



HAL
open science

Assessment of knowledge domains of PNRA for their maturity and criticality: a case study

Shahid A Mallick, Jean-Louis Ermine, Mohammad Ali Awan, M. Ammar Mehdi

► **To cite this version:**

Shahid A Mallick, Jean-Louis Ermine, Mohammad Ali Awan, M. Ammar Mehdi. Assessment of knowledge domains of PNRA for their maturity and criticality: a case study. KGCM '11: 5th International Conference on Knowledge Generation, Communication and Management, Mar 2011, Orlando, United States. hal-02500982

HAL Id: hal-02500982

<https://hal.science/hal-02500982>

Submitted on 6 Mar 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

**Assessment of Knowledge Domains of PNRA for their Maturity and Criticality:
A Case Study**

Dr. Shahid A Mallick, Jean Louis Ermine, Mohammad Ali Awan, M. Ammar Mehdi

E-mail: shahid.mallick@pnra.org

Pakistan Nuclear Regulatory Authority, Islamabad.

ABSTRACT

Nuclear power operating organizations and regulatory bodies (RB's) are facing problems related to shortage of technical and experienced human resources due to the dearth of new developments in the field of nuclear science and engineering and due to the ageing of the existing, experienced manpower; this has become even worse. This poses a serious concern to the nuclear industry vis-à-vis its survival and progress. Therefore it is essential that the organizations working in this area, to devise different mechanisms for the proper management and preservation of the knowledge and the intellectual capital contained therein. International Atomic Energy Agency (IAEA), being the apex body of the United Nations, responsible for the safe and secure progress of the nuclear field, has also taken different steps in order to guide these organizations in this regard.

Pakistan Nuclear Regulatory Authority (PNRA) established in 2001, has also taken different measures to assess the maturity of the knowledge it contains and its significance for the success of the organization. This paper highlights the methodology employed by PNRA to assess the criticality and maturity of its knowledge domains.

Keywords: Knowledge Maturity Model, Knowledge Criticality Model, Knowledge Domains, Accident Analysis, Radiation Safety

1. INTRODUCTION

In order to compensate for the non-existence of a proper knowledge management system, Pakistan Nuclear Regulatory Authority developed an intranet web site, accessible only to the personnel of PNRA. This web site has been arranged into main knowledge areas in which PNRA is working and whose knowledge PNRA's

personnel require for the proper accomplishment of their tasks. This arrangement would be functional till PNRA develops its own Knowledge Management Portal, based on the international standards and professional expertise.

Up till now, we have, after extensive discussions with knowledge experts and brain storming sessions, following a thematic approach, identified the domains in which PNRA is working. Moreover, we have developed an interactive front-end layout of the Portal using the conventional web-development approach. This would form the prototype of the Knowledge Management portal that we plan to develop and therefore would help us in further improving our classifications and design.

The paper highlights the methodology employed by PNRA to assess the criticality and maturity of its knowledge domains. Initially, comprehensive efforts were made to map the existing knowledge domains for performing core regulatory functions. Once the knowledge domains were identified, next step was to select two domains as a pilot project. Accident Analysis and Radiation Protection were selected for the pilot study. To assess the criticality and maturity of these domains, three assessment models i.e. Knowledge Maturity Model and Knowledge Criticality Model, developed by Mr. Jean Louis Ermine; and the other developed by International Atomic Energy Agency called Knowledge Management Assessment Tool, were selected.

**2. KNOWLEDGE MANAGEMENT ASSESSMENT
TOOL**

IAEA'S Knowledge Management Assessment Tool is used for the assessment of the following areas:

- 1) Policy & Strategy for KM

- 2) HR Planning & process for KM
- 3) Training and Human Performance Improvement
- 4) Methods, Procedures & Documentation Processes for Improving KM
- 5) Technical (IT) solution
- 6) Approaches to Capture/Use Tacit Knowledge
- 7) KM Culture/Workforce Culture Supporting KM

In the first phase, due to the limitation of time, only the following two (02) areas were selected for this study:

- 1) HR Planning & process for KM
- 2) Technical (IT) solution

The tool is based on a questionnaire which is required to be filled by knowledge experts. Suitable persons from within PNRA, working on the domains mentioned above, were selected to fill the questionnaire. To avoid any misconceptions, all project participants were provided with sufficient understanding of the tool through presentations and individual assistance. To ensure the reliability of the data, participants were asked specific questions about their domains.

Results of analysis showed that following practices are being applied in PNRA:

- 1) Talent Programs
- 2) Job Profiles
- 3) Work Force Planning
- 4) Succession Planning
- 5) Portals
- 6) IT & KM Strategy
- 7) Information Management
- 8) Content management
- 9) ERP
- 10) Simulation Tools

However, following practices are not yet being applied in PNRA:

- 1) Exit Interviews
- 2) Knowledge Risk Assessment
- 3) Search Engines
- 4) Expert System

- 5) Collaboration Tools
- 6) Concept Mapping
- 7) KM Data Base
- 8) Yellow Pages

3. Knowledge Maturity Model

Knowledge Maturity Model is used to analyze the maturity of a knowledge domain. The tool is based on a questionnaire which is required to be filled-in by the knowledge experts. It uses a number of parameters to assess the level of maturity of the domain and to identify an organization's strengths and weaknesses vis-à-vis that domain.

The knowledge management experts of PNRA explained the Knowledge Maturity Model (KMM), developed by Mr. Jean Louis Ermine, to the knowledge experts. These knowledge experts, selected from within PNRA, filled-in the questionnaire, which was then analyzed by the Knowledge Management Experts, to draw conclusions regarding that domain.

The domains selected in the first phase, for the analysis were:

- a) Accident Analysis
- b) Radiation Safety

Below is provided a brief summary of the results obtained, using the knowledge maturity model, for both the domains:

a) Accident Analysis

The format of information storage and the methods of its collection are relatively refined and organized however these could not be made independent of the willingness or otherwise of an individual employee to conform to these methods. Moreover, there are no dedicated tools or people for KM and the information to be stored is not validated at all.

Although, all the basic tools of Information Technology like a vibrant network, intranet portals, a mailing system and other such basic tools are available and the security and safety of information is satisfactory, commensurate with the requirements of PNRA, yet no specific KM tools are being employed. The access to

information stored has been made fairly user-friendly through intranet using shared resources; even then the reutilization of information is alarmingly low. The information once stored is very rarely accessed again.

A formal system of training exists but it has not been normalized into the system and the knowledge is

enriched mostly through personal initiatives. The processes are not oriented to increase the quality of the output and to allow room for creativity and the cooperation between internal and external units is institutionalized and normalized into the system of the

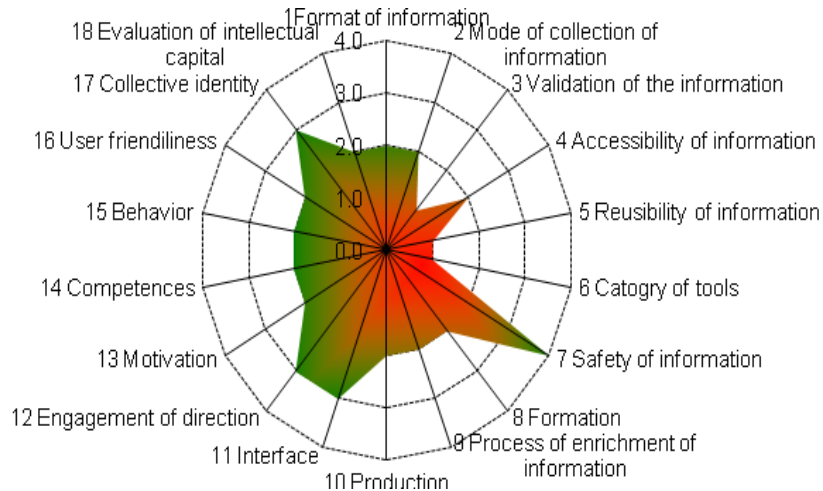


Figure: 1 Applying KMM Tool on the Knowledge Domain- Accident Analysis

organization. The management of PNRA is convinced of the efficacy of using KM tools and methods however there is still room for improving their commitment. The incentives for an employee to contribute in complying with the KM strategy are minimal. The organization has formally identified the competencies it contains and their corresponding experts however access to them is mostly through personal initiatives. The culture of the company exists and the employees identify with the collective identity of the company.

The above discussion and Figure 1 show that the knowledge domain is less than mature. The management is committed to implement KM strategies and the organization is doing satisfactorily in ensuring the safety and security of information. The cooperation and the exchange of information between the personnel are smooth however the competencies have not been identified and managed in a professional manner. The collective identity of the company exists. In spite of maturities in some attributes, there is room for improvement in almost all the characteristics being used to assess the maturity of a knowledge domain.

b) Radiation Safety Group

The format in which the information regarding Radiation Safety is stored in PNRA is not raw but it needs to be structured further. The method through which information is collected is organized however it depends on the individual employee to conform to these methods and is not ingrained in the workings of the organization. There are no dedicated tools or people for facilitating the KM tasks, the information contained is not validated at all and the access remains difficult and random. Although the management and the staff realize the importance of reutilization of information to increase productivity however there are only a few such cases which can be identified.

All the basic tools of information technology like a vibrant network, intranet portals, a mailing system and other such basic tools are available however no specific KM tools are being employed by PNRA. The personnel working on Radiation Safety are satisfied with the arrangements made by the organization for the security and safety of information. Moreover, a formal system of training exists but can be improved further in order

to add to the creativity and productivity of the organization.

The knowledge is enriched mostly through personal initiatives and the processes involved in production need to be modeled, organized and oriented

towards increasing the quality of the product and creativity of the personnel. Cooperation between internal and external units of PNRA is institutionalized and normalized into the system. The management is convinced of the efficacy of using

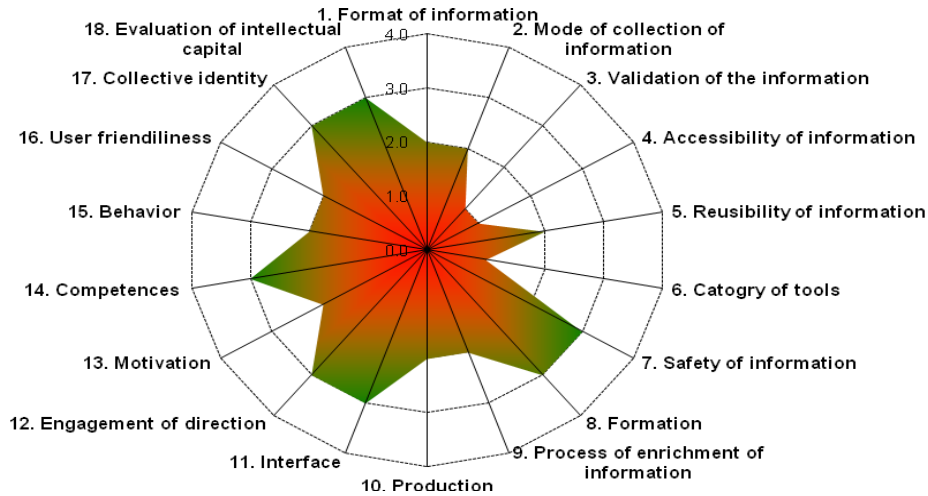


Figure: 2 Applying KMM Tool on the Knowledge Domain- Radiation Safety

KM tools and methods however there is still room for improving their commitment since the incentives offered to the employees to contribute to and to follow the KM strategy are minimal.

The organization has formally identified the competencies it contains and their corresponding experts and the exchanges between them are official as well as voluntary. The culture of the company exists and the employees identify with the collective identity of the company.

4. Knowledge Criticality Model

The paper also uses the Knowledge Criticality Model, developed by Mr. Jean Louis Ermine, using the same methodology as was adopted for the KMM tool. This tool uses different parameters e.g. the number of specialists available, the status of the organization in the field, ease of access to knowledge resources etc. in order to assess the significance of the knowledge domains for an organization and the level of efforts required for its preservation, perpetuation and maintenance.

Figure 2 above shows that the knowledge domain is less than mature. First of all the management is committed to implement KM strategies. The organization is doing satisfactorily in ensuring the safety of information. The cooperation and the exchange of information between the personnel are smooth and the competencies have been identified and managed. The collective identity of the company exists. In spite of these maturities in some attributes, there is room for improvement in almost all the attribute.

The domains selected in the first phase, for the analysis were:

- a) Accident Analysis
- b) Radiation Safety

Below is provided a brief summary of the results obtained, using the Knowledge Criticality Model, for both the domains:

a) Accident Analysis

The field of knowledge is defined as priority in the strategy of PNRA; it is unusual and is controlled by a few organizations. A great number of people share the expertise on the field, and one is able to contact them easily however the control of the field of knowledge implies the control of many parameters which come from various disciplines. This attribute increases, to some

extent, the complexity of the knowledge domain. Few organizations work on this field and PNRA has predominance in the field. The history of the field constitutes an important source of knowledge. The Knowledge contained will always remain useful, and the rate of its evolution is low.

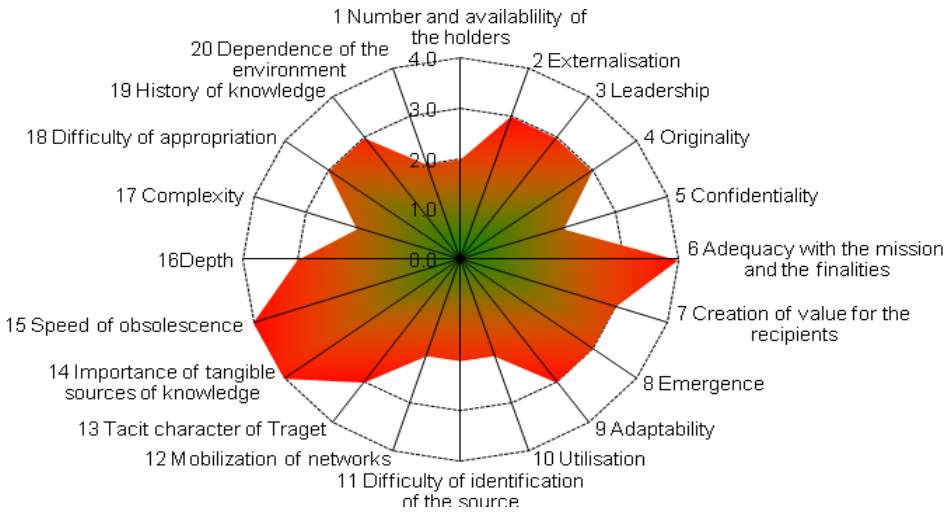


Figure: 3 Applying Knowledge Criticality Model on the Knowledge Domain- Accident Analysis

The field is in progressive emergence and corresponds to the objectives of the organization. The knowledge may be reused again and again for increasing the efficiency and the effectiveness of the organization. Moreover, PNRA has the tools and the networks which make it possible to find different sources of knowledge. The knowledge available makes it possible to solve the problems and it has an overall positive contribution for the recipients. Knowledge available makes it possible to solve the problems. Lastly, the development of the field is dependent on constraints like regulations, etc.

amongst the most active ones working in the field. The field is rare and specific and the number of organizations and the specialist working in this field is not that high. Moreover, the field of knowledge is unusual and is controlled by only a few companies. The field is in progressive emergence and corresponds to the objectives of our organization.

It can be deduced from the Figure 3 and the above discussion that the field is critical for the working of the PNRA and is amongst the most important tasks assigned to it. For better organization of the knowledge domain, the organization must pay attention to adapt different methodologies and plans for better utilization of the knowledge, confidentiality of the knowledge and the creation of networks of knowledge in the field.

The history of the field constitutes an important source of knowledge. The field is relatively stable, knowledge remains useful for a long time and has been studied for a long time and has been the object of many publications, documentations and/or bases of information.

b) Radiation Safety Group

The access to knowledge within PNRA is protected however the knowledge available has been adapted to increase the efficiency of the organization and may be reutilized again. The use and reuse of knowledge is made regularly. The company has the tools or the networks which make it possible to find sources of knowledge-people or bases of information. These tools are in precise places, but are not always known to all. The control of the field of knowledge implies the control of many parameters which come from various disciplines. It is necessary to invent new devices of appropriation of knowledge.

The field is defined as priority in the strategy of PNRA. The organization has predominance in the field and it is

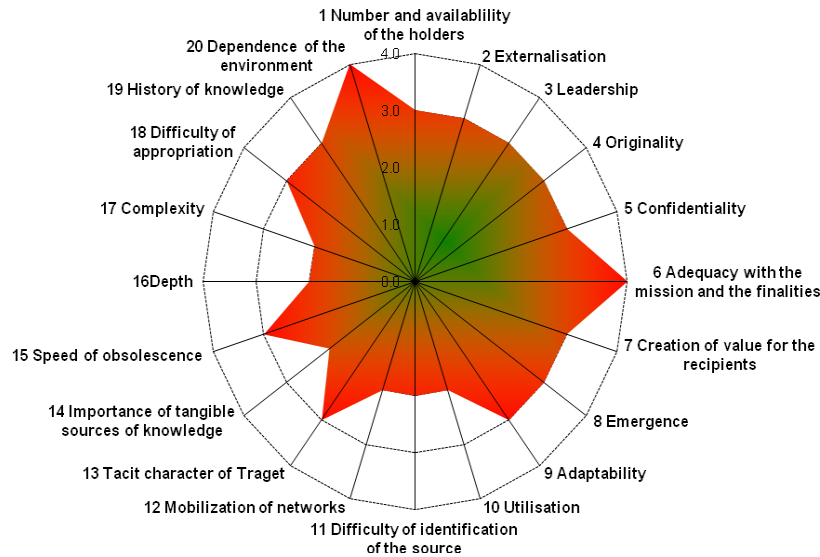


Figure: 4 Applying Knowledge Criticality Model on the Knowledge Domain- Radiation Safety

Figure 4 and the above discussion shows that the field is critical for the working of the organization and is amongst the most important tasks assigned to the organization. The organization must pay attention to methods for better utilization of the knowledge and the creation of networks of knowledge in the field.

managing nuclear knowledge, 22-26 August 2005, Trieste.

[5] Summary of an international conference Managing Nuclear Knowledge: Strategies and Human Resource Development, 7-10 September 2004, Saclay, France

5. Conclusion

The paper provides an analytical assessment of the criticality and maturity of the domains selected-Accident Analysis and Radiation Safety; and elaborates on the strategy to be adopted for preserving these critical knowledge domain in Pakistan Nuclear Regulatory Authority (PNRA) and their usefulness for other nuclear regulators worldwide.

References

- [1] Planning and Execution of Knowledge Management Assist Missions for Nuclear Organizations, IAEA-TECDOC-1586.
- [2] Knowledge Management for Nuclear Industry Operating Organizations, IAEA TECDOC-1510.
- [3] J.E. BOYLES, Approach of TVA nuclear to retaining critical knowledge in an Ageing Workforce, proceedings of workshop on managing nuclear knowledge, 22-26 August 2005 Trieste.
- [4] B. DUFF, Nuclear knowledge management at the Canadian nuclear safety commission, proceedings of workshop on