Developing an Evaluation Framework for Knowledge Management: A Case Study

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ABSTRACT

This presentation is relevant in the context of current knowledge management initiatives because it wedds theory and practice. The work of Malhotra (2002) was used to provide a structure for the development of an evaluation framework for knowledge management because it acknowledges that intellectual assets are as important as financial and physical assets in enabling innovation and organizational learning in a twenty-first century organization. The organizational capital, human capital and social capital that comprise the intellectual assets of an organization provided a useful structure to review current strengths and issues at the National Energy Board (NEB) of Canada in relation to the organization’s Knowledge Management (KM) function. The NEB is an independent federal agency that promotes safety and security, environmental protection and economic efficiency in the regulation of pipelines, and energy development and trade. An evaluability assessment was conducted using a review of internal documents, a literature review, and key informant interviews to identify perceived facilitators and barriers to the management of the NEB’s intellectual assets. A high-level logic model was then developed to describe the Board’s activities and to provide a context for KM. Subsequently, a KM logic model was developed along with an evaluation framework. Data collection methods, evaluation questions and timelines were proposed to facilitate the implementation of the KM evaluation and next steps were explored. As available at the time of this presentation, the evaluator will provide feedback on management’s response to this important initiative.

Context for the Evaluation Framework

The National Energy Board (NEB) of Canada is an independent federal agency that regulates several aspects of Canada's energy industry. Its purpose is to promote safety and security, environmental protection and economic efficiency in the Canadian public interest within the mandate set by Parliament in the regulation of pipelines, energy development and trade. The (NEB) Audit and Evaluation Committee sponsored the Knowledge Management (KM) Initiative Evaluation Framework project as a way to link strategic NEB goals and values with KM organizational practices in a simple, appropriate model supported by realistic measures.

It was generally the view of the NED staff interviewed for this project that KM was implicit in all of the NEB goals. It was seen as overarching, as a way of “doing business”. However, they all agreed that there was a need to change current KM practices. The NEB had a matrix style of organizational structure that focused on three functional areas; many important processes supported overall goal achievement but lay beyond these areas. As a result, a number of non-technical services, including KM, had no organizational “owner”.

At the time the project was initiated in late 2005, the NEB’s organizational knowledge resided in paper and electronic records, and in people’s memories. Employees tended to rely on email or on who they knew to solicit information. These methods were seen as ineffective, haphazard and inefficient. As one of the interviewees commented:

“Our product is information. It’s funny, after 50 years, we don’t have a repository for our products to be mined for future use. We need a system to let you capture it in context. You need to rely on history.”

This KM Initiative was not the first attempt at managing knowledge at the NEB. In fact over 10 previous attempts at KM, stretching back as far as 1992, were identified. The fact that a number of past initiatives have been discarded resulted in a sense of cynicism. As one staff member commented:

“KM practices have fallen apart, been disbanded. Maybe you can’t do it!”

In addition, 11 current initiatives were identified that had some bearing on KM. The impetus for this initiative was the appointment of a Knowledge Exchange Officer (KEO) to demonstrate the renewed commitment of senior management to do something about this issue.
Literature review

Before an evaluation framework could be developed, some preparatory work had to be done. It was discovered that a large body of literature is available on the topic of KM; however, at the same time, practically none of the literature looks at the evaluation of KM systems and processes. In fact, one key informant commented that most KM experts had actually given up on this particular challenge.

With some help from my colleagues at the American Evaluation Association, I was quickly able to access the KM literature and found an interesting way of looking at intellectual assets. In preparing a paper for a United Nations advisory meeting of the Department of Economic and Social Affairs, Malhotra (2002) suggested that KM is the enabler of innovation and organizational learning and is critical to the success of twenty-first century organizations.

Malhotra provided a way of looking at intellectual assets that proved useful in developing an evaluation framework for KM. He divides the intellectual assets of an organization into three main categories:

1. **Organizational capital**—the non-human storehouses of an organization’s knowledge assets. These are embedded in:
   - Technological information and communications systems such as proprietary and other software, hardware, databases, and organizational structures;
   - Distribution networks, supply chains, market and trade relationships to create value from knowledge; and
   - Investments for future growth such as research and development and whatever supports innovation and productivity through sharing and transmission of knowledge.

2. **Human capital**—the human resources of the organization, its customers, suppliers and stakeholders. These are embedded in:
   - Individual capabilities, expertise, knowledge, and wisdom;
   - Collective knowledge found within groups such as skills, innovativeness and ability to meet the tasks at hand to complete value-creating tasks and goals.

3. **Social capital**—including social structures and underlying attitudes and values with a focus on collective action, cooperation, collaboration and coordination. These are embedded in:
   - Social interaction, trust and reciprocity, human well-being and empowerment to produce effective organizational and personal outcomes; and
   - Social structures and networks.

While in the past, the focus has been on organizational capital as the means to enhancing KM, it is now clear that both the human capital, in terms of capabilities of both individuals and groups in the organization, and social capital, or the values and culture embodied by the organization, are also essential to a comprehensive approach to KM.
Development of a High-level Logic Model

In order to understand the context within which KM operated, it was useful to return to first principles and look at overall organizational goals. The NEB’s Strategic Plan for 2006-2009 outlines five corporate goals:

- NEB-regulated facilities and activities are safe and secure, and are perceived to be so;
- NEB-regulated facilities are built and operated in a manner that protects the environment and respects the rights of those affected;
- Canadians derive benefit from efficient energy infrastructure and markets;
- The NEB fulfills its mandate with the benefit of effective public engagement; and
- The NEB delivers quality outcomes through innovative leadership and effective processes.

These high-level goals provided a framework to use in the development of a program theory to link organizational purpose and goals to activities and outcomes. To this end, an umbrella logic model was developed for the NEB. It must be pointed out that this model was advanced for discussion purposes only and is not considered a formal document.

What is important for our discussion is that intellectual assets were placed in the NEB logic model as an input to indicate that intellectual assets are as important as financial and physical assets. By including them in the logic model, it then made it possible to measure and track the use of these intellectual assets and to see their impact on organizational goal achievement.
1. NEB mandate is set by Parliament
2. Strategic plan & annual plans & priorities guide activities
3. Stakeholder input is accessed through public engagement
4. Organizational capital, human capital & social capital are the intellectual assets that facilitate goal achievement
5. Financial & physical resources support goal achievement

2.1 Application process is managed in the public interest, allowing regulated companies to:
   2.1.1 Construct & operate pipelines
   2.1.2 Charge pipeline tolls
   2.1.3 Export/ import oil, natural gas & electricity
2.2 Compliance is assured by:
   2.2.1 Inspection
   2.2.2 Monitoring
   2.2.3 Audit
   2.2.4 Energy information is synthesized
2.3 Effective innovative leadership & quality management are employed to manage/report on intellectual, financial & physical assets

3. Decisions, orders, licenses & permits are issued
4.1 Canadian pipelines, energy development and trade are regulated
5.1 Safety and security are promoted
5.2 Environmental protection is promoted
5.3 Economic efficiency is promoted
6.1 The NEB is a respected leader in energy regulation
6.2 The NEB protects and enables in the Canadian public interest
6.3 Canadians derive the benefits of economic efficiency

**National Energy Board High-level Logic Model**

1. Inputs
2. Implementation Process
3. Outputs
4. Immediate Outcomes
5. Intermediate Outcomes
6. Ultimate Outcomes
Assessment of the Organizational Environment

Through a series of interviews with 12 key informants, issues associated with developing a KM evaluation framework and subsequent evaluation were identified. Not surprisingly, considering the long history of the organization and the many KM initiatives that had preceded this one, a host of topics was provided. These were analyzed using the lens provided by Malhotra, namely the type of intellectual capital. The organizational component and knowledge assets were identified for each. The analysis was organized as follows:

<table>
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<tr>
<th>Type of Intellectual Capital</th>
<th>Organizational Component</th>
<th>Knowledge Assets</th>
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| **Organizational Capital**  | a) Technological information & communication systems | • Proprietary software systems  
  • Databases  
  • Hardware  
  • Software  
  • Files/data |
|                            | b) Organizational structures | • Organization chart & flow of information |
|                            | c) External relationships that create value from knowledge | • Regulatory relationships & public hearings |
|                            | d) Investments for future growth | • Research & development  
  • Supports for innovation & productivity |
| **Human Capital**          | a) Human resources | • Individual capabilities, expertise, knowledge & wisdom  
  • Collective knowledge found within groups |
|                            | b) Stakeholders | • Learnings from stakeholder engagement |
| **Social Capital**         | a) Social structures | • Informal social structures & networks |
|                            | b) Underlying attitudes, values & culture | • Trust & reciprocity  
  • Social interaction  
  • Well-being & empowerment |

While in the past, the focus had been primarily on organizational capital, it was clear that both human capital, in terms of capabilities of individuals and groups in the organization, and social capital, or the values and culture embodied by the organization, were also essential to obtain a comprehensive understanding of KM.

The information obtained in the interviews about the perceived facilitators and barriers to managing the NEB’s intellectual assets was then summarized according to these categories and the following conclusions were reached:
- Organizational capital at the NEB was strong and held good potential for a KM system.
- The knowledge assets associated with organizational capital needed to be coordinated, integrated or completed; training needed to be provided; and a clear message was required from the Board to endorse ownership for KM and its supporting systems.
- Human capital, in terms of both individuals and groups, had some strengths but there were a number of barriers that were holding back the full utilization of these assets.
- The performance evaluation system needed to incorporate an explicit statement about individuals' performance in the area of knowledge sharing.
- Learning organization concepts, such as communities of practice, were useful in terms of capturing group learning but processes were not standardized and the resulting information was not easily accessible.
- Social capital was seen as critical to the successful implementation of KM in order to achieve buy in to the concept and application of KM in employee's daily work.
- Staff values, attitudes and work habits needed some reframing for the concept of a learning organization to take hold.
- Most key informants believed that enough success factors were already present to build an effective KM culture.

The key informants had a number of ideas about what they would like to see in terms of KM outcomes. KM success was described as follows:

*Vibrant knowledge networks that rapidly identify who has knowledge assets available to take advantage of. .... To be seen as a leader who is well advanced in the field, that can recruit easily and well. Baseline knowledge would be able to catapult us forward rather than making every battle hard won.*

Their views of future success clustered around several key topics, including:

1. Efficiency outcomes;
2. Effectiveness outcomes;
3. Mentoring and coaching; and

**The KM Logic Model**

Following this analysis and using the high-level logic model as a template, it was possible to develop a logic model for KM. The KM Logic Model provided links to the high-level logic model as well. The potential was also there for logic models to be developed in other functional areas as well to facilitate measurement and the roll-up of evaluative data. If staff could agree that the high-level logic model represented both what they did (Process) and what they wanted to achieve (Outcomes), then measurement systems would become straightforward.
National Energy Board Knowledge Management Logic Model

Process

1. Inputs (1.4) *
   - Organizational Capital:
     - Electronic tools
     - Quality management
     - Records management
   - Human Capital—Individual:
     - New employee selection & orientation
     - Coaching/mentoring
     - Performance measurement
     - Ongoing learning dissemination
   - Human Capital—Group:
     - Professional leader support
     - Communities of Practice
     - Review & Learns
   - Social Capital:
     - Collaborative culture
     - Underlying attitudes

2. Implementation Process (2.4) *
   - Organizational Capital:
     - Use of electronic tools supported
     - Key processes & systems supported
     - KM evaluation framework developed & used
   - Human Capital—Individual:
     - Collaborative behavior a selection criterion/awareness raised with new employees
     - Coaching/mentoring processes in place
   - Human Capital—Group:
     - Group processes supported
   - Social Capital:
     - Sr. Ldrs. supported

3. Outputs (3.6) *
   - Organizational Capital:
     - Electronic tools improve capture/transfer of K
     - Key processes & systems improve capture/transfer of K
     - Process change results from evaluation
   - Human Capital—Individual:
     - New employees have collaborative behaviors; use KM
     - Employees are coached; receive feedback on KM
     - Learning disseminated & used
   - Human Capital—Group:
     - Groups & networks improve KM
   - Social Capital:
     - KM culture developed
     - Social attitudes support collaboration

4. Immediate Outcomes
   - 4.1 Canadian pipelines, energy development and trade are regulated
     - This goal is supported by the following outcomes:
       1. KM principles & objectives are broadly evident
       2. Information management processes are effective
       3. Knowledge management processes are effective

5. Intermediate Outcomes
   - 5.1 Safety and security are promoted
   - 5.2 Environmental protection is promoted
   - 5.3 Economic efficiency is promoted

6. Ultimate Outcomes
   - 6.1 The NEB is a respected leader in energy regulation
   - 6.2 The NEB protects and enables in the Canadian public interest
   - 6.3 Canadians derive the benefits of economic efficiency

* See NEB High-level Logic Model on Page 2
The narrative accompanying the KM Logic Model can be summarized into the following IF-THEN statements:

**Inputs:**

IF

- There is KM input into electronic tool development (*Organizational Capital*),
- There is KM collaboration in individual-focused human resource initiatives and group-focused organizational learning initiatives (*Human Capital*), and
- Concrete ways are identified to develop a collaborative culture and Incentives and rewards are developed that value collaboration and personal knowledge management (*Social Capital*)—

**Implementation Process:**

SO THAT

- Electronic tools improve the capture and transfer of knowledge and needed information,
- Key processes and systems are supported by KM across the organization,
- An evaluation/ performance measurement framework is developed and implemented for KM (*Organizational Capital*); and

  - Demonstrated collaborative behavior is one of the selection criteria for new hires,
  - Employee orientation raises awareness about KM principles and objectives,
  - Coaching and mentoring processes are in place across the organization,
  - Performance measurement includes an indicator that measures collaboration and knowledge sharing,
  - On-going learning dissemination processes are used routinely (*Human Capital—Individual*); and

  - Professional leaders ensure that knowledge sharing occurs in their disciplines,
  - Communities of Practice ensure that knowledge sharing occurs,
  - Project managers ensure that knowledge sharing occurs in the meetings that they conduct (*Human Capital—Group*); and,

  - Senior leaders promote a culture of transparency and reciprocity,
  - Underlying social attitudes support collaboration and the promotion of KM, and
  - Employees are rewarded and recognized for demonstrating collaborative behaviors and personal knowledge management (*Social Capital*)—

**Outputs**

THEN

- Electronic tools improve the capture and transfer of knowledge by staff and information is easier to access,
- The Quality Management cycle of plan-do-measure-improve uses KM principles to improve the capture and transfer of knowledge by staff and the resulting information is used for process improvement,
- Staff members use the records management system routinely and access to required information becomes more efficient, and
- Formative evaluation findings result in positive KM process changes; (*Organizational Capital*); and
New employees demonstrate collaborative behaviors,
New employees are aware of KM principles and objectives and apply them in their daily work,
Staff in new positions receive coaching and/or mentoring that allows them to conduct their work more effectively,
Staff receive feedback about their ratings on collaboration and knowledge sharing in their performance measurement process and ratings are compiled into team scores and tracked over time, and
Staff access the learnings of their peers; (Human Capital—Individual); and

The members of Professional Leaders’ networks experience improved productivity and their access to and use of required information/knowledge is improved,
The members of Communities of Practice experience improved productivity and their access to and use of required information/knowledge is improved, and
The productivity of Review & Learns is improved through effective knowledge sharing; (Human Capital—Group); and

A culture of transparency and reciprocity is developed at the NEB,
Underlying social attitudes support collaborative behaviors and personal knowledge management, and
The effective use of information and knowledge is rewarded (Social Capital)—

Immediate Outcomes
AS A RESULT

The high-level goal of regulating Canadian pipelines, energy development and trade is supported by the following KM outcomes:

- KM principles and objectives are broadly evident at the NEB;
- Information management processes are effective; and
- Knowledge management processes are effective.

Intermediate and Ultimate Outcomes
These Outcomes reflect the Intermediate and Ultimate Outcomes of the High-level Logic Model.
Key KM Evaluation Questions

To evaluate the NEB’s success in adopting and implementing KM principles and objectives into daily work patterns, several key evaluation questions were identified, as follows:

1. Has the implementation of KM electronic tools, the quality management system, and the records management system improved the capture and transfer of knowledge for NEB employees?
2. Do NEB employees demonstrate collaborative behaviors and apply KM principles and objectives in their daily work?
3. Has knowledge sharing in NEB work groups, such as the Professional Leader networks, Communities of Practice, and Review & Learn, improved productivity?
4. Has a culture of transparency and reciprocity been developed at the NEB so that the prevailing culture is one of collaboration and effective knowledge management?

Evaluation Framework

As the culmination of this research endeavor, an Evaluation Framework was developed to answer these key evaluation questions. It linked the KM Logic Model, as a sub-model of the NEB High Level Logic Model, with related evaluation topics, key evaluation questions and sub-questions, data sources and data collection tools, and indicators of success. It provided a basis for a planned approach to the evaluation of KM at the NEB over the next three to five years. The evaluation questions were also provided for each data collection method and a timeline for evaluation activities was developed in consultation with NEB staff.

Conclusion

Two significant learnings about the evaluation of KM occurred during the process of this consulting assignment. The first learning was that KM could never be measured successfully until it appeared on the organizational radar screen. To accomplish that goal, a high-level logic model was developed for the NEB that acknowledged the importance of intellectual as well as financial and physical assets. With this philosophical shift in place, it would then be possible to measure the achievement of KM within the organization.

The second learning related directly to Malhotra’s conceptual framework. By dividing intellectual assets into organizational, human and social capital, it was much easier to identify the various factors that either facilitated or hindered the development of KM in the organization. Further, it clarified the need to tease human capital apart further into separate categories for individual capital and group capital. Then by using these asset strands, it was possible to think about developing a program theory that reflected the human issues as well as the technical ones.

As a result of these pre-planning activities, it was then fairly straightforward to develop an evaluation framework and key evaluation questions. As it stands, the framework is still untested but it shows promise for future development both in this organizational context and in others where effectively managing intellectual capital and KM systems and processes can provide a significant edge in an increasingly competitive world.
References


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