

2001

Knowledge Management: Results from an Exploratory Case Study

Vanessa Freke

Griffith University, V.Freke@cit.gu.edu.au

Follow this and additional works at: <http://aisel.aisnet.org/acis2001>

Recommended Citation

Freke, Vanessa, "Knowledge Management: Results from an Exploratory Case Study" (2001). *ACIS 2001 Proceedings*. 30.
<http://aisel.aisnet.org/acis2001/30>

This material is brought to you by the Australasian (ACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ACIS 2001 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Knowledge Management: Results from an Exploratory Case Study

Vanessa Freke

School of Computing and Information Technology
Griffith University, Brisbane, Australia
V.Freke@cit.gu.edu.au

Abstract

This paper presents the results of an exploratory case study into knowledge management within an organisation. Using a theoretical framework as a guide to research and analysis, the case study looked the knowledge processes of generation, codification and utilisation, and the effects that different corporate sub-systems have on the knowledge processes, as well as KM efforts as a whole. The results have led to the identification of areas requiring extra investigation that will be explored in future research.

Keywords

AL04 Knowledge Acquisition; AC0303 Knowledge Utilisation; AI0102 Case Study; Knowledge Management

INTRODUCTION

This paper reports on the results of an exploratory case study into Knowledge Management (KM) within an organisation.

Alavi (1999) describes the knowledge processes of generation, codification and utilisation, and suggests that these processes take place in knowledge management efforts. The presented case study explored whether these processes were present within the case organisation, and if present, how the processes were performed. Hoffmann et al's (1999) KM sub-systems (organisational, social and technical) were also used to examine the context in which the knowledge processes took place. The purpose of this was to explore whether the knowledge processes enabled KM, given the influences of the sub-systems within the organisation.

The case study research was explored using the following question, "Is Knowledge Management enabled through the knowledge processes of generation, codification and utilisation within an organisation?" The use of technology within the knowledge processes was of particular interest. The knowledge processes needed to be viewed within the organisational context, leading to the inclusion of the corporate sub-systems of KM from Hoffmann et al (1999).

Two sub-questions were used to investigate and frame the research question; these are,

- (i) What are the knowledge processes of generation, codification and utilisation that occur within an organisation?
- (ii) How do the corporate sub-systems (organisational, social and technological) affect knowledge processes and KM within an organisation?

The case study involved a single organisation in Brisbane, Australia. The organisation was a large law firm that was in the process of evaluating their KM strategy. Research data was gathered from interviews with organisational members and internal documents. The data was analysed with a theoretical framework developed from Alavi (1999) and Hoffmann et al (1999), and is outlined in the section, "Theoretical Framework". The case study was interpretivist in nature, allowing investigation of KM within a real-life context, where there was little control over the context (Benbasat et al, 1987; Yin, 1994, page 13).

Research into the area of KM is significant for several reasons. Firstly, organisations have become increasingly interested in the phenomenon, given the claims that KM can produce sustainable competitive advantage (Skok, 1999; Bertels and Savage, 1999; Zack, 1999). However, practitioners lack a clear and shared view of what KM is, and how it can be performed (Zack, 1999; Holsapple and Joshi, 1999). Additionally, few case studies have been performed in the area.

The first section of the paper deals with concepts drawn from literature. The importance of KM is discussed, followed by definitions of data, information and knowledge. Organisational knowledge and different types (tacit/explicit) of knowledge are then briefly covered. After this a selection of definitions of KM from literature are presented. Finally the paper reports on the author's case study research into KM, starting with the research question and propositions, the theoretical framework used in research and the results of the research.

WHY IS KNOWLEDGE MANAGEMENT IMPORTANT?

Economies are now moving towards a new business age where information and knowledge are to become the most important resources in organisations, leading to sustained competitive advantage (Sveiby, 1996; Schultze, 1998; Moody and Shanks, 1999). Malhotra (1998) identifies knowledge as the critical resource for business activity, while Zack (1999) asserts that an organisation's ability to manipulate knowledge will lead to sustained competitiveness. Skok (1999) reports that the British Council believes that competitive advantage will be gained from the management of knowledge about the UK. Bertels and Savage (1999) argue that as we move towards a knowledge-based economy, competitive advantage will come from knowledge management.

Nonaka and Takeuchi's (1995) research into Japanese companies leads them to conclude that the source of Japanese success is continuous knowledge creation within an organisation. Continuous knowledge creation leads to continuous innovation, which in turn leads to competitive advantage and hence success. Zack (1999) shares this view, stating that organisational competitiveness is recognised as coming from the creation, location and sharing of organisational knowledge, and the use of such knowledge in problem solving and opportunities. He goes on to present a knowledge management architecture that is used in two case studies to highlight strategies to manage explicit knowledge.

DATA, INFORMATION, AND KNOWLEDGE

It is generally observed that knowledge is related to (or made up of) data and information. Hence a clear understanding of both data and information is required to understand knowledge.

Figure 1 summarises different authors' understandings of data, information and knowledge. It also shows how data is changed to become information, and how information is changed to become knowledge.

This is not to say that the relationship between knowledge, data and information has been resolved. Tuomi (1999) argues that the traditional pyramid of data, information and knowledge needs to be reversed, with implications for KM and Information Systems that support knowledge and knowledge practices. Tuomi argues that we start with knowledge, and by articulating, verbalising and adding structure, create information. By then fixing representations and interpretations to information, we create data. To support this idea, Tuomi uses the development of computer systems as an example (Tuomi, 1999).

When articulated knowledge is stored in computer memory, the information within the knowledge needs to be represented. Information is then split into atoms that have no meaning themselves to allow automatic processing. Using a database analogy, this means taking some form of knowledge, structuring the information contained within the knowledge into a conceptual design for a database, and finally fixing representations and interpretations for data within each element.

For this research, the traditional pyramid relationship between data, information and knowledge has been adopted. Hence data is seen as discrete facts (e.g. cells in a database), information as organised data (e.g. tables in a database), and knowledge as knowing what to do with information. (e.g. using a table to make a decision).

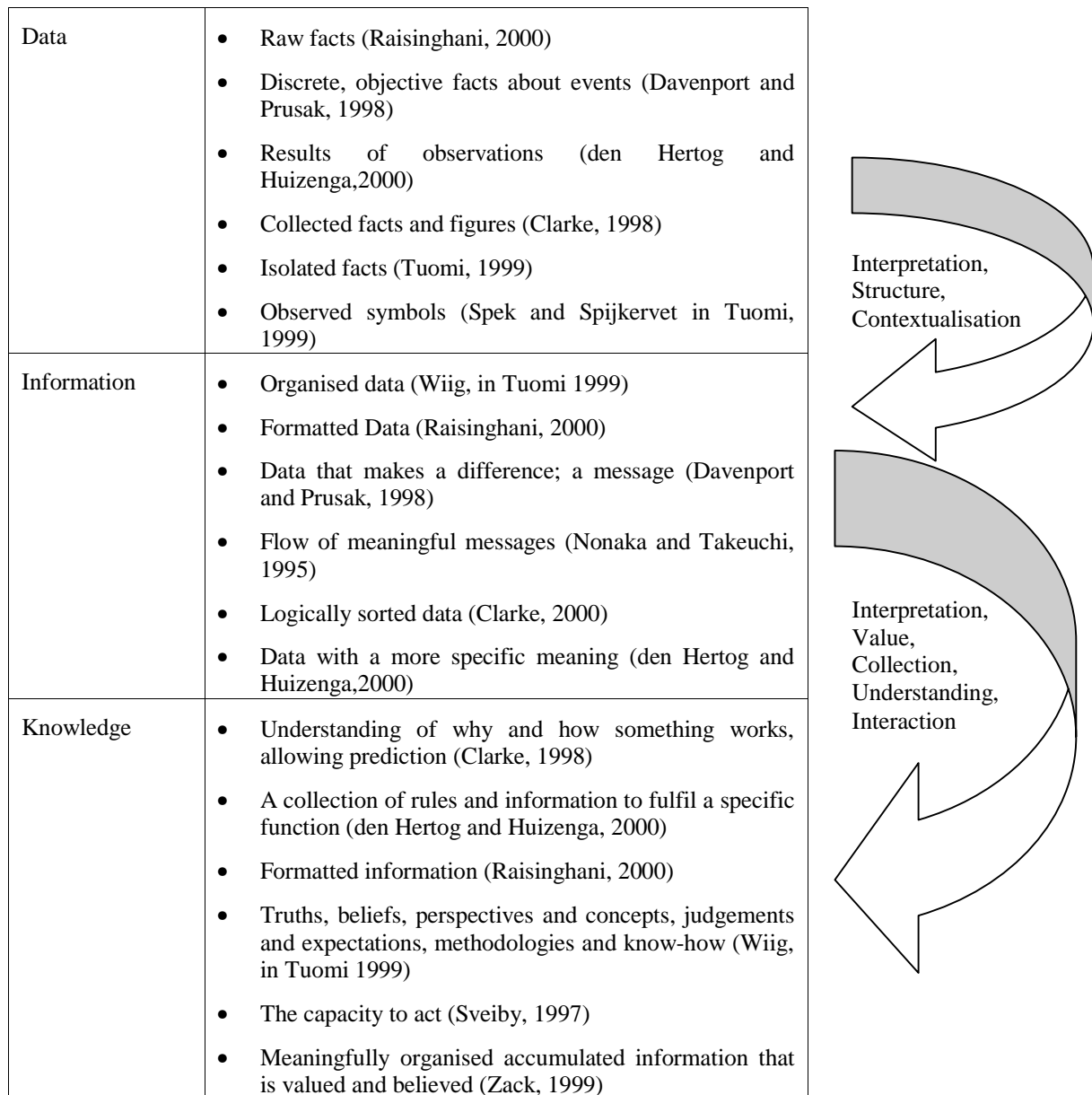


Figure 1: Data, Information and Knowledge

Organisational Knowledge

Related to the concept of knowledge is the concept of organisational knowledge. If knowledge can be defined as the understanding of how and why something works, allowing the owner to predict (Clarke, 1998), then organisational knowledge should allow organisations to understand their environment and competitors; it should also be a source of competitive advantage.

Vanhoenacker et al (1999) purport that organisational knowledge constitutes information, action and people, not simply organisational documentation. Davenport and Prusak (1998) support this view stating that,

“ [Organisational Knowledge] ... often becomes embedded not only in documents or repositories but also in organisational routines, processes, practises and norms.”

Hence organisational knowledge can be seen as the collection of organisational information, processes, values and beliefs. While it is made up of individual’s knowledge, it is also more than their knowledge, and is unique to an organisation. This is the view of organisational knowledge taken for the case study research.

Types of Knowledge

There are many different opinions on the types of knowledge. Here the difference between explicit and tacit knowledge will be addressed. Explicit knowledge can be precisely and formally articulated, and is codified in the form of organisational procedures, policies, manuals and programs. Tacit knowledge is non-articulated, and cannot be manifested as rules. Tacit knowledge is subconsciously understood and applied, is hard to articulate using formal language and is developed from experience. It involves individual experience, beliefs, perspectives and values. Tacit knowledge exists (for example) in domain expert's skills, in the heads of employees, in accepted but un-codified organisational practices (Clarke and Cooper, 2000; Yu-N and Abidi, 2000; Nonaka and Takeuchi, 1995; Schultze, 1998; Tuomi, 1999; Zack, 1999).

KNOWLEDGE MANAGEMENT

Definitions of knowledge management generally fall into one of three groups. The first group is generally concerned with value-adding to an organisation, leading to definitions such as from Erik Sveiby (1996): "The art of creating value from an organisation's intangible assets". Authors such as Rosemann and Chan (2000) who state that KM, "...seeks to deal with the problem of leveraging knowledge resources in an organisation" echo this view. Marshall (1997, in Herschel and Nermati, 1999) states that the concept of KM recognises knowledge as an important asset to an organisation, and hence defines KM as the harnessing of intellectual capital within an organisation. Schwabe (1999) more loosely defines KM as "an administrative function that enables knowledge work".

Definitions that see knowledge management as simply a value-adding process provide an organisational focus to KM. However, they fail to define how value is added to an organisation. The next set of definitions shows how value is added through knowledge activities.

Edwards and Mahling (1997) define KM as "...the organised effort to capture, organise and share the knowledge of employees for the achievement of a shared strategic goal". Rademacher (1999) defines KM as comprising activities necessary to discover, acquire, store, manage, develop, disseminate and use knowledge.

Schultze (1998) states that KM,

"...addresses the generation, representation, storage, transfer, transformation, application, embedding and protection of organisational knowledge. It is also concerned with establishing an environment and culture in which knowledge can evolve".

Here the author not only addresses the knowledge processes or activities, but also mentions two of the factors that may affect KM within an organisation.

By specifying the activities involved within KM, the second group of definitions provides a guide for KM activities within an organisation. The final group of definitions are concerned with the concept of a KM system, rather than just KM.

Alavi (1999, page 19) defines a KM system as,

"...an IT-based system developed to support and enhance the primary organisation knowledge management processes of knowledge generation, knowledge codification and knowledge transfer".

Hoffmann et al's definition of a KM system provides support to the organisational processes of development of new knowledge, preservation of knowledge, distribution of knowledge and the recombination of knowledge. Similar to Schultze (1998), the authors include factors that may affect KM within the organisation. They define a company's KM System as encompassing,

"...organisational, social and technological sub-systems. From our point of view, KM combines continuous organisation design, development of human resources, and innovation of technology. Success can only be ensured by simultaneous development of all parts of the KMS and their mutual adaption."

While all the definitions can be seen as correct, the last group (concerned with KM systems) provides the recognition that KM is a complex concept that involves not only activities but also influences from the organisational environment. Schultze's (1998) definition also provides this focus. Since this research has focused on both knowledge processes and their context, a combination of the definitions from Hoffmann et al (1999) and Alavi (1999) has been derived:

"KM is a system involving the knowledge processes of generation, codification and utilisation within the organisational, social and technological sub-systems of an organisation"

RESEARCH

KM was investigated as part of the authors honours year in an Information Technology degree at Griffith University, Brisbane, Australia. After reviewing the literature on KM, the following research question was developed:

“Is Knowledge Management enabled through the knowledge processes of generation, codification and utilisation within an organisation?”

The purpose of the research was to investigate if the knowledge processes were enacted, how they were instantiated and if they enabled KM within an organisation. Specifically, evidence was sought for the use of technology in the instantiation of knowledge processes. Recognising that such processes would occur within the organisational context, Hoffmann et al’s (1999) sub-systems were used to identify any contextual affect on the processes and hence KM efforts. Two sub-questions were developed to aid research:

- (i) What are the knowledge processes of generation, codification and utilisation that occur within an organisation?
- (ii) How do the corporate sub-systems (organisational, social and technological) affect knowledge processes and KM within an organisation?

Few KM case studies are reported in literature, despite the growing awareness of KM. Hence it was decided that as part of the authors honours thesis, a single case study would be used to investigate the research question and propositions. An ideographic methodology (case study) was deemed to be suitable due to the lack of understanding about KM within literature, and the use of only one case organisation was due to time limitations for the thesis.

The case study was carried out in August 2000, in a large law firm in Brisbane, Australia. The organisation was in the process of attempting to evaluate knowledge management practices within the organisation. Research data was gathered from organisational documents and interviews with organisational members. Two key organisational documents were examined; the first was a knowledge map of the organisations knowledge, and the second was a KM report developed for the firm’s partners. Three interviews were conducted with organisational members from different sections involved in the direction of knowledge management.

Theoretical Framework

A theoretical framework, as shown in figure 2, was developed to guide the research, and to aid in analysis of the findings. The framework itself is an amalgamation of the work of Alavi (1999) and Hoffmann et al (1999). Alavi provided the definition of knowledge processes, while Hoffamann et al provided the corporate subsystems. However, many authors have also identified the same or similar processes; a summary of these can be found in table 1 after the discussion of the processes used in the framework. While the framework is not meant to be a definitive representation of the important processes of knowledge management, it attempts to provide a broad selection to allow investigation of KM processes within an organisation.

Within the framework, the knowledge process of Generation refers to more than just creating a document, or other explicit knowledge source. It can also refer to identifying or acquiring knowledge from a source. The primary question at this stage is **“Where does the knowledge come from?”**

Codification occurs after Knowledge Generation. Given that knowledge Generation is often unsystematic, Codification may be the first explicit process of KM. Codification is concerned with the following question: **“How is the knowledge to be stored, using what medium, how will it be accessed?”**

Utilisation of knowledge is the final link in the knowledge process cycle, and ideally leads into further knowledge Generation. At this stage the value of knowledge Generation and Codification should be realised, as the knowledge is applied to the organisation’s business. Hence this process requires major attention from organisations (Alavi, 1999, page 20). Knowledge Utilisation is concerned with **getting the information to the people who need it, to allow the knowledge to be used.**

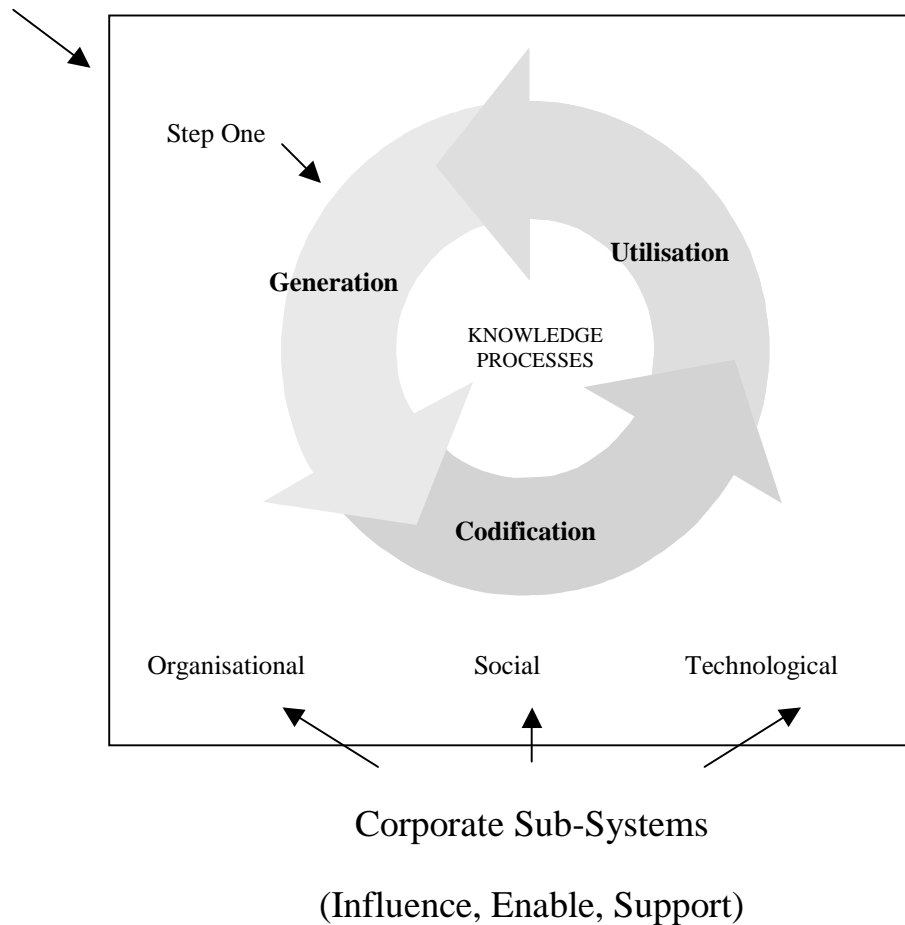


Figure 2: Theoretical Framework; “Framework for Analysis of Knowledge Management Processes and Context”

As mentioned earlier, different authors use different terms to describe the above processes. In the following table, other words used to describe each process have been listed, along with the associated authors.

Process	Other Names	Authors
Generation	Identification	Herschel and Nermati (1999); Rosemann and Chan (2000)
	Creation	Ferran-Urdaneta (1999)
	Acquisition	Rademacher (1999); Zack (1999)
	Discovery	Rademacher (1999)
	Capture	Edwards and Mahling (1997)
Codification	Organisation/Organising	Herschel and Nermati (1999); Edwards and Mahling (1997)
	Refining, storage and retrieval	Zack (1999)
	Transferring and storing	Rosemann and Chan (2000)
Utilisation	(re)-using and Transfer	Rosemann and Chan (2000)
	Distribution and presentation	Zack, (1999)
	Sharing	Edwards and Mahling (1997); Ferran-Urdaneta (1999)
	Dissemination and Usage	Rademacher (1999)

Table 1: Knowledge Activities and Equivalents

The knowledge processes are represented as a circular, continuous process. This assumes that for any KM effort to leverage competitive advantage, it must be an on-going effort. This view is supported by (Leonard-Barton, 1995; Rosemann and Chan, 2000; Arthur Andersen and APQC in Holsapple and Joshi, 1999; van der Spek and Spijkervet in Holsapple and Joshi, 1999).

The inclusion of the corporate sub-systems reflects the belief that to understand activities, understanding of the context in which they exist is necessary. Inclusion of the corporate boundary reflects the belief that for KM to be successful, it must be applied across an organisation.

The organisational sub-system refers to continuous organisational design (Hoffmann et al, 1999). This can include organisational structure, design, work processes, strategy, goals, culture, and management style.

The social sub-system refers to the development of human resources (Hoffmann et al, 1999). Therefore, it may contain aspects such as training of users, and the development of an environment conducive to knowledge management.

The technological sub-system refers to the “innovation of technology” (Hoffmann et al, 1999). This should include knowledge management software and any other technology devices (including hardware) used to facilitate or support the corporation’s knowledge management. The way that the technology is used and deployed also forms part of the technological sub-system.

CASE STUDY RESULTS

The first research sub-question was, “What are the knowledge processes (generation, codification and utilisation) that occur within the organisation?” Specific focus was on the use of information technology within the knowledge processes.

The process of knowledge generation was found to occur widely. New knowledge was generated from precedents, current law, sharing of knowledge, linking of knowledge and research. Knowledge was codified in documents, email and people’s ‘top drawers’. However, few attempts were made to codify (using technology) personal notes and interpretations or tacit knowledge so that all organisational members could access such knowledge. The process of utilisation occurred using Internet browsers and the organisation’s library. Information technology (primarily desktop computers) was used within each of the processes, primarily in document preparation (email or word-processing) and access (Internet browser or work processor).

Knowledge codification was primarily limited to explicit knowledge, and therefore limited the amount of knowledge that was available to be utilised. Utilisation of codified knowledge was sometimes hampered by non-linkage of systems across the organisation’s four offices. A lack of sufficient software licenses also caused limits to be placed on the utilisation of some knowledge.

“How do the corporate sub-systems (organisational, social and technological) affect the knowledge processes and KM within the organisation?” was the second sub-question posed.

As briefly mentioned above, the technological sub-system affected the knowledge processes by limiting utilisation of knowledge (through non-linkage of systems and software access). This was a negative affect on the organisation’s KM. However, the increasing move towards centralisation of the organisations knowledge was seen as a positive affect. Eventually it was expected that centralisation would lead to better codification and utilisation, in turn enhancing overall KM efforts.

The social sub-system had two key effects on KM. The lack of incentives and high level management support to participate in KM for were identified as limiting the willingness of organisational members to change their work habits and adopt KM processes. This in turn limited the organisation’s KM efforts. This limitation is supported in literature, Hoffmann et al (1999) reporting that the success of a system or activity is dependant on the people in the organisation. Additionally, Hoffmann et al suggest that effective KM will come from embedding technical support for KM within daily work practices of workers. The reluctance of organisational members to do so is therefore another limitation on the organisation’s KM efforts.

The organisational sub-system also effected KM. One limitation on KM was the lack of organisational strategy and co-ordination of efforts. Interviews indicated that different groups (such as marketing and accounting) had developed their own KM strategies that were not co-ordinated at a higher level. The lack of high level co-ordination was also reflected in the lack of management support for KM. Interviewees indicated that the management of the firm saw KM as simply document retrieval, failing to see that it could also involve areas such as Human Resource Management, Accounting, Marketing etc.

Overall, support was found for the research question, “Is KM enabled through the knowledge processes of generation, codification and utilisation within an organisation?” The case organisation showed evidence of the processes being carried out and contributing to KM (sub-question one). However, major limitations on the processes came from the organisational sub-systems (sub-question two). Specifically, greater management support for the organisation’s KM strategy is needed, as well as incentives to encourage organisational members to participate in the strategy. Better use of technology could also aid the organisation’s KM.

CONCLUSIONS

The first section of this paper presented a literature review of KM and other related topics. It started by defining data, information and knowledge and finished with definitions of KM. After this, the research into KM was introduced through discussion of the research question and outline of the theoretical model.

Finally the paper presented the results of a single organisation case study into KM. Specifically, the results of the study showed that while the case organisation was attempting the knowledge processes of generation, codification and utilisation, the efforts were limited by the corporate sub-systems.

The effects that the internal organisational climate has on KM will be further explored a part of a PhD the author is currently undertaking. Additionally, the way that technology can be used to support KM processes will be investigated. The expected outcomes of the PhD research are:

- Identification of the elements of KM (including exploring the activities and processes that are involved in KM, identifying the different influences on KM, and the impact that KM has on an organisation)
- Clarification of the influence and impact relationship between the organisational context and KM
- Identification of characteristics of technology which support successful KM
- A framework that clarifies the relationship between KM, IT configuration/s and the organisational context for use by both practitioners and researchers.

REFERENCES

- Alavi, M. (1999). "Chapter 2: Managing Organisational Knowledge". Framing the Domains of IT Management: Projecting the Future through the past. R. Zmud, W. Pinnaflex Educational Resources, Cincinnati, OH: 15-28.
- Benbasat, I., Goldstein, D., Mead, M. (1987). The Use of Case Research in Studies of Information Systems, *MIS Quarterly*(September): 368-386.
- Bertels, T., and Savage, Charles M. (1999). A Research Agenda for the Knowledge Era: The Tough Questions, *Knowledge and Process Management* 6(4): 205-212.
- Clarke, P. (1998). Implementing a knowledge strategy for your firm, *Research Technology Management* 41(2): 28-31.
- Clarke, P., and Cooper, M. (2000). Knowledge Management and Collaboration. Proceedings of The Third International Conference on Practical Aspects of Knowledge Management (PAKM2000), Basel, Switzerland, 30-31st October, 2000 .
- Davenport, T. H., and Prusak, L. (1998). Working Knowledge: How Organizations Manage What they Know. Harvard Business School Press, Boston, MA
- den Hertog, J. F. and. Huizenga, E. (2000). The Knowledge Enterprise: Implementing Intelligent Business Strategies. Imperial College Press, London
- Edwards, D., and Mahling, D. (1997). Towards Knowledge Management Systems in the Legal Domain. Proceedings of International ACM SIGGROUP conference on Supporting group work: the integration challenge, Phoenix, AZ USA, November 16-19, 1997 .
- Ferran-Urdaneta, C. (1999). Teams or Communities? Organisational Structures for Knowledge Management. Proceedings of 1999 ACM SIGCPR conference on Computer personnel research, New Orleans, LA USA, April 8 - 10, 1999 .
- Herschel, R., and Nermati, H. (1999). CKO's and Knowledge Management: Exploring Opportunities for using Information Exchange Protocols. Proceedings of 1999 ACM SIGCPR conference on Computer personnel research, New Orleans, LA USA, April 8 - 10, 1999 .
- Hoffmann, M., Loser, K., Walter, T. and Herrmann, T. (1999). A Design Process for Embedding Knowledge Management in Everyday Work. Proceedings of International ACM SIGGROUP Conference on Supporting Group Work, Phoenix, AZ, USA, November 14-17 .
- Holsapple, C. W., and Joshi, K. D. (1999). Description and Analysis of Existing Knowledge Management Frameworks. Proceedings of 32nd Hawaii International Conference on System Sciences, Maui, HI, January 5 - 8, 1999 .
- Leonard-Barton, D. (1995). Wellsprings of knowledge: Building and Sustaining the Sources of Innovation. Harvard Business School Press, Boston, Massachusetts
- Malhotra, Y. (1998). Knowledge Management for the New World of Business, *Journal for Quality and Participation* special issue of Learning and Information Management 21(4): 58-61.
-

- Moody, D. L., and Shanks, G. (1999). Using Knowledge Management and the Internet to Support Evidence Based Practice: A Medical Case Study. Proceedings of 10th Australasian Conference on Information Systems.
- Nonaka, I. and. Takeuchi, H. (1995). The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation. Oxford University Press, New York
- Rademacher, R. (1999). Applying Bloom's Taxonomy of Cognition to Knowledge Management Systems. Proceedings of 1999 ACM SIGCPR conference on Computer personnel research, New Orleans, LA USA, April 8 - 10, 1999 .
- Raisinghani, M. (2000). Knowledge management: A cognitive perspective on business and education, American Business Review 18(2): 105 -112.
- Rosemann, M., Chan, R. (2000). Structuring and Modeling Knowledge in the Context of Enterprise Resource Planning. Proceedings of Pacific Asia Conference on Information Systems, Hong Kong, China, June 2-3, 2000 .
- Schultze, U. (1998). Investigating the Contradictions in Knowledge Management. Proceedings of IFIP WG8.2 Joint Working Conference on Information Systems: Current Issues and Future Changes, Helsinki, Finland, December 10-13 1998 .
- Schwabe, G. (1999). Understanding and Supporting Knowledge Management and Organisational Memory in a City Council. Proceedings of 32nd Hawaii International Conference on System Sciences, Maui, HI, January 5 - 8, 1999 .
- Skok, W. (1999). Knowledge Management: London Cabs Case Study. Proceedings of 1999 ACM SIGCPR conference on Computer personnel research, New Orleans, LA USA, April 8 - 10, 1999 .
- Sveiby, K. (1996). What is Knowledge Management? , URL <http://www.sveiby.com.au/KnowledgeManagement.html>
- Sveiby, K. E. (1997). The New Organizational Wealth: managing and measuring knowledge-based assets. Berrett-Koehler Publishers, Inc., San Francisco, CA
- Tuomi, I. (1999). Data is More Than Knowledge: Implications of the Reversed Knowledge Heirarchy for Knowledge Management and Organisational Memory. Proceedings of 32nd Hawaii International Conference on System Sciences, Maui, HI, January 5 - 8, 1999 .
- Vanhoenacker, J., Bryant, A., and Dedene, G. (1999). Creating a Knowledge Management Architecture for Business Process Change. Proceedings of 1999 ACM SIGCPR conference on Computer personnel research, New Orleans, LA USA, April 8 - 10, 1999 .
- Yin, R. (1994). Case Study Research: Design and Methods. SAGE Publications, California, USA
- Yu-N, C. and. Abidi, S. (2000). A Scenarios Mediated Approach for Tacit Knowledge Acquisition and Crystallisation: Towards Higher Return-On-Knowledge and Experience. Proceedings of Third International Conference on Practical Aspects of Knowledge Management (PAKM 2000), Basel, Switzerland.
- Zack, M. H. (1999). Managing Codified Knowledge, Sloan Management Review 40(4 (Summer)): 45-58.

COPYRIGHT

Vanessa Freke © 2001. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.
