

A STRUCTURED APPROACH TO INTRODUCE KNOWLEDGE MANAGEMENT PRACTICE IN A NATIONAL NUCLEAR RESEARCH INSTITUTION IN MALAYSIA

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Abstract: In 2002, the Government of Malaysia has launched the Knowledge Management Master Plan with the aim to transform Malaysian from a production-based economy to a knowledge-based economy. In June 2003, the 2nd National Science and Technology policy was launched. The policy puts in place programmes, institutions and partnerships to enhance Malaysian economic position. Several initiatives developed emphasize on the important roles of national nuclear research institutions in the knowledge based economy. The Malaysian Institute for Nuclear Technology Research (MINT) as a national nuclear research institution is thus expected to make significant contributions to the knowledge economy. To a certain extent MINT has been successful in knowledge acquisition and exploitation from more advanced countries as well as in knowledge generation and in the knowledge application and diffusion to the socio-economic sectors. This paper describes a structured approach to introduce the knowledge management practices or initiatives in MINT. It also describes some of the challenges foreseen in adopting the practices.

Keywords: knowledge management practices, nuclear research institution.

1. Introduction

In 2002, the Government of Malaysia has launched the Knowledge Management Master Plan with the aim to transform Malaysian from a production-based economy to a knowledge-based economy. Seven strategic thrusts were developed [1]. One of which was to dramatically increase capacity for acquisition and application of science and technology in all sectors. Knowledge-based economy strengthen Malaysia capability to innovate; adapt and create indigenous technology; and design, develop and market new products, thereby providing foundation for endogenously driven growth. By 2020, Malaysia expects to become a contributor, rather than a consumer of knowledge and technology.

In June 2003, the 2nd National S & T policy was launched. The policy puts in place programmes, institutions and partnerships to enhance Malaysian economic position including the quality of life of the people [2]. Seven strategic thrusts and several specific initiatives for each strategic thrust were developed. Many of the initiatives developed emphasize on the important roles of national research institutions in the knowledge based economy.

2. Roles of MINT in k-based economy

The Malaysian Institute for Nuclear Technology Research (MINT) as a national research institution is thus expected to make significant contributions to the knowledge economy. MINT is established in 1972 and its main responsibility is to promote the application of nuclear technology in various socio-economic sectors including industry, agriculture, manufacturing, health, radiation safety and the environment. Its core competency is R & D in nuclear science and technology.

MINT has always considers the international and regional technical cooperation programs such as the International Atomic Energy Agency (IAEA), Regional Cooperative Agreement (RCA) and Forum for Nuclear Cooperation in Asia (FNCA) as one of the important mechanisms for MINT to acquire knowledge and technology from more advanced countries. Some specialised technologies are acquired through other mechanism such as bilateral cooperation.

Over the years, MINT has been consciously and unconsciously implementing the knowledge management (KM) initiatives. MINT to a certain extent has been successful in knowledge acquisition and exploitation from more advanced countries as well as in knowledge generation and in the knowledge application and diffusion to the socio-economic sectors. [3]. For MINT to sustain the image, the trusts, the credibility and the professionalism that the institution holds, as the promoter of the applications of nuclear and related technologies for economic development, MINT recognizes the need to implement knowledge management (KM) practices in a more structured manner [4].

3. Knowledge management practices

Planning and External Relation Division is the division in MINT that is responsible for establishing and maintaining linkages with national, regional and international agencies; and for the management of technical cooperation program under the IAEA, RCA, FNCA and bilateral cooperation. In addition, the division is also responsible for the management of the quality system, the strategic planning and technology management.

The division manages large volume of information both from external and internal sources. There is always a need for getting the right information to the right people at the right time. To find the right tools and to develop the right culture to manage information and knowledge for increased responsiveness or adaptability, innovation, competency and efficiency is exerting pressure on the division and MINT at large. In view of these scenarios, KM practice is initially planned to be introduced within the division as a project focusing on the organizational behavioral approach. If successful, it will be introduced to other divisions in MINT.

Eight keys focus of KM practices will be considered, namely, knowledge-identification, knowledge-acquisition, knowledge-application, knowledge-sharing, knowledge-development, knowledge-creation, knowledge-preservation and knowledge-measurement. KM initiatives for each key focus of KM practices will be identified and implemented accordingly.

The project will be conducted in phases over 12 - 24 months period. The first 5 keys focus areas will be considered during the 6 months Implementation Phase III, followed by another 6 - 12 months to sustain them during the Sustainability Phase IV, before going to a full Progressive Journey Phase V, as illustrated in Figure 1. Proposed KM Journey and its Initiatives.

3.1 Structure Knowledge Identification

The division will identify issues to be solved. For any issue that requires problem solving, the Knowledge Need Analysis (KNA), will be applied. Each team member of the division is requested to identify and determine the existing knowledge that each member has, the required current and specialised knowledge that each member is expected to have and eventually the knowledge gap that need to be covered. The number of issues to be solved can be the measurement indicator.

3.2 Intense Knowledge Acquisition

Once the knowledge gap is established, the required and relevant information and knowledge is imported from various sources using as many strategies as possible. The team members can import knowledge from stakeholders, suppliers, customers, and specialists, acquire knowledge from K- products such as compact discs, books, documents, and reports; and through K-partnership such as private sectors, research institutes, universities, hospitals as well as through organised learning such as training, workshop, technical visit. The number of sources and strategies made at this stage can be the measurement indicator.

3.3 Obsession in Knowledge Application

With the attitude of “*local knowledge global application*” [4] a situation can be established where team members are encouraged and supported to apply both the tacit and explicit

knowledge acquired. The team members who prove to be applying their knowledge and work for them or their knowledge being duplicated and practised by as well as shared with other members will be given recognition. The number of recognition given can be the measurement indicator for K-application.

3.4 Speed in Knowledge Sharing

With the principle of “*local problem global solution*” [4], a situation can be created where a problem in the division attracts solution from various team members who contribute their knowledge towards solving the problem. For knowledge sharing to take place, the critical success factors are sense of trust and mutual respect among the team members as well as the desire of the individual towards wanting to share and collaborate. ICT facilitates K-sharing. Knowledge policy for tagging knowledge and motto such as “*Shared Knowledge leads to Constant Innovation*” [4] are also important factors for motivation of the team members. The team member who contribute ideas and solutions is to be given credit or tagging as K-donor. The number of solution provided and credit obtained can be the measurement indicator.

3.5 Focused Knowledge Development

Knowledge development is concerned with the activities of developing new skills, products and ideas. It takes place through various mechanisms such as learning for higher degree of education and specialization. Collaboration within an organization and/or inter-organization as well as the daily activities of the organization also contribute to the knowledge development. Knowledge development is found to be effective when the ‘overall entry point’ or the level of competency of the team members for a particular issue is about the same.

To ensure knowledge sharing and collaboration to be accepted and effective, and at the same time beneficial to the team members, the choice of issues to be discussed and solved must be of common interest and concern to all the team members. An environment of meeting minimum standard of competency (i.e. overall entry point) will be employed in KM Practice as to encourage team members to participate actively in the discussion. Consequently, it will help team members to develop their ability and capability of improving and creating new ideas of solving the selected problems (i.e. increase overall entry point).

3.6 Passion for Knowledge Creation

With the attitude of “*Solid knowledge give rise to breakthrough innovation*” [4], situations and activities can be established whereby innovation can be created through movement of concentrated knowledge in the mind of each team member to another, which can be later developed and documented. Knowledge creation can take place through participation in activities such as socialization, discussion, meeting, writing and learning. Every team member must appreciate the self-reinforcing nature of knowledge-creating activities and has passion for knowledge creation. Through the process slowly the team members will transform to be Innovative Knowledge Professionals (IKP).

There are four fundamental patterns of knowledge creation, namely, from tacit to tacit, from tacit to explicit, from explicit to explicit and explicit to tacit. Tacit knowledge is undocumented knowledge that resides in an individual and explicit knowledge on the other hand is published and documented knowledge.

Tacit to tacit refers to the transfer of knowledge from one individual to another with about the same entry level for example among the senior team members during socialization, discussion, and meeting. Tacit to explicit is the process of recording and documenting the knowledge of an individual for example in ‘thinking through’ process before writing new knowledge. Explicit to explicit is a process of improving documented knowledge or a combination of ideas from the documented knowledge to a creation of a new knowledge as in writing a review paper. Explicit to tacit is a process of transferring a documented knowledge to individual e.g. through learning.

3.7 Culture of Knowledge Preservation

At the advance stage of KM practice, it is expected that there would be some culture of knowledge preservation being developed by the team members, where knowledge is capture, selected, store and updated. Selecting involve the process of deciding what knowledge is to be kept and to be documented. Only valuable experience, skill, knowledge need to be identified and transferred in the organization system.

Collective knowledge from a group of individual is more powerful than an individual's knowledge. Collective knowledge can be preserved through minutes taking and group discussion. As IKPs, the team members are expected to preserve both their past experiences and current knowledge and the future knowledge requirement through the use of KNA. Electronics data bank can be established to store the knowledge acquired. The number of reports on the knowledge stored in the data bank can be the performance indicator for the K-preservation.

3.8 Periodic Knowledge Management Measurement

Measurement is imperative if practice of KM is to be successful. Knowledge can only be controlled indirectly by controlling the context in which it develops. Knowledge can be recorded but not precisely. Thus it is not possible to quantify knowledge precisely. In this project, each phase of the KM project implementation workplan will be measured independently. A checklist of performance indicator/achievement will be used as to monitor the implementation of the initiatives.

4. Distinct Features of A K-Organization

In order to ensure that the project is conducted successfully, appropriate distinct features of a knowledge organization will be selected and implemented, namely, physical architectures, structural design, living K-policy and plan, K-driven human capital, K-tools and K-info structure

4.1 Physical Architectures

The division has adequate facilities and rooms for the project to start with. There is a meeting room facing a lake in the division. This room with the blind up, it can be used as Knowledge-Port to discuss and dream of the future. On the other hand, when the blind is down, it can be turned into a Strategy Zone, to discuss action plans and strategies. There is also a corner with television and a room for tea/coffee, which can be used for Talk Place to share and exchange ideas, and a documentation/filing room as Knowledge Capital Centre.

Appropriate mottoes will be displayed to create conducive environment to implement KM Practices and to reinforce KM value and culture. This effort will create awareness and curiosity as well as the urge to know more about KM.

4.2 Structural Design

The division organizational structure is developed according to the government organizational structure. A transformation of the division organizational structure to the k-based organization structure is illustrated in Figure 2. In this project, the current divisional organizational structure will not be modified, but the k-organization structure will only be adopted as to instil the culture of KM. The team member's roles in k-organization structure for the division will be defined and proposed as shown in Figure 2.

In the k-organization structure, everyone has multi and flexible roles to play. Opinion is exchanged and shared without fear. Duties are carried out willingly (self-driven) within clear job scope, without being directed. There should be mutual trust and understanding in the division in executing the duties.

The director is still the leader of the division. He is supposed to be visionary and innovative leader. He has to equip himself with current knowledge to be able to lead and be led by the team members. He is supposed to provide guidance to the team members according to the

clear vision, mission and objectives of the division. At the same time, he must be able to listen to the team and invite the team to take risk without fear of embarrassing themselves as well. The Unit Heads play the roles of a strategist. Understanding the vision, mission and objectives of the division, the Unit Heads and the staff collectively, have to established strategies to achieve them. Once the strategies agreed and understood by all staff, the strategies will guide the team to carry out their respective roles. The staff of each unit and the supporting staff of the division will have a role as the specialists. With shared vision, mission and clear objectives, the leader, strategists and specialists must have self-driven strength to explore the creativity and innovative methods to perform their tasks. The KNA will be used in undertaking any assignment and solving problem. Leveraging on rich and different knowledge capabilities of the staff, together with conducive environment, proper guidance, and operational tools, the staff of the division will naturally enrich their knowledge and ready to apply it as a self-achievement and satisfaction for being able to contribute to any assignment.

4.3 Living K-policy and Plan

Besides the vision, mission and the objectives of the division, the division also requires knowledge living (operating) policy to support the implementation of the KM practice. The policy will guide the division for short duration i.e. 1-2 year, to innovate the practice of KM. In developing the living policy statements, the corporate vision, mission and objectives, the strategic focus of the division and the 8 key focus of KM have to be considered.

Based on the living policy, guidelines will be provided to the division for the implementation of KM practice. Of course the policy and guidelines have to be agreed by the team members.

4.4 K- driven Human Capital

In an effort to create innovative knowledge professional (IKPs) the division will nurture a culture of trust and respect. Each member shall be considered a specialist in his own functional area and more team-based work will be encouraged. The team members will be given a lot of exposure and training both formal and informal, to help them to develop positive mind set. The members will be informed of 8 key attributes of a positive mind-set IKPs which include innovative thinking (Thinking Outside the Box), k-responsibility, performance directed learning, contributing in innovative teams, professional discipline, self-drive innovation habits, solution focus mindset and personal knowledge creation. The team members must be more independent and able to take charge of their own career development. Individuals and teams within the division gain their authority not from the hierarchy but from their knowledge and skill.

4.5 K-Tools

There 2 types of k-tools to support the implementation of KM practice, namely, technology-driven k-tool and culture-driven k-tool. For this project, the culture-driven k-tool will be employed, using the already available tools and facilities within the division such as personal computer, telephone. The Learning History approach will used. In this approach, the critical episodes such as mistakes made, failures and achievements of the senior team members during past years of service will be captured through interviews and light discussion (story telling session) as well as answering simple questionnaires. The critical episodes will be clustered accordingly and documented. A collection of critical episodes will become divisional experiences, which will be shared to generate corporate learning lessons. The lessons learned will be documented and disseminated to all staff as to ensure smart decisions are repeated and mistake avoided. If the needs arise, the division will organise a k- Forum to discuss the lessons learned. The divisional story and Best Practice Case Material can be developed out of the exercises.

A k-creation/collection board will be another initiative to be considered. The board will be used to display the information on KM activities for team members to share and to facilitate collaboration.

4.6 K-infostructure

K-Infostructure comprises networks, appliances and legislation that are essential for the transmission of information. The transmission and access to information is greatly facilitated with the establishment of the relevant legislative and regulatory framework.

The division is well equipped with Information & Communication Technology (ICT). E-mail messaging is widely used among the team members. To certain extent, it will facilitate collaboration and the implementation of KM practice. On the other hand, electronic folder and electronic calendars are available but not yet fully utilised and online document repository is not available at all in the division. The importance of online information sharing is imperative especially for collaborative problem solving and participative decision-making.

5. Key Challenges and proposed solution

Introducing any new changes in an organization will normally lead to resistance, since agreeing to new changes is to mean accepting uncertainty. Uncertainty will create the feeling of insecurity. Piloting the project will face some challenges and limitation, which have to be overcome steadily. Among other things are as following.

5.1 Complacent in the familiar routine

The team members are used to the familiar routine that help them to execute their daily tasks. Introducing a new concept such as KM Practice will require changes in their routine as well as their mind-set in executing their work. They may be sceptical in accepting a new concept especially if the idea is not properly introduced and explained.

Proposed solution: Some mental reorientation to adapt to the new practice is required. Conduct an Awareness (Familiarisation) Program to introduce the concept of KM Practice and the importance of k-driven organization to the team members before it is implemented.

5.2 Different knowledge entry level (Total participation vs competence level)

Different levels of competencies, experience, maturity and knowledge of the team members may pose some problems at the early stage of implementing KM Practice. The junior team members that are unfamiliar, shy and lack of confidence to express own ideas on some issues and problems identified may only be able to participate partially in the k- sharing. The consequence is the ineffective collaboration and slow implementation of KM Practice.

Proposed solution: A minimum standard of intellectual competency needs to be established for any assignment to be undertaken. Encourage some preliminary preparation such as self-learning through reading and researching on issues related to the assignment. Encourage learning without fear of looking incompetent among the team members.

5.3 Need for new skill set

Implementing KM project leading to bring in new environment and method that require new skill and new practice before enable it to transform into the desired habits The team members may need to have some kind of basic skill set to implement practice of KM. For example, as K- sharing is one of the 8 key areas of focus, skill to be able to work in a team must be present in the individual team members. Other skill such as strategic thinking must also be with the team members especially the team leader. The team members must also have the ability to use the cognitive and explicit knowledge under the KM identification KNA

Proposed solution: Provide k-environment that is conducive to learning and self-renewal as to encourage learning, unlearning and relearning among the team members. Motivate team members to share knowledge. Assist team members to acquire skill in areas such as knowledge need analysis (KNA), team building, innovative leadership, strategic the respective team members to facilitate practice of KM

5.4 Managing change and attitude.

In implementing KM project, the habits of giving orders and instruction to the junior team members will no longer practised. The process of problem solving and decision-making will be easily noticeable as a result of flatter structural design. Reasons for any delay become more obvious under the new k- environment. Accountability becomes evident. In this situation, the team members especially the senior ones may find some difficulties in managing change and attitude. The consequence is the rejection of KM Practice by the senior team members who seems to have lost their authoritative power.

Proposed solution: Highlight knowledge management best practice and provide skill through training on managing change and attitude for the team members.

5.5 Sustaining the KM project in the division.

Sustaining the KM project is a necessity for KM to be a culture for the division, but it may be a challenge if there is inadequate support from the management.

Proposed solution: Conduct special awareness program on KM for the middle and top management. Explain the benefit of KM practice and provide information on achievement of Most Admired Knowledge Enterprise (MAKE).

6. Ultimate Impact of Knowledge Management

Practice of KM will lead to a collaborative problem solving and participative decision-making and its best practices can be shared across the organization. Below are some expected impact of KM practice that could contribute to the division;

- Motivate and generate the habit of information sharing among members through better leveraging of information and knowledge for divisional issue and problem.
- Achieve better communication, horizontal integration and more streamlined process through establishing a richer collaborative system environment among members seeking and providing ideas for proposed solutions
- Provide open and flexible communication flow that will fulfil and improve the information needs for problem solving and final decision-making processes at all levels.
- Knowledge base division will ensure the availability of and accessibility to information and lessons learn by every team members. This knowledge base division will be a repository for knowledge on successfully implemented of KM practice, methodology and best practice
- K-preservation leads to organization reducing its cost each time it reduces duplication effort especially when organization has to retrain their new employees every time 'knowledge-walk out' happen.
- Specialized knowledge embedded in individuals can be unified and applied by other in their day-to-day operation for strategic used. Every one has own specialization that together can help to address organization challenges. Team members can have opportunity to learn from others and to develop division best practice.
- Creating strong mentor and mentees relationship during the process of KM practice that the end of the process will help promoting and practicing the concept of caring and harmony

7. The Way Forward

The structured approach to introduce the knowledge management practices is a commendable first step towards transformation of MINT into a knowledge organization. Practice of KM, will enable the division to develop the habits and eventually the knowledge-culture. The experience, the lessons learn, best practices and knowledge gained while implementing KM, is to be shared and disseminated to other divisions in MINT. This will help to expedite the development of the habits and K-culture throughout MINT. While developing the K-culture, implementation of the technological aspects of KM will continue concurrently, through the ICT capabilities. The ICT capabilities manage the organization knowledge assets. These two-

prong approaches will ensure full transformation of MINT into K-organization both technologically and culturally.

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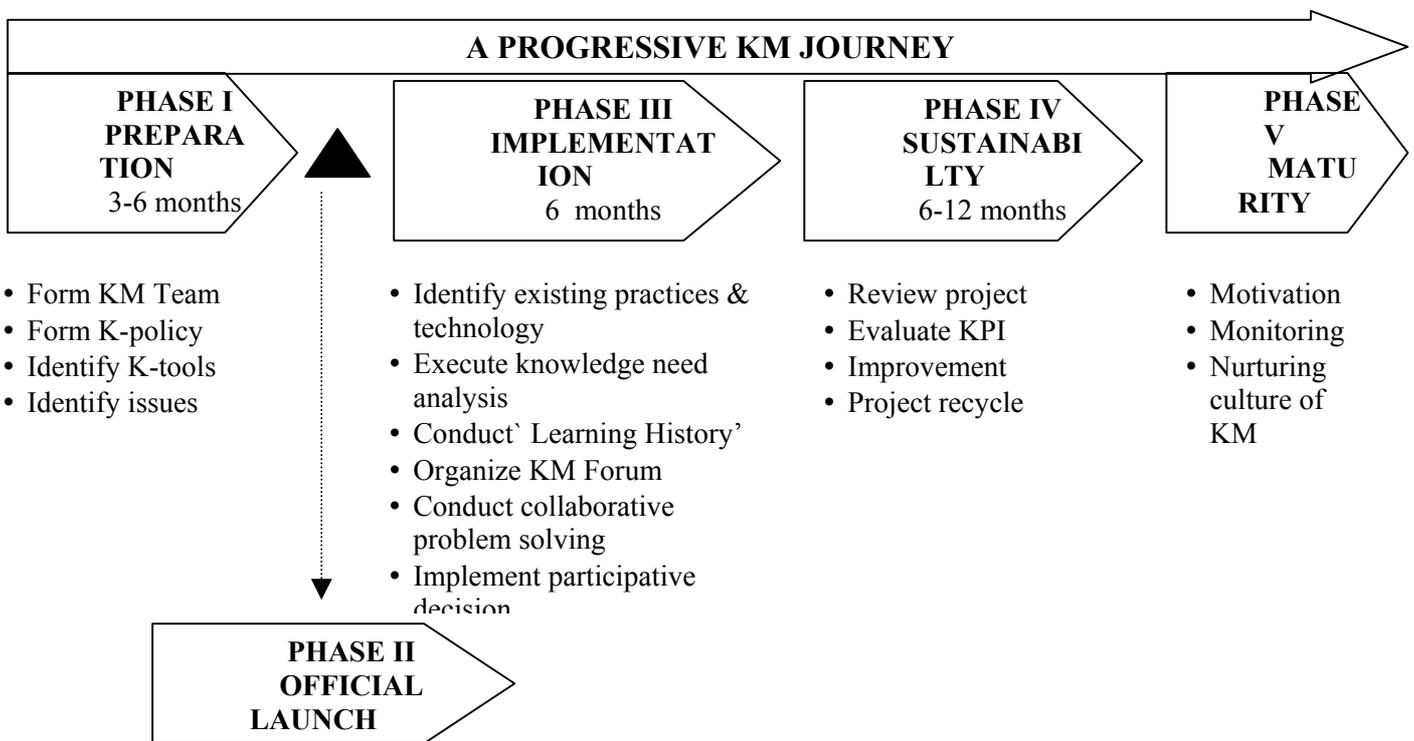


Figure 1. Proposed KM Journey and its Initiatives.

