1. Abstract

This research was undertaken for Kemmy Business School and Atlantic Projects Company Limited. The research identified methods from literature to assess both an organisation’s Strategic Knowledge Goals and its current knowledge maturity level. From here it was possible to identify several existing Knowledge Management frameworks and analyse these against each other to identify strengths and weaknesses, pro’s and con’s.

This paper combines Zack’s (1999) techniques with Minnone & Turner’s (2001) KM³ model to allow an organisation to assess what its long-term goals are along with its current KM ability to determine what the gap is between where they are and where they want to be. Four selected KM frameworks are compared and contrasted against each other and the results of the research.

Interviews were carried out with Upper Management to identify the organisation’s current strategic goals and objectives. Once these were established it was possible to interview a selection of the organisation’s personnel to determine what the current status of Knowledge management was within the organisation and which of the selected frameworks was the best fit for it.

The research into long-term strategic goals found that an effective Knowledge Management system, particularly one which focused on the fields of Quality assurance and Safety, were the strategic goals of the organisation. Further Education and Training of employees was seen as important and the loss of Knowledge, through retirement or employees leaving the organisation, was the largest threat. The organisation was found to be at level one maturity on Minnone & Turner’s (2009) Knowledge Management Maturity model. A framework, responsible person, project team and KPI’s for KM are required to advance the organisation’s Knowledge Management effectiveness. Rubenstein-Montano et al’s (2001a) framework was identified from the preliminary research as the most appropriate for the industry, organisation and environment.

Theoretically this research is the first step in introducing a KM framework tailored for the needs of PBO’s in the power generation industry. More research is needed to further analyse the organisation and industry and select specific details for what is currently a broad framework. While this research has indicated that the organisation is typical for its industry further research would be required before it could be claimed that the results of this research can be generalized.

This research is the beginning of a longer process of implementing a KM framework within the organisation. It has been established that the organisation has a basic understanding of Knowledge Management and a lot of work is left to do before an effective system is operational.
2. Introduction

Knowledge management is a topic which has become more popular over the last fifteen years. A shift in thinking to consider the Knowledge-based theory of the firm has supported the view that knowledge has become increasingly important to a wide range of industries and organisations (Despres & Chauvel, 1999; Greiner et al, 2007; Ajmal et al, 2009). Whilst this view has gathered momentum, the field still lacks either a broad, all-encompassing definition and framework for knowledge management (Deguire, 2008; Heisig, 2009) or specific definitions for particularly types of industry or organisation type (Imani, 2011). A popular view in the literature is that knowledge management will be best utilized by an organisation if it is integrated with the organisations processes and departments (Ajmal et al, 2009) and is tied to its organizational strategy (Young et al, 2012; Deguire, 2008; Tavakoli & Lawton, 2005; Thiry & Deguire, 2007; Greiner et al, 2007). It seems from the literature that frameworks, definitions and processes should be industry or organisation specific due to the differences that exist in how organisations can collect, store and utilize knowledge depending on their culture, environment, methods, and processes (Ajmal et al, 2009).

This research attempts to analyse one organisation in the power-generation industry for its current level of knowledge management performance and to determine the organisations business strategy and knowledge processes. One organisation was selected due to the time restrictions on the research and the author’s position as employee of that organisation; other organisations in the industry would not be interested in sharing their operational information. The research indicated that innovation was not prevalent with contractors in the industry and was usually reserved for the organisations that developed the plant and machinery (designers). Upper management indicated that the industry did not allow its sub-contractors to try novel methods due to the restrictions on time in most projects and the amounts of revenue generated by having a functioning plant. In short, certainty was preferable to potential innovation and, more specifically, the risk that came with it. Several knowledge frameworks were examined and, using interviews, analyzed for suitability with the organisation. It was established that an increase in the organisations effectiveness, through the sharing of knowledge and advancement through training, were the driving force for KM in the organisation. This research was undertaken to define what the best framework was for this organisation specifically and that this research could allow further analysis of the industry and organisation type to determine if the results could be more broadly defined.
3. Literature Review

The term Knowledge Management refers to the methods, tools, techniques and values through which an organization can acquire, develop, measure distribute and provide a return on their intellectual assets (Kamara et al, 2002). Knowledge is described by Davenport & Prusak (2000) as “… a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information.”

When discussing knowledge as it relates to the firm it can be separated into ‘Explicit Knowledge’ and ‘Tacit Knowledge’. Explicit knowledge is described as that which can be codified and expressed in a formal language while Tacit knowledge is knowledge which is difficult to expressly communicate or express, such as experiences (Nonaka, 1994).

The two most commonly encountered strategies for managing knowledge are codification and personalization. The Codification Strategy involves carefully codifying and storing knowledge in databases which are accessible throughout the organization whereas with the Personalization Strategy the knowledge remains closely tied to the individual and is shared, often explicitly, through communication rather than storage (Hansen et al, 1999).

Throughout the literature it is commented that whilst the benefits of Knowledge Management are clear, finding a common framework for knowledge management has yet to occur, largely due to the need for Knowledge Management to reflect the context or environment of the organization or because organizations sometimes struggle to comprehend what Knowledge Management is (Holsapple & Joshi, 2002; Thiry & Deguire, 2007).

Project Knowledge management is knowledge management as it applies to project situations (Hanisch et al, 2009). In this context it refers to knowledge within the project, about the project and between different projects. Hanisch et al (2009) identify four types of knowledge which can be transferred from and between projects: expert knowledge, methodological knowledge, procedural knowledge and experience knowledge. Kasvi et al (2003) identify four broad groups of activites for project Knowledge Management: Knowledge Creation, Knowledge Administration, Knowledge Dissemination (within and outside the project) and Knowledge utilization and productisation.

Project Based Organisations are those organisations where the requirements of projects outweigh those of the functional departments or where the project is the primary business mechanism of the firm (Thiry & Deguire, 2007). Managing knowledge in Project Based Organisations (PBO’S) is more difficult because of the differences that exist between projects, difficulty in developing steady routines, different disciplines, etc. (Bresen et al, 2003; Thiry & Deguire, 2007). In PBO’s, the temporary nature of the projects undertaken can lead to knowledge being lost once the project is terminated and the personnel move on. The projects themselves do not possess any organizational knowledge and deliberate
initiatives are required to create, capture and transfer knowledge from or between projects. If knowledge is managed efficiently in PBO’s it can lead to decreased project time, improved quality and satisfaction from the shareholders and minimized delivery times. (Ajmal et al, 2009)

When analyzing PBO’s regarding Knowledge Management it is important to recognize the role that the culture of the organisation will play in the process. Ajmal et al (2009) state that culture will have a significant impact on what is done, by whom, when and why. According to them 80% of Knowledge Management is concerned with people, process and culture. This highlights a need to involve these people in any plans for future initiatives to ensure that they fit with the organisations culture as much as possible. Thiry & Deguire (2007) highlight the fact that PBO’s, through their use of projects and programmes will generate their own behaviours and strategies unless managed and governed towards corporate strategy.

“Strategy is the direction and scope of an organisation over the long term, which achieves advantage in a changing environment, through its configuration of resources and competences, with the aim of fulfilling stakeholder expectations.” (Johnson et al, 2008)

Strategy is associated with issues such as:

- Long term direction of an organization
- The scope of its activities
- Gaining an advantage over competitors
- Reflecting the values of its leaders
- The organizations resources and capabilities

Johnson et al(2008) identify eight important terms associated with Strategy:

1. Mission: the main purpose, aligned with the stakeholders values and expectations
2. Vision/Strategic intent: the future aspiration of the organization
3. Goal: a more general aim or purpose
4. Objective: a more specific or precise statement of a goal
5. Strategic Capability: the resources, processes and activities available
6. Strategies: the organizations long-term direction
7. Business model: A description of how the product, service and information flow between the involved parties
8. Control: The monitoring of the effectiveness of strategies and altering of them if necessary

Strategic Management then is described as concerning itself with managing complex and ambiguous situations which will have organizational wide implications
Young et al (2012) investigate projects undertaken by the Victorian Public Sector, Australia and determine that in the majority of cases strategy is not realized in projects. Rao (2007) & Deguire (2008) both state that the connection between strategy and projects is still not clearly understood at the operational, projects level and that there is often a disconnect between the two which can also include the language or jargon used. They state that Project Management is concerned with realizing short-term objectives and strategy is concerned with long-term. Deguire (2008) recognizes that PBO’s should theoretically provide opportunities for strategies to be altered as they evolve and change within the organization whilst Combe (2000) highlights the importance of clear and specific statements regarding strategy to increase the likelihood of project being able to meet them.

Knowledge Management benefits strategy by allowing the strategy makers access to better, more current information (Tavakoli & Lawton, 2005) and by allowing projects in PBO’s to evolve, shape or re-shape strategies (Thiry & Deguire, 2007). So the benefits of aligning Knowledge Management with Organizational strategy has the potential to work form the top-down and from the bottom-up. However, the link between Knowledge Management and Organizational Strategy is often weak (Imani, 2011), particularly when a PBO views it’s projects as stand-alone, single ventures (Thiry & Deguire, 2007). Griffiths & Remenyi (2008) highlight the importance of considering both the organisations culture and its strategic goals when deciding on a Knowledge Management Strategy.

Greiner et al (2007) analysed eleven German and Swiss companies using a case study design and extensive literature review followed on by interviews with one or two personnel from each company. They outline two main objectives for any Knowledge Management system: Knowledge Management to improve efficiency and Knowledge Management to improve innovation and outline the likely focus and strategy of both. Their results suggest a relationship between the success of Knowledge Management when aligned with business strategy, their four categories of linked business and Knowledge Management strategy should prove useful when performing the case study analysis in this research:

1. Codification & Efficiency
2. Efficiency & Personalization
3. Innovation & Codification
4. Innovation & Personalization

Zack (1999) offers a framework for assessing an organisations strategic positioning, particularly relating to knowledge. He outlines a knowledge SWOT analysis and a knowledge map to allow an organisation to identify any knowledge gaps and what it requires to meet its strategic goals.

“To explicate the link between strategy and knowledge, an organisation must articulate its strategic intent, identify the knowledge required to execute its intended strategy, and compare that to its actual knowledge, revealing its strategic knowledge gaps.” Zack (1999)
Zack goes on to outline a knowledge strategy framework which describes an organisation against two dimensions. The first is the Explorer V’s Exploiter dimension, where an explorer is a creator of new knowledge. An exploiter, on the other hand, finds itself in a position where it’s knowledge resources exceed its competitive requirements and the opportunity exists to further exploit this knowledge. The second dimension Zack describes is Internal V’s External Knowledge. Internal knowledge is described as any knowledge contained within the organization, be it in the minds of the personnel or on databases or storage. External knowledge can originate from publications, consultants, professional associations etc.

As this paper’s research requires the organisation in question to be strategically analysed from a Knowledge Management perspective a large amount of Zack’s methods will be used to achieve this. Whilst the research is 14 years old it clearly outlines a process to analyse an organisation’s strategy as it relates to Knowledge management and is the only paper the author has discovered to do so in an applicable manner.

When developing a Knowledge management methodology the topics of frameworks and methodologies are largely relevant. Methodologies are generally more specific than frameworks; they describe how to specifically carry out knowledge management, usually within a given framework whereas frameworks give more of a broad structure to the system. (Rubenstein-Montano et al, 2001b). When starting from a position of little or no Knowledge Management within an organisation it necessary to develop the framework before the methodologies that will support it. While Rubenstein-Montano et al suggest that Knowledge Management is lacking a universal methodology, a claim corroborated by other researchers (Holsapple & Joshi, 2002; Deguire, 2008; Despres & Chuavel, 1999), their research also alludes to the fact that an organisation must first have a framework before it can consider and develop a methodology.

Minoone & Turner (2009) propose a framework to assess an organisation’s Knowledge Management Performance. Minoone (2008) identifies and describes four forms of Knowledge Management integration:

1. Cultural Integration
2. Methodical Integration
3. Procedural Integration
4. Organisational Integration

They argue that recognition and consideration of each form of integration will make it less difficult to derive Knowledge Management targets from the organisation’s overall strategy. They suggest that Key Performance Indicators (KPI’s), which monitor the efficiency and effectiveness of Knowledge Management in each of the forms of integration, is essential.
Minonne & Turner propose utilizing the Knowledge Management Maturity Model (KM³) – which outlines how developed an organisation's Knowledge Management is with a simple, five stage model, to facilitate the development of a Knowledge Management Monitor (KM²). They state that to implement effective Knowledge Management you must first measure current performance and then guide the organisation towards an established image of the future.

This research is interesting and the advice on KPI's rings particularly true. The KM³ model will be utilized in the research to determine where the organisation is at the present time in terms of Knowledge Management.

Heisig (2009) analysed 160 Knowledge Management frameworks from a wide range of organisations, associations and bodies worldwide. He categorized, coded and counted them; applying a methodology based on quantitative and qualitative content analysis of existing knowledge management frameworks. He classified them according to Rubenstein-Montano et al's (2009a) three types of framework:

- Prescriptive: provides direction on types of Knowledge Management procedures without providing specific details
- Descriptive: identifies attributes important for the success or failure of Knowledge Management initiatives
- Hybrid: a combination of the above

Heisig found that half of the 160 frameworks analysed exhibited a hybrid character. He analysed and grouped the Knowledge Management activities and emerged with the six most frequently used terms, from which he identified five central activities:

1. Sharing
2. Creating
3. Using/Applying
4. Storing
5. Identifying

He similarly analysed the data regarding Critical Success Factors (CSF's) and was able to identify four categories common to all:

1. Human – oriented factors: culture, people, leadership
2. Organisational factors: process and structure
3. Technological factors: Infrastructure and applications
4. Management Process: strategy, goals and measurement

Heisig, like many before him, recognized that a universal understanding of Knowledge Management and the term 'knowledge' does not exist. His research is scientific, detailed and encompasses a wide range of
articles and fields. It would be logical to assume that any framework for Knowledge Management should contain Heisig’s five central activities and the four categories of CSF’s. Heisig’s analysis of 160 previous frameworks determines that the majority of these works identify the same activities and CSF’s, although not always with the same exact titles, i.e. ‘Searching’ in place of ‘Identifying’.

Mostert & Snyman (2007) propose a Knowledge Management framework from research. They suggest that Knowledge Management is an application of management functions applied to the processes relating to an organisation's knowledge resources. They used the literature review to devise a Knowledge Management framework and a management framework and then combined the two. The knowledge processes they identify are:

- Knowledge acquisition
- Evaluation of knowledge
- Knowledge Storage and Retrieval
- Knowledge utilization and creation
- Knowledge application
- Knowledge Management

Mostert & Snyman combine the literature of a multitude of researchers to create their management framework. It demonstrates an organisation utilizing its resources fully to achieve strategic excellence. The Knowledge Management framework resulting from combining the management and knowledge frameworks is shown below:
It is primarily a matrix structure with the knowledge processes on the left and management functions along the top. This all collates to support the organisation's strategic objectives. They go on to describe the four processes in detail. As a conclusion they suggest that this strategy needs to be tailored to the needs of the organisation specifically to be completed.

Kamara et al (2002) describe a framework which allows an organisation to select an appropriate Knowledge Management strategy considering organizational and cultural context. They performed a literature review and then case studies and interviews of 15 construction firms to develop a theoretical framework. Their results suggest that organisations may require further assistance in identifying valuable knowledge, making it explicit and codifying it and selecting appropriate strategies. They developed the CLEVER (Cross-sectorial LEarning in the Virtual entERprise) framework. It consists of four stages:

1. Define Knowledge Management Problem
2. Identify ‘to-be’ solution
3. Identify Critical Migration Paths
4. Select Appropriate Knowledge Management processes

While this research does not directly relate to this paper's subject it may point to a systematic method of implementing any changes identified as being optimal at a later stage in this research.

Kasvi et al (2003) perform a literature review and study two programmes and a project to analyse Knowledge Management in Project Based organisations (PBO’s). They interviewed 24 participants of the projects, as well as using questionnaires, to supplement their research. The findings indicated that reports and interactions were the primary sources of knowledge and that the quality of reporting was dependent on the individuals competences. Document management was individual to projects and was collated and summarized in Project Managements final reports. Kasvi et al conclude that in order to effectively learn from experiences on projects a highly efficient knowledge management system is required.

They propose a systematic model for Knowledge Management, the learning project model, which splits the projects knowledge into two documents; the Project Plan and the Team Contract. The Project Plan is a destination for what is deemed ‘hard’ knowledge including project definition, activities and results.
IMPLEMENTING KNOWLEDGE MANAGEMENT IN A PBO IN THE POWER GENERATION INDUSTRY

The Team Contract contains organizational knowledge such as lessons learned and experience.

Kasvi et al (2003) Kasvi et al’s model has a number of attractive features and seems to be worthy of consideration as a starting point for this research. The need to systematically approach the whole management of projects to properly implement may be beyond the remit of this research however.

Holsapple & Joshi (2002) suggest a threefold framework which lists and explains the main elements of Knowledge Management. They attempt to be as general with the framework as possible and undertake a survey of 31 Knowledge Management researchers and practitioners to determine the appropriateness of their model. They identify six kinds of organizational knowledge resources:

1. Participants Knowledge
2. Culture
3. Infrastructure
4. Knowledge Artifacts
5. Purpose
6. Strategy

The environment around the organisation is important as contact with it will augment and replenish an organisations knowledge resources. They refer to this as an organisations ‘Virtual Knowledge’ as it may be used or acquired but does not belong to the organisation.
Holsapple & Joshi carry on to describe four knowledge manipulation activities which would generally be undertaken when working with the aforementioned resources. They are:

1. Acquiring Knowledge
2. Selecting Knowledge
3. Internalizing Knowledge
4. Using Knowledge

They also further describe the activities of generalizing and externalizing knowledge – which are described as sub-activities of using knowledge.

The third component of their framework aims to identify which activities are executed, when and by who, in doing this three classes of influencing factors are identified, which are described in detail by the authors:

1. Resource Influences
2. Managerial Influences
3. Environmental Influences

Whilst the model is comprehensive and logical it is also broad and unspecific, nevertheless it is worthy of further consideration.
Analysis of the frameworks

The four frameworks selected for analysis are Rubenstein-Montano et al (2001a), Kasvi et al (2003), Mostert & Snyman (2007) and Holsapple & Joshi (2002). These were selected for their similarities in the industry, environment or their focus (i.e. strategy) and need to be compared and contrasted as part of the selection process. Heisig (2009) provides much of the criteria for comparison as well as fit with the industry and type of organisation. Heisig identifies five Knowledge Management activities: Sharing, Creating, Applying, Storing & Identifying, and four broad critical success factors: Human, Organisational, Information Technology & Management. Each framework will be analysed to determine if they contain these factors. The table below shows the comparison of the frameworks.

<table>
<thead>
<tr>
<th></th>
<th>Rubenstein-Montano et al</th>
<th>Kasvi et al</th>
<th>Mostert &amp; Snyman</th>
<th>Holsapple &amp; Joshi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directly applied to PBO’s</td>
<td>X</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Considers Strategy</td>
<td>✓</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Identifies Heisig’s 4 CSF/KPI’s</td>
<td>✓</td>
<td>X</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Framework is ready to apply</td>
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<td>✓</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Holistic view of KM</td>
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<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Prescriptive/Descriptive/Hybrid Strategy</td>
<td>Hybrid</td>
<td>Descriptive</td>
<td>Hybrid</td>
<td>Prescriptive</td>
</tr>
<tr>
<td>Directly applied to similar industry</td>
<td>X</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Identifies Heisig’s 5 central activities</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Rubenstein-Montano et al outline a framework that is not focused on PBO’s or a similar industry, their framework identifies the CSF’s and central activities in line with Heisig’s research and it is a Hybrid (Prescriptive/Descriptive) strategy. They consider organizational strategy as part of their research but the framework would require some work to become practically applied.

Holsapple & Joshi’s framework does not apply directly to the industry or to PBO’s either however they do consider strategy as well as identifying Heisig’s activities and CSF’s. Their framework is prescriptive in that it fails to go into details regarding the implementation of the framework and as such would need further analysis to apply.

Mostert & Snyman do not address PBO’s or the power generation industry either. They identify Heisig’s five central activities of Knowledge Management but not the four CSF’s. This is due to a focus on the managerial influences on Knowledge management rather than the organization holistically. They do consider strategy as part of the analysis and propose a framework that could more easily be applied.

Kasvi et al describe a framework based on research on both a similar industry and PBO’s specifically. They identify Heisig’s five central activities but not his four CSF’s. They propose a framework that applies
to projects individually rather than the entire organisation and do not consider strategy. Their strategy is descriptive with the details on implementation left to the reader to determine.

It is important to note that the absence of either Heisig’s central activities or CSF’s does not necessarily mean that the framework is sub-standard. Heisig performed a meta-analysis of framework and identified these factors as common to many so their absence means that the research is different rather than wrong.

4. Data Collection & Methods

The research followed a Case study strategy (Saunders et al, 2008); analyzing the organisation that the author currently works within as a Project Manager. Single Case Studies generally take place where the research is unique, extreme or typical as it does not easily lend itself to generalization or verifiability. In this case the format was chosen due to restrictions, both in time and access but it was suspected, and hoped, that the organisation would prove to be typical in its industry and position. The research supported this view but was limited, and more would have to be done to be certain. The organisation operates as a contractor in the power generation industry and completes projects as a service to the client. It’s organisational structure is projectised and the number of employees fluctuates depending on the number of projects being completed, generally between 100 – 1000. Although Irish-based and owned the organisation operates internationally and has offices in Dublin, New York, Hong Kong and Singapore. The focus of the research was on projects and personnel within Ireland. The organisation was deemed to be suitable for the research as it did not seem to have a defined Knowledge Management system and appeared to be similar enough to its rivals in the industry to be the first step in defining a general framework for the industry, or at the least other contractors in the industry.

Although multiple case studies allow generalization and verification it was not possible in the timeframe given to analyse another, similar organisation and so this research was of a single-case. Single case studies are mostly used on unique, extreme or typical cases (Saunders et al, 2008), the use of multiple cases allow the researcher to verify that the results are generalizable. The use of a single case in this instance will greatly affect the generalizability of the results and it seems likely that further research would be necessary to do this. The study can be described as embedded, in that it focused specifically on Knowledge Management and how that ties in with the Organizational Strategy of the organization rather than giving a more holistic view.

The research took place in two distinct steps: the first step was to analyse the organisation from the perspective of Organisational strategy. Analyzing the organisations strategy to identify both its goals/objectives and any possible gaps in strategy. Following on from this the identified and analysed frameworks can be assessed to determine their fit with both the organisations strategic objectives and it’s culture and environment.
4.1 Strategic Analysis

Semi-structured Interviews were used as a means of performing a strategic analysis of the organization using the methods and techniques outlined in Zack (1999). These took place with two members of upper management and as part of the interviews a knowledge-based SWOT analysis, knowledge map and Gap Analysis was performed to clearly outline what the strategic goals and objectives of the organization were and where any potential gaps existed.

4.2 A Knowledge Management Framework

The data obtained from the first step of the research guided the generation of structured interviews and follow-up questionnaires to analyze where the organisation was currently regarding the management of knowledge and which of the selected Knowledge Frameworks would potentially best suit the organization. Minnone & Turner (2009) was used to assess the organisations Knowledge Management from the perspectives of level of implementation and level of control (KM³ model). Six members of the organization were interviewed with an emphasis of interviewing an individual from each of the different fields and professions within the organisation.

Using Qualitative data techniques sequentially in a mixed-method format allowed the research to use the appropriate methods for each step in the process, Qualitative Semi-structured interviews for the less predictable interviews regarding strategy and to analyse the Knowledge Management requirements. The interviews were all audio-recorded as well as taking notes to ensure any non-verbal cues or communications were captured. Recognition was given to the need to deliver the interviews identically if possible to reduce the likelihood of bias in the results but it should be noted that it may not be feasible to replicate them identically. Bias can occur on the side of the participant or the observer (Saunders et al, 2009). With participant bias the subject may give the answer that they think you wish to hear, or the one that they believe to be correct. It can be mitigated against through anonymity in the research, careful design of questions and careful analysis of results. Observer bias refers to the likelihood that the researcher will extrapolate the results that he/she wishes to find in the research. Again careful questioning and analysis are important as well as a recognition of the fact that it may occur. Verification through further research adds to validity.

It is important to note that the single case strategy, coupled with the small sample size for both of the interviews, and the fact that they are all from a single culture limits the generalization of the results and further research would be required to determine if the results and conclusions could be extrapolated to
apply to other organizations within the industry or other Project-Based Organizations (Saunders et al, 2008)

**Interviews**

The semi-structured, strategy based interviews (Appendix i) were undertaken with two directors of the organisation in workplace offices. Both interviews lasted around an hour. From the results of this interview it was possible to determine the organisations important knowledge categories and processes and this information was used in several of the interview questions when analyzing the organisations knowledge management performance and the fit of the selected frameworks.

The structured interviews (Appendix ii) analysed the organisations knowledge management performance and the fit of the selected frameworks using Minnone & Turner’s ‘Evaluating Knowledge management Performance’ (2009) to determine current performance and using the meta-analysis of the selected frameworks and the previous strategy interviews to assess the type of framework that would best fit with the organisation. Six people were interviewed from a varied background within the organisation, all selected personnel were long-term employees of the organization and at a level where they would be involved in a Knowledge initiative. The interviews lasted approximately half an hour in all cases.

**5. Results**

Two interviews were carried out to determine the current strategic direction of the organisation, as it related to knowledge. These were carried out with two of the directors of the organisation and each took about an hour to complete. Michael H. Zack’s ‘Developing a Knowledge Strategy’ (1999) was used as a template for the interviews. A knowledge SWOT analysis of the organisation was carried out, followed by defining the categories of knowledge that could be found within the organisation. A process map was presented to the interviewee and they were asked to alter it to suit their views of the organisations processes. From this it was possible to assign knowledge categories to the activity nodes and therefore generate a Knowledge Link.
5.1 Knowledge SWOT Analysis:

The combined results of the two interviews are shown in the SWOT diagram below:

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<table>
<thead>
<tr>
<th>Knowledge Strengths</th>
<th>Knowledge Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience</td>
<td>Innovation</td>
</tr>
<tr>
<td>Quality</td>
<td>Requires move diversification</td>
</tr>
<tr>
<td>Safety</td>
<td>Knowledge Capture</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Knowledge Transfer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge Opportunities</th>
<th>Knowledge Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training/Education</td>
<td>Loss of knowledge</td>
</tr>
<tr>
<td>Safety Accreditation &amp; Record</td>
<td>Investment in Training</td>
</tr>
<tr>
<td>Quality Accreditation &amp; Record</td>
<td>Degeneration of Safety &amp; Quality records</td>
</tr>
</tbody>
</table>
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5.2 Knowledge Strengths:

Experience was cited in both interviews as a strength and the strength of flexibility can be viewed as a sub-strength of this also. Both interviewees felt in-house, on-the-job training was important and one placed more weight in formal training than the other. In one of the interviewees the Quality and Safety functions were singled out as important within the industry.

Training and the transfer of knowledge internally were highlighted as methods to preserve or sustain the organisations strengths. Retaining the workforce was also important and it was commented that the Safety department is currently transferring knowledge quite well.

5.3 Knowledge Weaknesses:

Innovation was declared as a weakness, the reasons being that the industry is one in which old, practical practices are retained. New concepts and work methods trickle through slowly from industry leaders (GE, ExxonMobil etc.) and clients are unlikely to allow innovative concepts when schedules are tight and downtime is very expensive. Greater diversification, particularly relating to Quality Assurance, Knowledge Capture and Knowledge Transfer were also cited as weaknesses.
Innovation was highlighted as a weakness in the industry that would be difficult to affect given the position of the organisation and the industry environment. Training was selected as a means of offsetting the weaknesses of Knowledge Transfer and Capture and the culture of the industry would need to change from one in which personnel collected knowledge to gain an advantage over peers. Training was also cited as a means to improve Quality Assurance. It should be noted that Quality Assurance as described by ISO9001 would include the capture and transfer of data and knowledge within the industry and thus can be linked to the weaknesses of Knowledge Capture & Transfer although it does not in itself constitute a Knowledge Management System due to the focus on information.

5.4 Knowledge Opportunities

Creating a balanced workforce in terms of education and training was one of the opportunities given for the organisation. Having a career path for workers should prove attractive to clients, as it would show a workforce that is trained and experienced and that considers the improvement of its service. Having excellent Safety and Quality records were also cited, for the same reasons; to appear more attractive to clients. Accreditation to Safety, and Quality to a lesser extent, were highlighted as opportunities to advertise the organisations abilities. Advertising and Marketing were stated as the best methods to capitalize on these opportunities.

5.5 Knowledge Threats

The loss of knowledge, through personnel changing organisation or retiring and the failure to educate the workforce are highlighted as the main threats. The industry is transient and the maintenance aspect of the business (which is the more frequently performed than installation) is seasonal and it can be difficult to keep personnel at quieter times even if they perform well in their roles. Identifying those worth holding on to and investing in them can mitigate against this as well as diversifying somewhat to similar industries whose maintenance seasons differ (i.e. process industries require mechanical maintenance around Christmas time while Power Generation usually perform maintenance in the summer).
5.6 Process Map & Knowledge Link

Following on from the Knowledge SWOT analysis a process map was drawn up and knowledge categories present within the organisation were identified. A process map was drawn up by the author (Appendix iii) which generally described the processes involved in undertaking a project from the point of view of a contractor PBO. The project begins at the tendering stage when clients ask the organisation to price work based on their selected scope and specifications. If the tender submitted is attractive the two parties will enter negotiations on price and scope after which, if successful, the project is awarded to the organisation. Planning begins from here based on the scope, specifications and estimate of the project and from this the assigning of personnel and mobilizing of resources takes place. The execution phase encompasses the entire project completion and leads on to the documentation phase, which comes before the project close-out.

During the interviews the interviewees were asked to review the process map and make any and all changes they would to reflect their opinion of the typical processes involved for their organisation, the modified process map is shown below:
The interviewees were asked to identify the categories of knowledge present in the organisation and the combined results are as follows:

- Estimating
- Budgeting
- Risk Management (RM)
- Contingency
- Project Management (PM)
- Mechanical
- Piping
- Welding
- Electrical & Instrumentation (E & I)
- Erection
- Access
- Installation
- Human Resources (HR)
- Safety
- Quality
The interviewees were then asked to attribute the knowledge categories to the processes on the modified process map. This information can then be applied to create a Knowledge Link; which outlines how the knowledge categories link together within the organization. The combined Knowledge Link is shown below:
5.7 Knowledge Gap Analysis

As the final step in the analysis the interviewees were assisted in performing a Knowledge Gap Analysis. The selected strengths in the Knowledge SWOT analysis were used and were analysed for where the knowledge is, where it needs to be to reach organizational goals and what needs to be done to get there.

<table>
<thead>
<tr>
<th>Where Knowledge is</th>
<th>Where Knowledge needs to be</th>
<th>What we need to do to get there</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety – Above average for industry</td>
<td>Excellent-Flawless</td>
<td>Educate Workforce</td>
</tr>
<tr>
<td>Quality – Above Average</td>
<td>Excellent, may require further diversification</td>
<td>Education &amp; Training, hire personnel</td>
</tr>
<tr>
<td>Experience: workforce is good but ageing</td>
<td>Need to improve Knowledge Transfer</td>
<td>Cultural Change</td>
</tr>
<tr>
<td>Flexibility: currently a flexible workforce</td>
<td>Improved, particularly regarding qualifications</td>
<td>Hire personnel, give HR more authority</td>
</tr>
</tbody>
</table>

5.8 Knowledge Management Assessment & Suitability of Frameworks

Six interviews were carried out with personnel working within the organisation to assess the current level of Knowledge Management within the organisation and to determine from the interviewees which of the selected frameworks was best for the organisation, it’s employees and the environment. Each interview took 15-30mins depending on the interviewee and the selected interviewees included Upper Management, a Portfolio Manager, A Quality Assurance Engineer, a Mechanical Engineer, A Supervisor & An Administrator, representing a healthy cross-section of the employees of the organisation.

The first ten questions focused on assessing the organisations current level of Knowledge Management and any initiatives that may be in use and their successes. The questions related to Minnone, C. & Turner G. (2009) ‘Evaluating Knowledge Management Performance’ *Electronic Journal of Project Management* 7(5) pp. 583-592 and allowed the organisation to be classified according to the stages of implementation and control maturity outlined in the article. The second half of the interview asked the participants questions which it was hoped would allow the frameworks selected for analysis during the literature review to be compared and contrasted against the operational and cultural realities of the organisation.
5.9 Assessment of Knowledge Management

Minnone & Turner (2009) discuss four complementary forms of Knowledge Management integration as conduits of a integrative form of Knowledge Management strategy. These four forms are:

- **Cultural Integration**: Integrating KM with the organisation's overall culture encourages the exchange of knowledge and a high esteem throughout. They identify action reviews, job rotation and communities of practice as common practices in this field.

- **Methodical Integration**: The integration of human and system oriented KM practices into work processes so that they increase quality, productivity and innovation. Skill Inventories, Mentoring and Document Management are identified as common practices.

- **Procedural Integration**: Integrating KM into the organisation's business processes allows it to become embedded in its work-flows allowing KM to become a continuous aspect of how the organisation performs tasks, reduction of processing time and avoidance of work inefficiencies.

- **Organisational Integration**: Integrating KM into the organisation's structure and recognition and dedicated management of KM throughout the organisation. This can be achieved using centralization, decentralization and centres wholly responsible for organizational activities.

Minnone & Turner state that attention to the four forms of integration would create measurable targets to inform strategic direction. The identification and assessment of Key Performance Indicators (KPI's) is also important to assess the performance of initiatives, assessment of the effectiveness and efficiency of initiatives in each of the four forms of integration are necessary. Measures need to align with strategic objectives and be understood and implemented by all employees.

They put forward a maturity model (The Knowledge Management Maturity Model, KM³) and table to outline the five stages of KM Maturity and the related levels of implementation and control.
IMPLEMENTING KNOWLEDGE MANAGEMENT IN A PBO IN THE POWER GENERATION INDUSTRY

Minnone & Turner (2009)

<table>
<thead>
<tr>
<th>Level of implementation</th>
<th>Maturity Stage</th>
<th>Level of Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>The basics of KM and the difference between it and information management are understood by some within the organisation. The potential benefits and the use of KM have been discussed in some functional areas.</td>
<td>1</td>
<td>No KPIs other than perhaps some qualitative assessment of efficiency in managing knowledge assets.</td>
</tr>
<tr>
<td>An intermediate level of cultural integration has been achieved. Organisational integration remains at a low level and no meaningful methodical and procedural integration are yet established.</td>
<td>2</td>
<td>A few qualitative metrics developed to control efficiency in guiding the implementation of KM strategy towards the future.</td>
</tr>
<tr>
<td>An advanced level of cultural integration and an intermediate level of organisational integration have been achieved. Only a low level of methodical integration is in place and no meaningful procedural integration is yet established.</td>
<td>3</td>
<td>Mainly qualitative, but some quantitative KPIs developed to monitor efficiency and some qualitative KPIs to assess effectiveness in the implementation of KM strategy.</td>
</tr>
<tr>
<td>An advanced level of cultural and organisational integration as well as an intermediate level of methodical and procedural integration has been achieved.</td>
<td>4</td>
<td>Qualitative and quantitative KPIs in place to monitor the implementation of an effective and efficient KM strategy to take the organisation in the direction of its perceived future image.</td>
</tr>
<tr>
<td>An advanced level of all forms, cultural, organisational, methodical and procedural, integration has been achieved. The organisation has reached world class status.</td>
<td>5</td>
<td>KPIs, both quantitative and qualitative, in place to measure changes in the image of the future and frequent reassessment of KM strategy to reflect changes in that image.</td>
</tr>
</tbody>
</table>
Have you heard of KM or related initiatives within the Organisation?

The interviewees were asked if they had heard of knowledge management or any procedures for capturing knowledge or information within the organisation. In every case the interviewees had either heard of KM or of procedures to capture knowledge within the organisation. Safety & Quality were mentioned 50% of the time as departments where KM was being utilized to enhance work processes. Project Management was mentioned in one but the capture of historical data from precious projects was discussed in two further interviews and this could be interpreted as the capture of PM knowledge also. Microsoft SharePoint was discussed in 33% of interviews as a recent method of implementing KM throughout the organisation but it was recognized that it was only being used in an ‘ad hoc’ manner to date.

![Pie chart showing 100% Yes for Have you heard of KM or similar initiatives within organisation?]

Is anyone within the Organisation responsible for knowledge Management?

Only 33% of interviewees stated that an individual in the organisation was responsible for KM, the Quality assurance Manager as he was responsible for the control of documents and information throughout the organisation, one felt that there were people responsible for KM in different departments.

![Pie chart showing 33% Yes and 67% No for Is anyone in the organisation responsible for KM?]
Is Knowledge Managed in relation to financial data, non-financial data or both?

83% of interviewees thought that knowledge was managed in relation to both financial and non-financial data. Budgeting, Quality & Safety were given as processes where knowledge was collected and one person felt that both types were collected on projects but financial was collected solely in the functional departments in the organisations offices. One person felt that only financial data was collected but that work was in progress to collect non-financial.

What are employees attitudes towards...

...sharing knowledge and experiences?
Two thirds of those asked felt that employees were resistant to sharing knowledge. They felt that the culture of the industry was one where ‘knowledge is power’, although mentoring was present in some cases other professions or trades were quite insular. All interviewees, including those who felt employees were open to sharing, felt that older workers were more inclined to hoard knowledge than younger workers indicating a generational shift in culture.

... learning from others?
83% of those asked felt that employees were willing to learn from others, although some felt they would be suspicious of the process. The interviewee who felt they would not be open to the process cited cultural resistance as the reason, particularly in older workers. A resistance from older workers was mentioned by several other interviewees as well, older workers were inclined to feel they didn’t need to learn anything more than they already knew about their positions.
Cultural Integration

Cultural Integration of Knowledge Management was examined by asking interviewees if the organisation used action reviews, job rotation, communities of practice or any similar initiative to encourage the exchange of knowledge. Two thirds of those asked felt that this was not done and one-third felt it was. However, all felt that it was not done formally or even consciously and took place as part of the natural process of the business. Being a PBO, job rotation occurred to accommodate the employees in the projects that were active at the time; so a person could be a supervisor on one project and the manager of the next one. The majority also felt that Communities of Practice (CoP’s) were active informally through employee relationships and the sharing of knowledge by project team members from experiences of previous projects.

Methodical Integration

Participants were asked if Mentoring, Document Management, Skill Inventories etc. used to integrate human and system practices. All felt that some of this processes were used, particularly document management as part of the organisations Quality Management process. The majority also stated that this, again, was not implemented with Knowledge Management in mind but as a natural part of the organisations activities. Mentoring and Skill Inventories were mentioned in some interviews.

Procedural Integration

Interviewees stated in 83% of interviews that they felt that Knowledge Management was not integrated throughout the organisations business activities. They were largely of the opinion that it was integrated in specific processes or disciplines, particularly Quality Assurance and Safety and relating to the organisations activities during completion of projects and the collection of historical data for estimating.

Organisational Integration

Asking if the organisation considered Knowledge Management in its organizational structure, by centralizing or decentralizing activities to facilitate the management of knowledge resulted in all participants reported this was so. As with previous questions some felt that this was done as it was the most efficient way to operate rather than with Knowledge Management specifically in mind. The departments of Accounts/Finance and Purchasing were centralized to allow them to work and share information more easily whereas Quality Assurance and Safety were decentralized so that representatives were present on projects to manage and collect information and report back to functional managers. Some interviewees mentioned Administration/HR as decentralized to projects to allow more efficient management of issues on site.
KPI’s and Strategic Knowledge Goals

None of those asked felt that the organisation had outlined measureable targets in relation to Knowledge Management; one person felt that while there was a willingness to increase KM no specific details had yet been established.

Two thirds of interviewees were aware of some of the organisations long term strategic goals relating to knowledge. Capture of knowledge from previous project to facilitate better completion of future projects was cited by 50% of those questioned, Safety and Quality Departments were specifically highlighted as important. One participant felt that training and up-skilling of personnel in order to acquire employees with Expert Knowledge in their fields was a long-term goal.

Suitability of Analysed Frameworks

Participants were asked questions that would help to determine which of the Knowledge Management Frameworks analysed would best suit the organisation and industry and if the organisation or industry were similar to any others.

When asked if the organisation was typical in its industry relating to how it operates 83% of participants thought that it was, with the other 17% believing that the organisation is more flexible and experienced than its competitors but that it was otherwise similar. Likewise, when asked if the organisation was typical in the industry relating to how it manages knowledge; 83% thought that all organisations in the same industry and position managed Knowledge badly or not effectively. 17% believed that the organisation was behind competitors when it came to Knowledge Management. Interviewees were then asked if they thought that the organisation was similar in how it operates to organisations in any other industries or was it unique to its industry. 50% thought that the organisation was unique to its industry and the other 50% felt that it shared similarities to the petro-chemical, process engineering and pharmaceutical industries PBO contractors.

When asked if knowledge should be managed holistically across the organisation all asked thought that it would be best to manage it holistically but most opined that if it was to be specific the most important aspect to focus on was knowledge relating to the completion of projects. One participant felt that it would be best to start with a focus on projects and evolve the system from there to eventually be holistic.

Half of interviewees felt that a broad framework was best for the organisation; which would allow the organisation to tailor the specific details to its own needs and realities. The other half felt that a specific, detailed framework would be easier to implement and follow and that the organisation needed assistance on Knowledge Management so a broad framework was not suitable.
Although it had previously been asked if participants knew the organisations long-term strategic goals relating to knowledge they were also asked what they thought themselves were the long-term strategic goals, as there could be unofficial and natural goals and aspirations. Training and Up-skilling, having personnel with Expert Knowledge in their fields, maintaining competitiveness and the collection of Historical Data for estimating future projects were the goals given.

Finally the interviewees were asked what knowledge competences they felt were important in the organisation, for both management personnel and the staff. The graphs below show the competences given in each case.
6. Conclusions

As part of the Knowledge SWOT analysis the selected strengths revolve around the use of experience (tacit knowledge) and the improvement of flexibility in the workforce through additional training. The functions of Safety and Quality were highlighted as very important in the industry. Knowledge Capture and Transfer were identified as weaknesses, suggesting an understanding of Knowledge Management within the organisation. The selected requirement of diversification ties in with the view of flexibility as important to the industry. Lack of Innovation was suggested as a weakness but it was stated that the stature of the organisation within the industry means that trying to change this would be very difficult. Education & Training were selected as opportunities as well as increasing the organisations Quality & Safety Accreditations and overall reputations within the industry. These opportunities would all further the organisations selected strengths. The threats identified were the loss of Knowledge through personnel leaving the organisation, lack of investment in training and the potential degeneration of the organisations Safety & Quality reputations and capabilities.

The process map outlines a typical project undertaken by the organisation, this differs from the more traditional view of Project Management in that the organisation perform projects as contractors; meaning that the design and planning phases of the project are performed by the client. The interviewees outlined a wide range of knowledge categories within the organisation. Safety, Quality and Project Management were present throughout the Knowledge Link and this ties in with the SWOT analysis. These are the most prevalent and important knowledge categories and any Knowledge Management Framework should give attention to them. The knowledge categories involved in the execution of the project are important also as they are used by the workforce to compete the projects. While Project Management, Safety and Quality can be viewed as important to management; Mechanical, Electrical & Instrumentation, Welding, Piping & installation can be viewed as important to the execution phase and the workforce.

The Knowledge Gap Analysis shows that education and training, changes to the knowledge culture and increases in HR capabilities are required in order for the organisation to improve towards its strategic goals.

The interviews with Upper Management have shown that the organisation views education, training and the capture and transfer of knowledge as strategic goals of the organisation from a knowledge perspective. For management personnel these specifically include Project Management, Safety and Quality capabilities and for the workers it includes Mechanical, Electrical & Instrumentation, Welding, Piping and Installation Knowledge.
IMPLEMENTING KNOWLEDGE MANAGEMENT IN A PBO IN THE POWER GENERATION INDUSTRY

The assessment of the current level of Knowledge Management within the organisation found that employees had heard of KM but that initiatives were not fully developed, no person had been made responsible for KM although the Quality Assurance Manager was highlighted as being responsible for document management. The organisation currently captures knowledge relating to both financial and non-financial aspects of the business but in an ‘ad hoc’ manner rather than a systematic framework. The organisation currently has no measurable targets for Knowledge Management. Two-thirds of those asked were aware of the organisation long-term strategic goals relating to KM; the capture of knowledge from projects, training and up-skilling were cited as goals and maintaining or improving the level of Safety and Quality performance was seen as vital.

Interviewees were asked questions which allowed the organisation to be analysed along Minnone & Turner’s (2009) four forms of knowledge integration:

- Cultural Integration: Job Rotation and Communities of Practice were present but either informally or for reasons other than integration of KM. As a PBO the organisation naturally rotates personnel to suit the roles that are available in current projects and the personnel transfer knowledge and experiences between projects and through communicating between projects.
- Methodical Integration: As with Cultural, this process seems to occur as a natural part of how the organisation does business. Document Management is a part of the organisations Quality Assurance process and some participants felt that the organisation used skill inventories and mentoring.
- Procedural Integration: It was found that Knowledge was not integrated within the organisations business processes generally but was considered in the fields of Quality Assurance, Safety and Project Management.
- Organisational Integration: Centralization of activities such as Finance & Accounts and Purchasing and Decentralization of Quality Assurance, Safety and Administration were cited as signs of organizational integration but this had been done to increase operational effectiveness and communication and Knowledge Management was not considered.

The organisation has some aspects of each of the forms of integration but they are neither systematic or, in many cases, intentional. Looking at the five stages of maturity from Minnone and Turner (2009) it is clear that the organisation is at a maturity level comparable to stage one; the basics of Knowledge Management are understood and the potential benefits are known, KM is in use in some functional departments. In order to proceed to stage two maturity the organisation must make a member of the organisation responsible for KM (currently the Quality Manager is seen as responsible by default). A team must be appointed to implement KM and a framework for Knowledge Management must be
chosen. The organisation’s knowledge base must be explored to discover potential knowledge gains and measurable targets or KPI’s must be set regarding KM.

In analyzing the suitability of the selected frameworks for Knowledge Management it was widely agreed that the organisation was typical of PBO’s in the industry in how it operates and how it manages knowledge. Half of those asked felt that the organisation was unique to its industry and it must be noted that the other half felt it was similar to petro-chemical, pharmaceutical and process engineering PBO’s only. These industries would be viewed by many, including the author, as one and the same industry, which could be referred to as ‘heavy industry’. From this perspective it could be said that all participants felt that the organisation was unique to its industry. The majority felt that a holistic approach to KM was best but that projects should be the priority. The participants were equally divided when it came to whether the organisation needed a broadly or specifically defined framework for KM. The most important knowledge competence for management personnel was Project Management. Human Resources and Engineering were second most cited competences and Safety and Quality assurance featured also. For the staff of the organisation the trades (piping, welding, rigging etc.) were the most important competences, as would be expected. Engineering was second highest and again Safety and Quality Assurance featured.

7. Recommendations

It is clear from the research that Quality Assurance and Safety are important to the industry and to the organisation as they feel that these functions provide competitive advantage. Safety and Quality assurance are mentioned as strengths and opportunities in the SWOT analysis and important competences for all the organisations personnel. These, along with Project Management, are the areas of the business that are most important when considering a Knowledge Management Framework.

Going by the interviewees responses the framework must be geared towards PBO’s, as all participants highlighted that projects were the priority when it came to KM and address Knowledge Management holistically. There was no clear preference when it came to a broad or specific framework but due to the fact that the organisation is identified as being unique to its broad industry it could be argued that a broad framework, which can be tailored to the organisation individual needs, would be best in these circumstances. In order to advance to stage two level of maturity, as per Minnone and Turner (2009), it would be beneficial if the framework outlined KPI’s also.
Implementing Knowledge Management in a PBO in the Power Generation Industry

With these factors in mind the framework analysed which best suits the organisation is that outlined in Rubenstein-Montano et al (2001a) ‘A systems thinking framework for knowledge management’ Decision Support Systems 31 pp. 5-16. Although not directly applied to PBO’s the framework is holistic in its approach to Knowledge Management and outlines a broad framework, where the details need to be tailored to the organisation’s specific needs and capabilities. The framework also outlines KPI’s in line with those outlined by Heisig (2009) in his meta-analysis. The framework selected is not yet ready to implement and further work is needed to analyse the organisation’s KM needs and objectives and then to fine tune the framework to the organisation’s needs. A focus on Project Management, Safety and Quality Assurance as the fields that require most attention and priority is important as well as ensuring employees have a rounded knowledge of the core trades of the industry. On top of this it is important to appoint a person responsible for KM within the organisation, as well as a project team to support them as per Minnone & Turner (2009). Whilst the framework outlines KPI’s it is also important to set measurable targets for the implementation of the framework and Knowledge Management in general.

8. Limitations

This research was undertaken to a limited timeframe and within an industry where competitors are reluctant to share information with each other due to the advantage of knowledge, particularly any knowledge which allows better estimating of future projects. In this environment the authors position within one organisation makes it increasingly difficult to gain permission to study another organisation. Single Case Study’s (Saunders et al, 2008) are mostly used on unique, extreme or typical cases, the results are not usually generalizable and are difficult to verify. Further research can continue in two distinct directions; firstly a deeper analysis of the organisation in question and the available frameworks to determine in more detail what the organisation’s goals are strategically and from a Knowledge Management perspective and the tuning of a framework to best suit its needs and requirements. Independent research is required to analyse several organisations in the industry to determine if a common framework can be established for similar organisations. This research found that the majority of participants felt that the organisation was typical in both how it operates and how it manages knowledge but the relatively small sample size means that this would have to be verified further.

The sample size of participants was small but the organisation’s structure is one in which there are only a small number of full time employees, with the majority of employees being hired on a short-term, project to project basis. There are approximately 100 full-time employees in the organisation of which approximately half would be considered not to have enough knowledge of the workings of the organisation to be useful in this research, from this perspective the small sample size is seen as being more representative of the overall organisation. Another limitation was the timing of the research; the industry is quite seasonal, with the majority of projects, particularly the short-term, high intensity ones,
Taking place during the months of May through to August. Further research should take place from September so that the organisations have more resources to devote to the process, during this research the organisations personnel were spread throughout the country on short projects which demanded at least 68 hours per week of their time and sometimes more.

This research should be seen as the first step towards establishing a Knowledge Management process tailored to an organisation and industry which considers flexibility and efficiency as its key characteristics.

Also, it must be stated that Zack’s (1999) work would be considered to be somewhat dated 14 years later but it was the only article found by the author which outlined a process to analyse an organisation’s current strategic goals and the gap between them and their current position, particularly one which one could implement without further research. There are also other aspects to Knowledge Management which should be explored; relating to its relationship with the organisation’s culture and its Organisational structure particularly, there simply was not enough time to do so broad an analysis in this research.
Bibliography

IMPLEMENTING KNOWLEDGE MANAGEMENT IN A PBO IN THE POWER GENERATION INDUSTRY

Appendix i – Semi-structured interview template

Knowledge Management analysis of APCL – Semi Structured Interview

Location:___________ Date:___________ Interviewee:___________

As described in the consent form given to you earlier this research would like to analyse the strategic goals of the organisation to allow analysis and selection of a Knowledge Management Framework that will align the strategic goals with the method of capturing and transferring knowledge. This section of the research is concerned with capturing the organisations current strategic position as well as any potential gaps between where it is now and where it would like to be, strategically speaking. This analysis will largely involve the analysis described by Zack (1999). I will be providing the methods and techniques whilst I will rely on you for the necessary information and opinion.

Knowledge SWOT Analysis

1. Having read the consent form and information sheet are you comfortable to carry out this interview?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. From the perspective of knowledge: ie. Education, experience, capabilities etc, what would you describe as the organisations greatest strengths?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

i) Which of these strengths is the most important/strongest?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
ii) Which of these would you like to preserve or sustain and how would you recommend doing this?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

3. From the knowledge perspective, what are the organisation's greatest weaknesses?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

i) Which of these weaknesses has potentially the greatest impact?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

ii) How would you offset these weaknesses?

_____________________________________________________________________
_____________________________________________________________________

4. What knowledge opportunities; that is opportunities to gain competitive advantage, new products or services or increase market share, exist for the organisation?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

i) Which of these opportunities is most appealable?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

ii) How would the organisation best capitalize on these opportunities?
5. What knowledge threats exist for the organisation?

i) Which of these threats carries the greatest risk?

ii) How would the organisation best mitigate these threats?

6. Describe the categories of knowledge present within the organisation: ie. Electrical, quality, instrumentation etc.??

7. A process map outlines the processes involved in an activity, task, project etc. I would like you to look at this process map I have printed which relates to Project Based Organisations and how they approach projects as a service. Would you go through the map and outline any aspects you would like to remove, add or change please.
8. Does the organisation consider knowledge in its organisational structure; for example by having centres responsible for certain activities or through centralisation or decentralisation of activities?

9. From the information you have provided it is possible to generate a Knowledge Link, which highlights the links between the knowledge required in the overall process. Are you happy with the answers and details given for each stage of this process? I will use this information to validate the knowledge map and send to you for approval.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

10. The next step in assessing the organisation’s strategy is to perform a knowledge gap. Using the table below we can outline what we need to know to meet our strategic goals and what we actually know. The difference between the two is known as the knowledge gap.

<table>
<thead>
<tr>
<th>Where our Knowledge is</th>
<th>Where our Knowledge needs to be</th>
<th>What we need to do to get there</th>
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11. Have you any questions or clarifications?
________________________________________________________________________
________________________________________________________________________
Appendix ii – Structured interview template

Knowledge Management analysis of APCL – Semi Structured Interview

Location:___________ Date:___________ Interviewee:___________

As described in the consent form given to you earlier this research would like to analyse the strategic goals of the organisation to allow analysis and selection of a Knowledge Management Framework that will align the strategic goals with the method of capturing and transferring knowledge. This section of the research is concerned with assessing the organisations current level of knowledge management and the success of any initiatives that may be in use. I will be asking you questions which relate to Minnone & Turners article ‘Evaluating Knowledge Management Performance’ (2009). In many cases there are no right or wrong answers; what I am looking for is your level of knowledge and understanding of the area.

Assessing current Knowledge Management Level

1. Have you heard of knowledge management or procedures to capture information or knowledge within the organisation?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Is anyone within the organisation, that you know of, responsible for knowledge management?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. Is knowledge managed in relation to financial, non-financial data or both?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
4. What do you think, are the employees attitudes towards:
   iii) Sharing their knowledge and experiences?

   iv) Learning from others?

5. Does the organisation encourage the exchange of knowledge within the organisation, perhaps through action reviews, job rotation or communities of practice?

6. Does the organisation use mentoring, document management or skill inventories to try to integrate human and system practices and improve quality, productivity and/or innovation?

7. Is the capture of knowledge within the organisation integrated throughout its business activities?
8. Does the organisation consider knowledge in its organisational structure; for example by having centres responsible for certain activities or through centralisation or decentralisation of activities?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

9. That you know of, does the organisation set measurable targets to achieve in relation to knowledge capture, storage, use etc.?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

10. Are you aware of APC’s long term strategic goals, in particular regarding Knowledge Management?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Suitability of selected frameworks

11. Would you consider the organisation to be typical in this industry when it comes to:
   i) How it operates?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
ii) How it manages knowledge?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

12. Is the organisation, its structure and how it operates similar to other industries or unique?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

13. Given your knowledge of the organisation do you believe it would be better to manage knowledge at a project or at an organisational level?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

14. Given your understanding of how the organisation currently manages knowledge would you recommend implementing a system that describes a broad framework, allowing the organisation to decide on the details or one that completely describes how to manage knowledge on all levels?

_____________________________________________________________________
_____________________________________________________________________
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15. What, in your opinion, are the organisation’s strategic goals as regards knowledge?

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16. What, in your opinion, are the most important knowledge competencies:
   iii) For Management personnel?

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iv) For Staff?

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17. Have you any questions or clarifications?

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Appendix iii – Typical Process Map for PBO contractor

Typical Process Map for PBO Contractor

[Diagram showing the process map for PBO contractor]