

Development of a knowledge management initiative and system: A case study

Kuan Yew Wong^{a,b}, Elaine Aspinwall^{b,*}

^aDepartment of Manufacturing and Industrial Engineering, Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Malaysia

^bSchool of Engineering, Mechanical and Manufacturing Engineering, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK

Abstract

As knowledge emerges as the primary strategic resource in the 21st century, many firms in the manufacturing and service sectors alike are beginning to introduce and implement Knowledge Management (KM). Organisations can certainly benefit from its application for enhanced decision support, efficiency and innovation, thus helping them to realise their strategic mission. However, KM is an emerging paradigm, and not many organisations have a clear idea of how to proceed with it. This paper presents the results of a case study conducted in one company in the United Kingdom (UK), the major aim being to identify how it has developed a KM initiative and system. Hopefully, the information extracted from this study will be beneficial to other organisations that are attempting to implement KM or to those that are in the throes of adopting it.

© 2005 Elsevier Ltd. All rights reserved.

Keywords: Knowledge management; Implementation; Case study; Small company

1. Introduction

In the present era, the enormous changes that are reshaping the economy such as increased competition, rapidly evolving technology, more capricious customers, the growth of the internet and other factors (see for example, Bennett and Gabriel (1999); Neef (1999)) are driving organisations to proactively manage their collective intellect. Many organisations are transforming themselves into knowledge-based enterprises, in which Knowledge Management (KM) is crucial. Various strands of disciplines are believed to have contributed to the emergence of KM. Kelly (2000) discussed its origin from the knowledge-based theory of the firm, which in turn was built upon a number of streams of research such as resource-based theory (April, 2002; Grant, 1991; Wernerfelt, 1984), organisational learning (Huber, 1991) and core competence (Prahalad & Hamel, 1990). Grover and Davenport (2001) on the other hand, traced its emergence from the evolution of

information technologies. According to Liebowitz (2000), KM is a consolidation of ‘knowledge-based systems, artificial intelligence, software engineering, business process improvement, human resources management and organisational behaviour concepts’.

KM has become an important strategy for improving organisational competitiveness and performance. This is because the proper management and leveraging of knowledge can propel an organisation to become more adaptive, innovative, intelligent and sustainable (Wong & Aspinwall, 2004a). According to Civi (2000) and Gupta, Iyer, and Aronson (2000), the only competitive advantage that organisations will have in the 21st century is what they know and how they use it.

The work reported in this paper is part of an ongoing research programme aimed at investigating the implementation and practices of KM, which in turn will help to provide useful clues and directions on how to adopt it. Generally, this paper is structured in the following manner. Firstly, it defines some concepts and fundamentals relating to knowledge and KM. A case study carried out to explore the implementation of KM in a United Kingdom (UK) company is then presented. In particular, key elements that form the foundation of the company’s initiative are described. Finally, a discussion of the main findings gathered from the study is provided.

* Corresponding author. Tel.: +44 121 4144249; fax: +44 121 4144152.

E-mail addresses: wongky@fkm.utm.my (K.Y. Wong), e.aspinwall@bham.ac.uk (E. Aspinwall).

2. The notion of knowledge and KM

2.1. Knowledge

In the traditional or classical economy, knowledge was seen as external and unrelated to the economic process (*uit Beijerse, 1999*). Tangible assets such as land, labour, capital, natural resources and other commodities were recognised as the main production factors. However, as the pace of competitiveness increased, physical resources were inadequate to provide distinctive competitive advantage because they can be imitated and acquired by anyone on an equal basis. The real value of organisations depends on their knowledge base and the ideas and insights that lie in the heads of their employees. Organisational knowledge, in particular, is viewed as a strategic asset because it collectively meets the following four criteria; valuable, rare, inimitable and non-substitutable (*Bollinger & Smith, 2001*). Non-strategic assets, i.e. tangible resources do not contribute to sustainable competitive advantage and the long-term success of an organisation, but strategic assets do (*Meso & Smith, 2000*).

It is difficult to concisely define knowledge. The distinctions between data, information and knowledge have often been made in the literature (*Alavi & Leidner, 2001; Beckman, 1999; Bhatt, 2001; Clarke & Rollo, 2001; Frey, 2001; Grover & Davenport, 2001; Parikh, 2001*), although these three terms are usually used interchangeably in practice. Data are merely raw objective facts, while information is considered as structured and organised data. Knowledge can be conceptualised as meaningful and value added information which has been filtered by human minds. When they (i.e. data, information and knowledge) are arranged in a single continuum, knowledge has the highest value, the greatest relevance to decisions and actions, the greatest dependence on context, and requires the maximum amount of human involvement (*Grover & Davenport, 2001*).

Knowledge is also typically classified as either tacit or explicit. Discussions of this concept are abundant in the KM literature (*Alavi & Leidner, 2001; Baker, Barker, Thorne, & Dutnell, 1997; Civi, 2000; Gupta et al., 2000; Lee & Yang, 2000; Martensson, 2000; Nonaka, 1991, 1994; Nonaka & Takeuchi, 1995*). Tacit knowledge primarily resides in peoples' minds and it is relatively difficult to be expressed, codified and documented. In contrast, explicit knowledge is that which has been articulated, codified and formalised in some electronic or physical form.

In general terms, knowledge, when viewed as an object, can be perceived to be any piece of idea, insight, know-what, know-how or meaningful information that can be used to achieve an objective.

2.2. KM

KM is often viewed as multidimensional and multi-disciplinary which may sometimes lead to a fragmented

dialogue on the topic. *Gupta et al. (2000)* defined it as "a process that helps organisations find, select, organise, disseminate and transfer important information and expertise necessary for activities such as problem solving, dynamic learning, strategic planning and decision making". *Liebowitz (2003)* considered it as dealing with capturing, sharing, applying and creating knowledge in an organisation to best leverage this resource internally and externally. Various other definitions abound in the literature (*Bassi, 1997; Hibbard, 1997; Horwitch & Armacost, 2002; Malhotra, 1998; Rowley, 1999; van der Spek & Spijkervet, 1997; Wiig, 1997*). In its broadest sense, however, KM can be understood as a formalised and active approach to manage and optimise knowledge resources in an organisation.

While KM is not strictly a new movement per se, structured and formal approaches to leveraging knowledge are fairly new. There are generally a number of ways in which KM can be practised, and different approaches may be more suitable depending on the specific organisation. Aspects such as business focus, nature of products and services, organisational culture, company size, availability of resources, etc. will act as moderating factors that will determine how KM should be implemented. Typical approaches use information technology to facilitate the collection, storage, manipulation and sharing of knowledge. Building a KM system integrated with databases, search and retrieval engines, collaborative tools, groupware or even with intelligent systems is very common. At the other end of the spectrum, some organisations focus more on fostering a knowledge sharing culture, promoting organisational learning, encouraging teamwork, and managing human resources towards achieving KM.

In an effort to promote the understanding of KM approaches, *Hansen, Nohria, and Tierney (1999)* defined two different strategies that organisations adopt in practice; codification and personalisation. The former refers to the approach in which knowledge is extracted from people, codified and captured in repositories so that it can be accessed and reused. This strategy can also be seen as a way to withdraw knowledge from the person who possesses it, so that it remains in an organisation. In contrast, personalisation focuses on knowledge sharing via person-to-person contacts and dialogues. Knowledge remains inside the mind of an individual and human interaction is exploited to acquire it. A different taxonomy of strategies was also suggested by *O'Dell, Wiig, and Odem (1999)* based on their benchmarking study. The key point here is that numerous approaches to KM with varied emphasis are developing, and each of them is valid in its own context.

The major potential benefits of adopting KM are well documented in the literature (*Jarrar, 2002; KPMG, 1998; Skyrme & Amidon, 1997; uit Beijerse, 1999*). It represents a potent mechanism to, among others:

- (i) Enhance decision making through just-in-time intelligence.

- (ii) Improve work efficiency and productivity.
- (iii) Increase innovation of products, services and operations.
- (iv) Improve competency and competitiveness.
- (v) Enable rapid generation of technical solutions to clients' problems.
- (vi) Increase responsiveness to customers.

KM signifies an attractive initiative for organisations to undertake, but in order to develop a robust system, certain key issues that require the attention of researchers and practitioners are (Desouza, 2004):

- (i) How to organise or structure a knowledge repository (a layout problem).
- (ii) The best mechanism for knowledge transfer from an employee to another, and from a system to an employee, or vice versa (a transportation or logistics problem).
- (iii) Maintaining a KM system (a maintenance problem).
- (iv) Making a KM system user friendly (a human factor or ergonomics problem).

According to Desouza (2004), industrial engineers are the best candidates to optimise and systemise KM programmes in organisations. This is attributable to the fact that they are well trained in dealing with layout, transportation, maintenance and human factor problems. In addition, the knowledge that they possess is wide, ranging from quantitative (e.g. mathematics and operational research) to qualitative (e.g. social science and management) and programming subjects. The expertise and experiences of industrial engineers can certainly be utilised to address challenging KM issues in organisations.

3. Case study

The practices, experiences and success stories of large organisations in managing their knowledge have been widely published in the literature (Buckman, 1998; Davenport & Volpel, 2001; Forcadell & Guadamillas, 2002; Martiny, 1998; Petrash, 1996). Little attention has been given to small businesses despite the reality that they account for a high proportion of enterprises and form the main growth engine of the economy (OECD, 2000). To compensate for this, a case study was conducted in a small company. The main purpose of the study, which was carried out during June 2004, was to investigate how the company had approached the implementation of KM. Semi structured interviews were conducted with the employee who was responsible for the implementation process. Where appropriate, relevant documents (e.g. implementation plans, minutes of meetings, procedures, etc.) were collected in order to gain a more thorough understanding of its KM initiative. A few months later, the company was contacted

again to determine the progress of its initiative, and the developments and changes that had been made since the first visit. The company then provided more up to date and relevant information. Overall, the resultant information solicited from the case study is organised into five key themes, and the discussion that follows will be centred on them. They are:

- (i) General background information.
- (ii) Identification of knowledge areas.
- (iii) Roles and responsibilities.
- (iv) Technological system.
- (v) Implementation approach.

3.1. General background information

Located in Hampshire, UK, Company A (for anonymity purposes, the company identity is not disclosed) employs only around 30 people and its annual turnover is in the vicinity of £2.75 million. Incorporated in the late 1980 s, it provides business consultancy and software development services to primarily the defence, energy and government sectors. More specifically, it specialises in the provision of solutions in enterprise modelling, capability and requirement definition, organisational strategic transformation, system design representation and computerised decision support system development. Consultants in the company are led by a Delivery Manager who reports directly to the Managing Director. By and large, the workforce as a whole is well educated and experienced, each employee holding qualifications in engineering, software development, business management and other disciplines. This strong talent pool allows the company to respond to emerging and varied clients' requirements, thus assuring the execution of high quality projects. With the adoption of KM, this capability is further augmented. Company A is an example of a thriving small business, bringing demonstrable and tangible benefits to its clients. This in part, also justifies why the company was chosen for the case study.

Prior to the company embarking on its KM journey, little if any effort was undertaken to identify and capture key knowledge within the organisation. Information was not properly organised and categorised, and was often scattered in different directories, folders or locations. No rigorous or even ad hoc process was in place to audit and check the relevancy of knowledge, and to discard that which was outdated. As a result, there was more 'junk' rather than knowledge in the repository, and several versions of the same piece often resided in it, thereby consuming more storage space. Consultants had difficulty in finding the necessary information, and they were unsure of how up to date and relevant the knowledge was in the repository. In addition, there was a tendency to keep knowledge in their own personal computers, rather than to share and disseminate it to other employees. Hence, the main stimulus

for the company to implement KM was to improve this situation so that the consulting team could work smarter and more intelligently.

3.2. Identification of knowledge areas

One of the first tasks that the company conducted in its KM initiative was to identify the capability areas in which knowledge should be captured, organised and leveraged in its repository. After a few initial efforts in this regard, eight key knowledge areas or domains were finally identified. These areas are called '*Customers, Soft Systems Methodology, Operational Analysis, Requirements Elicitation, Software and Tools, Data Management and Analysis, Domain, and Mood*'. As apparent, they range from clients' information and requirements to domain-specific technical knowledge. **Table 1** gives an explanation of each of them (as

described by the company) in order to provide an overview of their contents.

There is also another area called '*Knowledge Pending Pool*'. This is where any document or information should be placed until it can be dealt with. Its relevance and classification will then be determined before archiving it in the appropriate knowledge area. This ensures the proper management of information. In short, having an explicit categorisation of knowledge areas is important because it helps to form shared vocabularies and terminologies among the employees.

3.3. Roles and responsibilities

A critical component for introducing KM is to have clear championship or ownership ([Wong & Aspinwall, 2004b](#)). In addition, establishing a set of specified roles for performing

Table 1
Knowledge areas or domains

1. Customers

This area captures knowledge related to the following four categories:

- (a) Customers—what are their background, needs and requirements?
- (b) Competitors—what are they doing and focusing on?
- (c) Markets—how do we excel in a particular market area?
- (d) Offers/services—how can we better articulate them? do they need changing?

2. Soft systems methodology (SSM)

- (a) SSM helps to formulate and structure thinking about problems in complex, human situations. Its core is the construction of conceptual models and their comparison with the real world. This process can greatly clarify those multi-faceted problems with many conflicting potential solutions, or with no obvious way forward
- (b) It should be noted that conceptual models are not representations of the real world; like a data flow diagram, they are constructs, which embody potential real world systems and more importantly, rigorously follow systems' principles and their own well-defined internal logic
- (c) SSM is therefore, not about analysing systems found in the world, but is about applying systems' principles to structure thinking about things that happen in reality—a difficult, but crucial distinction to grasp

3. Operational analysis

- (a) This area deals with objective (often mathematical and quantitative) analyses to support business decisions
- (b) It has a forecasting element—answering 'what ifs' to illuminate the consequences of different decisions
- (c) It may use a range of techniques—whatever works best for the problem in hand
- (d) It applies to a range of situations, e.g. operational choices, system behaviours performance, financial and commercial issues, etc

4. Requirements elicitation

- (a) This domain encapsulates the techniques, tools and methodologies that can be used to elicit, specify and capture different levels of requirements for a variety of systems
- (b) These techniques, tools and methodologies include used cases, activity diagrams and architectural frameworks
- (c) The different levels of requirements covered include capability, user and system requirements
- (d) The variety of systems addressed comprise human activities as well as IT systems, which can be of varying sizes (e.g. from a relatively simple data capture tool to a complicated aircraft carrier)

5. Software and tools

- (a) Knowledge contained in this area is that related to bespoke software or tools development. It covers important information dealing with the designing, coding, testing, installation and support of software

6. Data management and analysis

- (a) The data management domain is concerned with products that are specifically intended to allow data to be managed. They are typically known as Database Management Systems (DBMSs). 'Manage' means being able to access and change data, and to keep them safe and consistent (backup, recovery, transaction integrity, etc.). Essentially, a true DBMS should allow many users to perform all of these activities concurrently
- (b) The data analysis domain encompasses the techniques for modelling data as well as processes. All modelling techniques are the subject matter of this area (except SSM)

7. Domain

Domain is a specific name given by the company to represent the defence and energy fields (i.e. the core business of the company). Knowledge included in this area is complex and multi-faceted, and it comprises materials dealing with security, maritime, army, governance, energy, etc

8. Mood

Modular object orientated design (Mood) is a tool or software application that helps to generate models or methodologies. It is important that consultants are kept up to date with the software upgrades, the latest versions of service packs and add-ins, and functionality changes or improvements

knowledge-related tasks is helpful. The person responsible for spearheading the KM initiative in the company was the Delivery Manager. He appointed and allocated a designated Knowledge Manager and an assistant, from among the existing consultants who were more competent and experienced, to each of the eight key knowledge areas. Together, they represent a robust team that plan, coordinate and implement the initiative. Using the time that has been allocated in the company's business plan (between 2 and 4 days per month), the Knowledge Managers are expected to:

- (i) Collect documentation/literature in their knowledge area and to do this consistently.
- (ii) Keep up to date in their area.
- (iii) Look after the technical development of their area in the company.
- (iv) Provide a 'front-desk' point of contact for staff with queries regarding their area.
- (v) Ensure the availability of documentation/literature and direct staff to relevant sources and/or Subject Matter Experts where appropriate.
- (vi) Ensure that relevant information is available to interested parties, subject to security and commercial constraints.
- (vii) Determine if staff have any knowledge requirement.
- (viii) Actively seek lessons learnt/project close-out information.
- (ix) Brief the sales and marketing team on new developments/thoughts/techniques.
- (x) Bring interesting material to the attention of those who may find it useful (either the whole company or specific project teams).
- (xi) Develop, write and promote best practices.
- (xii) Give guidance on task metrics (e.g. duration estimation to accomplish certain tasks).
- (xiii) Where possible, identify areas where additional information is required.
- (xiv) Be prepared to act as Subject Matter Experts who can participate in internal problem solving regarding their knowledge domain.
- (xv) Write articles for journals, papers and relevant publications.
- (xvi) Go to and present at relevant seminars and conferences.

The Assistant Knowledge Managers should support the Knowledge Managers in all of the above tasks and deputise for them when they are not available. In addition, an Information Manager and a Network Manager were also appointed to support the KM initiative. The former is mainly tasked with coordinating the storage of knowledge, while the latter is focused on issues such as providing the infrastructure, search engine and security.

3.4. Technological system

Indisputably, one of the key enablers for KM is information technology. The company's developed knowledge base or repository is an intranet-based, interactive tool that consultants can access and use concurrently. Information in the repository is arranged and grouped according to the eight key knowledge areas. The types of things that are archived in it include project proposals, descriptions and summaries, presentation slides, progress reports, best practices, lessons learnt, success stories, conceptual models, methodologies, activity diagrams, graphics, test specifications, performance standards, journal papers, information pertaining to the defence and energy domain, etc.

A critical parameter of a repository is that employees should be able to easily browse through its contents and find their way around it. Without a clear and standard structure, it is difficult to extract knowledge (Davenport, De Long, & Beers, 1998). Hence, for each of the knowledge areas, a so-called 'domain guide' was developed. These guides help to structure and organise the knowledge areas, thus facilitating the users to understand and search for their contents. Broadly, each of the guides contains the following items:

- (i) Introduction or overview of a knowledge area.
- (ii) Summary of a scheme that organises the folders and their contents.
- (iii) A list of essential reading.
- (iv) A list of supplementary reading.
- (v) A set of keywords for internal searches (those that have been used to classify documents held internally in the knowledge base).
- (vi) A set of keywords for external web searches (those that have been found to return fruitful results on web search engines).

In order to ensure the consistency of the 'look and feel' of all the domain guides, they were created according to a predefined template, which is shown in Fig. 1.

In addition, a powerful search engine was employed by the company to find the necessary knowledge in the repository. Using this engine, employees are able to perform keyword searches to locate the relevant documents in various application formats such as Word, Excel, WordPerfect, HTML, XML, PowerPoint, Portable Document Format, Plain Text, Rich Text Format, etc. Search results are sorted and prioritised by relevance and are generated based on pattern recognition.

3.5. Implementation approach

Having discussed the key components of the company's KM initiative, this section will describe the overall implementation approach. The mechanism involved is an iterative

Knowledge area X														
Introduction [A written overview of the subject area X, including among others, its underlying concepts and tenets] [About 1 or 2 pages exposition of the knowledge area]														
Folders organisation [A scheme in which materials addressing the unique aspects of the subject area X are organised and classified properly. The documents contained in the folders could encompass a body of knowledge that includes best practices, lessons learnt, models, methodologies etc]														
This knowledge area has been divided into the following sections:														
<table border="1"> <thead> <tr> <th>Folders/Directories</th><th>Contents</th><th></th></tr> </thead> <tbody> <tr> <td><Classification/Category></td><td><Explanation here></td><td></td></tr> <tr> <td><Classification/Category></td><td><Explanation here></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> </tbody> </table>			Folders/Directories	Contents		<Classification/Category>	<Explanation here>		<Classification/Category>	<Explanation here>				
Folders/Directories	Contents													
<Classification/Category>	<Explanation here>													
<Classification/Category>	<Explanation here>													
[Express LH column as links straight to the folders] [There may be lower level sub-folders]														
Essential Reading The following documents will provide you with a solid understanding of the development of this knowledge area, its tenets, and where its current research is heading.														
<table border="1"> <thead> <tr> <th>Documents</th><th>Authors</th><th>Endorsement</th></tr> </thead> <tbody> <tr> <td><Document title></td><td><Name(s)></td><td><Endorsement here></td></tr> <tr> <td><Document title></td><td><Name(s)></td><td><Endorsement here></td></tr> <tr> <td></td><td></td><td></td></tr> </tbody> </table>			Documents	Authors	Endorsement	<Document title>	<Name(s)>	<Endorsement here>	<Document title>	<Name(s)>	<Endorsement here>			
Documents	Authors	Endorsement												
<Document title>	<Name(s)>	<Endorsement here>												
<Document title>	<Name(s)>	<Endorsement here>												
[Express document titles as links]														
Supplementary Reading The following documents will provide you with a deeper understanding of the different aspects of this knowledge area. [Table in the same format as above]														
Internal keywords Internally held documents have been classified using one or more keywords selected from the following set. [Keywords labelled with (y)* are shared with knowledge area Y (and so forth, as necessary)] [Table > List of keywords + Optional explanatory note]														
External keywords The following keywords have been found to return fruitful results on web search engines such as Google. [Table > List of keywords + Optional explanatory note]														

Fig. 1. Domain guide template.

process, and it can be illustrated by a flowchart, which is shown in Fig. 2. It should be noted that this framework is a refined version of an initial one constructed by the company. In the first instance, the company looked at what information was currently residing in the organisation, e.g. project descriptions and summaries, reports, models, seminar papers, etc. The ‘condition’ of these resources was assessed to determine whether or not there was a need for implementing KM in order to further leverage them to gain benefits. Upon deciding to embark on the KM journey, appropriate Knowledge Managers (and their deputies) were appointed by the Delivery Manager, and as a result, a working team was formed.

This team proceeded to plan the initiative, agree on the terms of reference and responsibilities, identify a workable timescale, determine the goal to be achieved, and specify

the exact activities that needed to be performed. Following these, the actual implementation process was rolled-out. The steps conducted were:

- (i) Identifying what information was at that time, held in the repository. This entailed manually examining and sorting out all the files and documents that existed.
- (ii) Auditing the information, and deciding whether or not it was relevant, useful and in a format that could be readily used.
- (iii) Removing and purging duplicate, obsolete and irrelevant information.
- (iv) Establishing the structure of each of the new knowledge areas, i.e. introduction, folders’ organisation scheme, essential reading, etc.

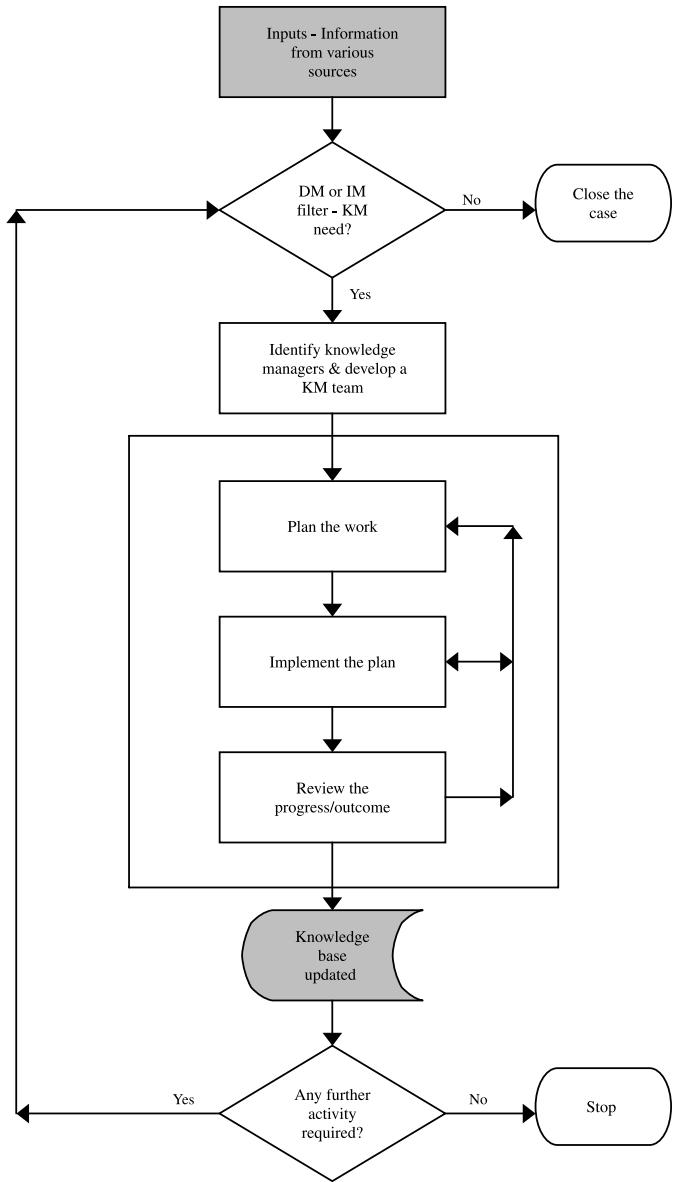


Fig. 2. KM implementation framework.

- (v) Migrating the information into the knowledge areas, and organising it properly.
- (vi) Installing the search engine to enable rapid retrieval of knowledge.

After the implementation effort, a review was conducted to determine the outcome and performance of the knowledge base. Necessary adjustments were made where appropriate, to ensure its integrity and efficiency. It is important that the repository is continuously updated since currency and relevancy are crucial surrogate measures for its value. At present, new and incoming information is evaluated either by the Delivery Manager or the Information Manager, and then indexed into the relevant knowledge areas. In addition, project reports and other pertinent documents are actively analysed to elicit best practices, lessons learnt and innovative

solutions, and these value added information are then catalogued, organised and stored in the repository. So far, the KM initiative has focused on the consulting domain, leveraging the key knowledge that is needed for the consultants to work smarter. The company plans, in future, to expand it to cover the sales and marketing domain. This implies that additional structured knowledge areas (pertaining to sales and marketing) will have to be identified, new Knowledge Managers may need to be appointed, and the cycle of activities as shown in Fig. 2 will be iterated.

4. Discussion

One of the noticeable business benefits of implementing KM in the company is the rapid generation of project

proposals. By using the knowledge base, consultants can generate proposal documents quickly, because significantly less time and resources are spent finding and locating relevant information. In addition, consultants are able to leverage domain specific knowledge, lessons learnt and best practices that have been captured in the repository, and apply them rapidly to deal with their customers' requirements and problems. This has enabled the provision of innovative and pragmatic solutions in near real-time to their clients. The reduction in response time translates to improved customers' satisfaction, and without doubt, it also brings about increased cost savings. In essence, these are the values and benefits that can be gained from proactive KM practices, which are facilitated by computers and information technologies.

The analysis of this case study allows the articulation of a series of key factors that can be considered as important in contributing to the effectiveness of the company's KM initiative. The first is the presence of a KM champion and team. The champion, i.e. the Delivery Manager is an individual who understands the KM concept. He has communicated its importance to top management and all the staff, and activated the initiative. Nevertheless, he alone could have very little impact, and so a team was formed to help with the implementation. This team has played its roles and executed all its tasks and activities, efficiently. The second factor is the full and continual support given by top management. The Managing Director appreciates the benefits that can be gained from KM, and he has allowed the necessary funds and resources to be expended for its implementation. This helps to clear the internal obstacles that can deter its success.

The third element is the user driven and applicable technological system. Of particular importance is to have a well-defined structure for a knowledge base, since this will aid the users to browse through it and extract the relevant knowledge. Having a standardised structure also eases its development and facilitates its maintenance. The fourth key ingredient is the persistent and systematic processes in place to collect, review, delete, classify and store knowledge into the repository. These activities ensure that the repository is up to date, and that knowledge can be easily channelled to, and retrieved by those who need it. Another important factor is that the company has started its KM initiative on a small and manageable scale, i.e. focusing first on the consulting domain. Doing this allows the company to capture important lessons, and to identify what problems have been encountered or what has made the initiative successful, before widening its scope in the future. Lastly, the culture in the company is one that highly values knowledge and supports the adoption of KM.

In spite of these positive aspects, one main problem encountered by the company in its implementation of KM is lack of time. Every employee is very busy with his/her own particular job since the functioning and survival of this organisation, i.e. a small firm is largely dependent on each

and every one of them. This also explains why the company has adopted a gradual approach towards deploying KM by starting in a small way and then slowly expanding the process, rather than executing it in a 'fully blown' manner at the outset.

5. Conclusions

This paper has presented the findings of a case study conducted to investigate the implementation of KM in a small UK company. Specifically, the key elements of its initiative, as well as the implementation approach have been described. In addition, major factors that are believed by the authors to have influenced the effectiveness of the company's initiative so far have been discussed. The ultimate aim of the company is to make KM a seamless part of its working operations. In order to build a true knowledge-based enterprise, assimilating and integrating KM practices into the daily work routines of the employees is important. As a single case study, the information presented in this paper cannot be generalised to other organisations. However, it does provide useful insights and directions for which KM can be implemented in reality. It is hoped that this study will be beneficial to other small companies that are either attempting or struggling to adopt it.

References

- Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 25(1), 107–136.
- April, K. A. (2002). Guidelines for developing a k-strategy. *Journal of Knowledge Management*, 6(5), 445–456.
- Baker, M., Barker, M., Thorne, J., & Dutnell, M. (1997). Leveraging human capital. *Journal of Knowledge Management*, 1(1), 63–74.
- Bassi, L. J. (1997). Harnessing the power of intellectual capital. *Training and Development*, 51(12), 25–30.
- Beckman, T. J. (1999). The current state of knowledge management. In J. Liebowitz (Ed.), *Knowledge management handbook*. Boca Raton: CRC Press.
- Bennett, R., & Gabriel, H. (1999). Organisational factors and knowledge management within large marketing departments: An empirical study. *Journal of Knowledge Management*, 3(3), 212–225.
- Bhatt, G. D. (2001). Knowledge management in organizations: Examining the interaction between technologies, techniques, and people. *Journal of Knowledge Management*, 5(1), 68–75.
- Bollinger, A. S., & Smith, R. D. (2001). Managing organizational knowledge as a strategic asset. *Journal of Knowledge Management*, 5(1), 8–18.
- Buckman, R. H. (1998). Knowledge sharing at Buckman Labs. *Journal of Business Strategy*, 19(1), 11–15.
- Civi, E. (2000). Knowledge management as a competitive asset: A review. *Marketing Intelligence and Planning*, 18(4), 166–174.
- Clarke, T., & Rollo, C. (2001). Corporate initiatives in knowledge management. *Education + Training*, 43(4/5), 206–214.

- Davenport, T. H., De Long, D. W., & Beers, M. C. (1998). Successful knowledge management projects. *Sloan Management Review*, 39(2), 43–57.
- Davenport, T. H., & Volpel, S. C. (2001). The rise of knowledge towards attention management. *Journal of Knowledge Management*, 5(3), 212–221.
- Desouza, K. C. (2004). Knowledge management: A new commission for industrial engineers. *Industrial Management*, 46(1), 26–30.
- Forcadell, F. J., & Guadarrama, F. (2002). A case study on the implementation of a knowledge management strategy oriented to innovation. *Knowledge and Process Management*, 9(3), 162–171.
- Frey, R. S. (2001). Knowledge management, proposal development, and small businesses. *The Journal of Management Development*, 20(1), 38–54.
- Grant, R. M. (1991). The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, 33(3), 114–135.
- Grover, V., & Davenport, T. H. (2001). General perspectives on knowledge management: Fostering a research agenda. *Journal of Management Information Systems*, 18(1), 5–21.
- Gupta, B., Iyer, L. S., & Aronson, J. E. (2000). Knowledge management: Practices and challenges. *Industrial Management and Data Systems*, 100(1), 17–21.
- Hansen, M. T., Nohria, N., & Tierney, T. (1999). What's your strategy for managing knowledge? *Harvard Business Review*, 77(2), 106–116.
- Hibbard, J. (1997). Knowing what we know. *Information Week* 653, 46–54.
- Horwitz, M., & Armacost, R. (2002). Helping knowledge management be all it can be. *Journal of Business Strategy*, 23(3), 26–31.
- Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. *Organization Science: A Journal of the Institute of Management Sciences*, 2(1), 88–115.
- Jarrar, Y. F. (2002). Knowledge management: Learning for organisational experience. *Managerial Auditing Journal*, 17(6), 322–328.
- Kelly, D.T. (2000). *The impact of the internal organisational environment on NSD knowledge management and NSD performance*. Ph.D. thesis. London: City University.
- KPMG (1998). *Knowledge management research report 1998*. KPMG Management Consulting. <http://www.brint.com/papers/submit/knowmgmt.pdf> [Accessed 8/4/2004].
- Lee, C. C., & Yang, J. (2000). Knowledge value chain. *The Journal of Management Development*, 19(9), 783–794.
- Liebowitz, J. (2000). *Building organizational intelligence: A knowledge management primer*. Boca Raton: CRC Press.
- Liebowitz, J. (2003). A knowledge management implementation plan at a leading US technical government organization: A case study. *Knowledge and Process Management*, 10(4), 254–259.
- Malhotra, Y. (1998). Deciphering the knowledge management hype. *Journal for Quality and Participation*, 21(4), 58–60.
- Martensson, M. (2000). A critical review of knowledge management as a management tool. *Journal of Knowledge Management*, 4(3), 204–216.
- Martiny, M. (1998). Knowledge management at HP consulting. *Organizational Dynamics*, 27(2), 71–77.
- Meso, P., & Smith, R. (2000). A resource-based view of organizational knowledge management systems. *Journal of Knowledge Management*, 4(3), 224–234.
- Neef, D. (1999). Making the case for knowledge management: The bigger picture. *Management Decision*, 37(1), 72–78.
- Nonaka, I. (1991). The knowledge-creating company. *Harvard Business Review*, 69(6), 96–104.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science: A Journal of the Institute of Management Sciences*, 5(1), 14–37.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford University Press.
- O'Dell, C., Wiig, K., & Odem, P. (1999). Benchmarking unveils emerging knowledge management strategies. *Benchmarking: An International Journal*, 6(3), 202–211.
- OECD (2000). The OECD small and medium enterprise outlook. Paris: Organisation for Economic Co-operation and Development.
- Parikh, M. (2001). Knowledge management framework for high-tech research and development. *Engineering Management Journal*, 13(3), 27–34.
- Pettrash, G. (1996). Dow's journey to a knowledge value management culture. *European Management Journal*, 14(4), 365–373.
- Prahala, C. K., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*, 68(3), 79–91.
- Rowley, J. (1999). What is knowledge management? *Library Management*, 20(8), 416–420.
- Skyrme, D., & Amidon, D. (1997). The knowledge agenda. *Journal of Knowledge Management*, 1(1), 27–37.
- uit Beijerse, R. P. (1999). Questions in knowledge management: Defining and conceptualising a phenomenon. *Journal of Knowledge Management*, 3(2), 94–109.
- van der Spek, R., & Spijkervet, A. (1997). Knowledge management: Dealing intelligently with knowledge. In J. Liebowitz, & L. Wilcox (Eds.), *Knowledge management and its integrative elements*. Boca Raton: CRC Press.
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180.
- Wiig, K. M. (1997). Knowledge management: An introduction and perspective. *Journal of Knowledge Management*, 1(1), 6–14.
- Wong, K. Y., & Aspinwall, E. (2004a). Characterizing knowledge management in the small business environment. *Journal of Knowledge Management*, 8(3), 44–61.
- Wong, K. Y., & Aspinwall, E. (2004b). A fundamental framework for knowledge management implementation in SMEs. *Journal of Information and Knowledge Management*, 3(2), 155–166.