year of service in the organisation and their awareness on KM. This section can be a primary concern to expect the level of awareness of KM among them based on the demographic.

Section 2: Knowledge Profile. Knowledge profiling is aimed to know the respondents' education level and their skill of ICT.

Section 3: Knowledge Requirement/Knowledge Flow Analysis. This section is to gather the flow of knowledge in the organisation that incorporates perception towards knowledge sharing; knowledge inventories (source of knowledge explicit and tacitly); and social interactions between colleagues (communication medium, knowledge and communication problems and barriers).

Section 4. Knowledge Management in The Organisation. This section is to analyse thoroughly how knowledge is managed within the organisation specifically among people, process and technology.

C. Top Management Interview

Two series of interviews were done that comprises the involvement of Top Management Officers of NAHRIM. The main objective is to identify precisely what knowledge the employees possess and what knowledge is lacking that needs to be addressed as the requirement in the future in order to meet the vision of NAHRIM. Six Top Management Officers were selected randomly and two groups of interview sessions were conducted. They were separated into two different sessions due to time constraint and tight workload schedule. Same set of questions checklist were used for both groups with the same procedure. Table 3 below summarise the details of the interviews.

Table 3. Details of Interview Sessions

Interview Session	First Session	Second Session
Date and Time	3 rd June 2014, 12noon	21 st July 2014, 3pm
Venue	NAHRIM	NAHRIM
Interviewees	1. Director of Hydraulic and Instrumentation Laboratory cum Chief Information Officer (CIO) 2. Director of Information Management Division	1. Director of Corporate Planning Division 2. Director of Water Resources and Climate Change Research Centre 3. Director of Coastal Management and Oceanography Research Centre 4. Senior Officer Cum Acting Director of Water Quality and Environment Research Centre

IV FINDINGS AND DISCUSSION

A. Initial Requirement

To summarize, we have uncovered three important elements of KM practices in these four organisations:

- i. These organisations follow the same KM basic processes:
 - a. Knowledge creation,
 - b. Knowledge storage (for preservation) and
 - c. Knowledge application (knowledge is disseminated and shared)
- ii. Three objectives were identified:
 - a. Create knowledge repository,
 - b. Improve knowledge access for re-use and
 - c. Manage knowledge as an asset.
- iii. The implementation of KMS is driven by information technology (e.g portal, intranet).

Lessons learned from these four organisations are:

- i. The success of KM relies on commitment from employees. Employees have to be willing to share knowledge and are committed in contributing their knowledge, be it to the repository or directly face-to-face.
- ii. These companies practice rewards and incentives as a motivation factor to encourage knowledge sharing among their employees.
- iii. Commitment from top management is essential for promoting knowledge sharing among their employees.
- iv. Quality of knowledge content is very important to sustain the use of KMS.

B. Survey

Demographic. Survey respondents represent a balance gender percentage of employees from NAHRIM, 51.4% male and 48.6% female respectively. Majority of them are in age group of 30 to 39 years old (54.2%), followed by 18 to 29 years old (29.2%), 50 above years old (9.7%) and 40 to 49 years old (6.9%). 54.2% of the respondents are employees from the management and professionals, 44.4% from supporting employees and 1.4% from the top management. About 6.9% of the respondents have been working at NAHRIM for more than 10 years, 6-10 years (34.7%), 3-6 years (25%), 1-3 years (12.5%) and less than 1 year (20.8%) respectively. They are from Information

Management Division (19.4%), Coastal Management and Oceanography Research Centre (18.1%) and Water Resources and Climate Change Research Centre (15.3%) and followed by other department/ research centres.

Knowledge Profile. One of the objectives of the study was to identify the level of awareness about KM among organisation's employees. 50% of the respondents ever heard and understood KM well while the other 36% of them have heard about the term but did not understand the meaning of it. 14% of them had never heard of KM and no awareness on KM at all. More than 50% of the respondents that do not understand KM were from the age group of 18-29 and 30-39 years old. Hence, the organisation needs to further educate their young employees about KM as well as making them actively involve in future KM implementation.

Knowledge Requirement/Knowledge Flow Analysis. One of an important aspect assessed was on the knowledge sharing among members of departments and inter-departments. Most of them agreed that their department facilitates knowledge creation, storage, access or retrieval and knowledge transfer. Respondents agreed that NAHRIM should encourage and promote knowledge sharing in current work environment and they somewhat agree that the office environment helps them to do their work effectively and efficiently. In a way, the employees realised that knowledge sharing is beneficial for them to improve their job performances, thus increasing their willingness to implement knowledge management in their work and change their work culture.

Knowledge Management in The Organisation. The result indicates that 68% employees do not think that the information stored in GEDUNG1NAHRIM is useful and important for their work as they still rely on resources stored in their private folders and files found in the intranet such as Network Acces Storage to do their work that may be due to easy access within network and file folder based, rather than web-based. Most of the respondents (83%) agree that the most useful knowledge resources can be found in the electronic files on their PC.

Meanwhile, the employees are still facing problems to find information related to their work. Sometimes the respondents are not sure what they should do when they face problems at work, how to solve the problems, to whom should they collaborate and where to find relevant information to solve problems at work. Respondents answered on a 5-point scale with 5 representing the highest score (Rarely-Always). The result suprisingly shows that knowledge in NAHRIM is not managed properly,

and the current information management system does not meet their KM implementation objective.

C. Top Management Interview

The top management of the organisation believes that the organisation will benefits a lot from KM, but some of them found that it is a hard to express the expectation of the actual benefits of KM specific to their jobscope. The expectation includes; improved decision making time, enhance quality of service and improve delivery time. However, when asked whether they are facing problems to search for information for decision making needs, they agreed that sometimes they could not find the information needed. One of them mentioned that sometimes they have problems to access knowledge from external expertise, as some specific knowledge is not available internally. Currently, information about research such as technical reports, technical guide, journals and non-confidential report are stored in GEDUNG1NAHRIM and raw data related to research projects are mainly kept in internal shared drives (Network Access Storage). Sources of knowledge mainly coming from the experts themselves, internal repositories, and network access storage, while external sources come from other organizations' repositories (i.e universities, Intergovernmental Panel on Climate Change (IPCC) reports, Natural Resources and Environment (NRE) reports, government) and also from the Internet.

According to the interviewed senior managers, knowledge management aims of storing tacit knowledge of the experts is a good initiative, but some of them were not convinced when it comes to practical implementation of this idea. Currently, they try to avoid working in silo to ensure that their expertise is shared with others and to avoid depending on one expert for knowledge related to specific problem area. They encourage teamwork within department or research centre and also knowledge sharing across departments as some of the projects involve multidiscipline research area. Most of the time, they use email for sharing knowledge with their colleagues, besides formal or planned meetings and discussion sessions.

While most of the Top Management personnels are positive about the knowledge management initiative, a few were sceptical about the KM implementation. Some uncertainty exists in the minds of the managers regarding the scope, objectives, and role of KM initiative in the organisation. Overall, the commitment to knowledge management is generally positive. They have not defined which knowledge areas are critical in order to improve its current or future performance as they believe all knowledge of

different research centres and business division are equally important.

V RECOMMENDATION

The finding of this study indicates that NAHRIM holds large volumes of data, information and knowledge that reside in GEDUNG1NAHRIM and also in the Subject Matter Experts (SME). As these examples demonstrate, NAHRIM stores, manipulates, and produces a great deal of data and information. Certain elements of KM do exist in NAHRIM in terms of technology. It includes;

- i. Official website – a portal that enables retrieval of information;
- ii. GEDUNG1NAHRIM - for storing and retrieval documents;
- iii. Network access storage – provide commonly accessed documents through internal shared drives or intranet.

While these technologies are considered as key resources of information, they do not focus on a core component of KM that is, people. KM is not only concern about managing information, but also emphasise on managing experts. The current systems do not store knowledge of employees, thus making the current management of people (SME), were left behind. They are at the risk of losing its extensive tacit knowledge as a result of retirement of its senior employees, staff resigning or transferred. We recommend that SME management needs to be taken into account for the organisations' future KM enhancement. Experts profiling, for example can be implemented and become a reliable tool for other employees and stakeholder of the organisation, such as Academia and Researchgate. Finding experts, binds with their research area of expertise, publications, technical papers, achievements and level of competency such as using semantic enrichment web searching is one of a growing approach nowadays (Thiagarajan, Manjunath, & Stumptner, 2008). With this, we suggest technology like web semantic for example, to be incorporated with existing KM because it enables the network relationship, information and knowledge among experts in NAHRIM and outsiders within the same domain of expertise so that it can lower the risk of losing experts' knowledge.

VI CONCLUSION

We concluded that the current systems used in NAHRIM have certain elements of KM in terms of

technology used such as the repository systems, databases, official websites and network access storage that enable knowledge to be stored, and shared across organisation. However, lack of experts' management may cause problems of NAHRIM to lose their strategic values of knowledge that may affect the organisation's survival, continuity and sustainability. They should apply KM best practices that combine people, process and technology as the key elements of KM, and managing organisational change through change management programme.

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REFERENCES

- Academia. Retrieved April 1, 2016, from <https://www.academia.edu/>
- Choy, S. Y., Lee, W. B., & Cheung, C. F. (2004). A Systematic Approach for Knowledge Audit Analysis: Integration of Knowledge Inventory, Mapping and Knowledge Flow Analysis. *Journal of Universal Computer Science*, 10(6), 674–682. <http://doi.org/10.3217/jucs-010-06>
- Gourova, E., & Todorova, Y. (2010). Knowledge audit data gathering and analysis. *Proceedings of the 15th European Conference on Pattern Languages of Programs - EuroPLoP '10*, 1. <http://doi.org/10.1145/2328909.2328927>
- Malaysia Administrative Modernisation and Management Planning Unit (MAMPU). (2011). *Knowledge management blueprint. Public Sector ICT Blueprint*. Cyberjaya, Malaysia. Retrieved from <http://www.mampu.gov.my/documents/10228/11852/KNOWLEDGE+MANAGEMENT+BLUEPRINT.pdf/e8e4c887-3921-44b6-ab8d-ac16614bec74>
- Mohammad Fikry, A., Juhaيمي, J., & Salmah, Z. (2008). *The Development of Gedung - An Information and Data Sharing Repository Platform For Hydraulic Research in Malaysia. The Development of Gedung - An Information and Data Sharing Repository Platform For Hydraulic Research in Malaysia*. Seri Kembangan, Selangor.
- NAHRIM. (2014). *Knowledge Information Integration (KI2)*. Seri Kembangan, Selangor.
- Nielsen, B. B., & Ciabuschi, F. (2003). Siemens ShareNet: Knowledge Management in Practice. *Business Strategy Review*, 14(2), 33–40. <http://doi.org/10.1111/1467-8616.00257>
- Researchgate. Retrieved April 1, 2016, from <https://www.researchgate.net/home>
- Thiagarajan, R., Manjunath, G., & Stumptner, M. (2008). Finding experts by semantic matching of user profiles. *CEUR Workshop Proceedings*, 403, 7–18.