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Barriers to the acceptance and utilisation of knowledge management systems: An exploratory study

Patricia Kennett
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THESIS

Barriers to the Acceptance and
Utilisation of Knowledge Management
Systems: An Exploratory Study

In partial fulfilment for the award of an Honours Degree

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0954536

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USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

ABSTRACT

Organisations entering the 21st Century are exposed to an environment of continuous change, a challenge that requires a movement away from more predictable structures of the past, with hierarchies and formal chains of command. The emerging fluid and network like structures present new challenges for ensuring the development and dissemination of organisational knowledge. An area of considerable current debate involves the issue of harmony and balance between an organisation's culture and its Knowledge Management (KM) systems. The focus of this study is on organisations that are recognising the implications of these changes and are responding by installing knowledge systems in an attempt to capture and distribute the organisation's explicit knowledge. Such actions indicate the recognition of a need to move towards a managerial culture which is inclusive of knowledge development, and where managerial actions demonstrate a concern with capturing the tacit knowledge of all employees, creating open external interfaces.

The success of the implementation of a knowledge management system depends upon full utilisation of the system by all potential users and the development of a culture which facilitates this inclusivity. Research and experience have indicated that KM systems are often not successfully adopted by the potential users. This study seeks to understand why users may choose not to participate in the use of knowledge management systems, which is the first critical step in ensuring that a knowledge management system may be fully utilised and provide maximum value to an organisation, creating a culture that provides a competitive edge.

This study attempts to explore and model the relationships between factors that act as barriers for individuals when knowledge management systems are implemented, and to identify aspects of an organisation or a KMS which may facilitate improved uptake of a KMS.. The study focuses on a range of employees across three organisations which have given the research project considerable latitude in research

opportunity and provided detailed in-depth interviews. The study is based on the findings of a pilot study, conducted by this researcher, that categorised the barriers into three broad areas: *structure, culture and individual perceptions*. That categorisation is used as a conceptual framework for this study. The qualitative data from the in-depth interviews and observation is analysed, categorised, and patterns of issues identified using a grounded theory approach. Industry experts have reviewed the results to identify and confirm possible issues in the data and give practitioner validity to the analysis.

For practitioners the results provide a framework of the relationships that may act as barriers to employee participation, and an indication of those issues that appear the most critical when constructing an appropriate organisational culture for knowledge management systems. Academically the study identifies critical issues that should be the subject of more detailed cultural exploration in this developing field.

DECLARATION

**I CERTIFY THAT THIS THESIS DOES NOT, TO THE BEST OF
MY KNOWLEDGE AND BELIEF:**

- (i) incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher education
- (ii) contain any material previously published or written by another person except where due reference is made in the text; or
- (iii) contain any defamatory material

Patricia Ellen Murphy Kennett (Candidate) 1st June 2004

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CHAPTER ONE

INTRODUCTION

While the nature of knowledge has been at the core of traditional academic study, Knowledge Management (KM) is a relatively new perspective within management studies, and therefore the subject of considerable debate. The current interest focuses on the questions of defining the boundaries, defining the terms, and how KM fits into the information creation, distribution and reintegration functions of management. The linguistic cynicism demonstrated by some writers questions whether KM is just another term to describe information in a way that continues to allow elitist groups to proliferate. KM as a recognised topic has been developing over the last few decades, with recognition including the development of the Institute for Knowledge Management as a joint project by IBM and Lotus. The business world has described the subject area in various terms relative to the perspective of the target audience, however the basic principles remain the same. Business planners use the term Transformational Organisations, trainers refer to the phenomena as the Learning Organisation, the quality movement uses the term Six Sigma, while the Information Technology sector, and increasingly management studies, have employed the label Knowledge Management. While each viewpoint is unique, the subject matter in question is similar, and the starting point is within the Total Quality Management (TQM) approach (O'Dell, Essaiades and Grayson, 1998).

While KM does not have clearly defined boundaries it does have core properties and can be seen to fit into the overall information picture as described in figure 1.1.

Obtaining a competitive edge within the current global networked business environment involves a need to continually produce and reproduce knowledge. Installation of a knowledge system creates a dichotomy between the knowledge systems

and the knowledge culture required for successful implementation. A shift in thinking is required to change to a knowledge culture. A managerial paradigm shift is required, a move to fluid structures, a flatter hierarchy, and promotion of the value in sharing personal knowledge which has previously been suppressed (Handy, 1994). The organisational culture must also shift to support the new structure and values, accept the reality of the organisational need for knowledge development. Where knowledge was with-held to protect personal power it must now be shared to protect and advance the organisation's economic position. The focus must shift from internal learning to external learning.

RELATED AREAS		CONSEQUENCES
Human Resource Management	<i>Knowledge Management</i>	Transformational/ Learning Organisation
Data Mining Modelling		
Change Management		
Total Quality Management		Business Intelligence
Data Warehousing		Knowledge Creating Company
Strategic Information Systems and Technology Planning		

Figure 1.1 Knowledge Management in the Information Picture

The lack of a common terminology for KM makes defining knowledge, as distinct from information, subjective. Differentiating knowledge from information is covered in many articles on the subject of knowledge (Teresko, 1999), but for the purpose of this research, knowledge will be considered to be a mix of information, expertise and experiential discourse. The context for the research will be the business arena, that is the educational sector and viewpoints on KM will remain outside the scope of the project.

A growing interest in the area of knowledge management in the business sector may be attributed to recognition of the rapid integration that occurs when on-going experiences and existing knowledge interact dynamically (Alexander, Schallert & Hare. 1991, p329). Knowledge is perceived as the new method of gaining or keeping a competitive advantage by capturing the previously untapped reserves within the organisation's valuable human resources. Creating an environment that produces knowledge requires an effective management culture.

One of the popular tools for capturing, storing and disseminating knowledge is a knowledge repository, such as Lotus Notes, where participants are able to submit items of interest, add to existing items, and build dialogue with other participants. See table 1.1 for further examples of knowledge tools, current and under design. The costs of implementing such knowledge systems can be high, and the drivers are financial (KPMG,1998), therefore success at an early date is important to justify the considerable capital outlay.

<i>Knowledge Management Tools</i>
<i>Clearview</i>
<i>Delphi</i>
<i>Domino - Lotus Notes (repository)</i>
<i>Intelliprise - Compac search engine</i>
<i>Knowledge Insight (search engine)</i>
<i>Knowledge.Innovation (future offering from Microsoft)</i>
<i>PC.Fulcrum (search engine)</i>
<i>SAS Collaborative Business Intelligence Solution (repository)</i>
<i>Viador Portal</i>

Table 1.1 Knowledge Management Tools

Many of the articles and books on the subject of knowledge management discuss the high failure rate of the systems (e.g. KPMG, 1998; Suma, 1999; Ruggles, 1997) but none are specific or offer an analysis or a definition of failure. There are many possible aspects of failure such as failure to recover costs, failure to keep the system alive, failure to find value in the implemented system that are not explored by such studies. The focus of this study is not failure per se but the barriers which impact on the use of an organisation's knowledge tools and therefore may contribute to various forms of KMS failure. This research builds on the results of an earlier exploratory pilot study investigating the issues concerned with using KM systems which was conducted by the same researcher in 1998.

Background to the Study

Recognition of the need to formalise and systemise management of knowledge within organisations is a recent development. Dr. Karl Wiig coined the concept of Knowledge Management during a keynote address to the United Nation's International Labor Organization in 1986 but the formalisation of managing knowledge had already begun. In 1980 Digital Equipment Corporation (DEC) developed one of the first expert systems, XCON (Liebowitz, 1998, p1-2), as a result of collecting and analysing information from many experts to generate knowledge which could be utilised by non-experts. Since the 1990s knowledge has been recognised as a critical organisational asset that requires management as does any asset that is to be fully utilised. The management of knowledge within and between organisations is now an area of considerable growth.

The objective of a knowledge system is to capture personal (tacit) knowledge, disseminate to a wide audience (tacit to explicit), organise related knowledge (explicit to explicit), and create new knowledge (explicit to implicit) as a cyclic, dynamic, interactive process (Nonaka, 1991. p28-29). It is therefore not just an issue of system implementation and use, but an issue that concerns the development of new forms of

organisational culture to match new shapes of organisations. The integration of systems within cultures that can act as tools of cultural change is very much at the heart of this study.

Developing the research project

The research project developed while working with an international company which employed multiple methods of resourcing projects including contractors, consultants, expatriate employees and international temporary personnel alongside in-country full and part time staff. The staff were theoretically united by a knowledge management system that was available to everyone, however it soon became clear that only staff with a broader cultural background, or a diverse employment history, were actually utilising the system. A review of the access files confirmed this suspicion. Attempts to increase utilisation of the system through awareness and reward programs failed.

During investigation of this problem the wider implications for KMSs became clear and a pilot study was created to identify the base causes of the problem. The results of the pilot study (Appendix A) indicated that the problem was more complex than the literature suggested and required further investigation.

Significance of the Study

The significance and relevance of a study such as this was recently highlighted by Guy Gable (2003) when he posed 10 questions regarding KM. The final question was:

Is recognition and management of knowledge a practice widely accepted by many consulting firms or just large firms? What barriers hinder such practice (or what catalysts are encouraging such practice)? P3

As with any new area of interest there is much controversy and debate over the organisational issues of knowledge management. Fundamentalists focus on the systems and the issue of KM tools, radical humanists are concerned with the soft issues, such as the perceived threat to an individual's accustomed power base, while the literature regarding the subject of knowledge systems and their management is lacking in explanations for the reluctance of employees and knowledge workers in general to participate in the new practice. Understanding the underlying issues provoking this reluctance is crucial to the future success of the field, equipping knowledge managers with the ability to plan around problem areas, avoiding or minimising identified risks and issues that may render an investment in knowledge systems a failure. Strategic planning can then incorporate the appropriate, site-specific, requirements to ensure the capture, dissemination, and utilisation of the knowledge inherent in the organisation and the workforce.

This study is positioned to form the basis for further research on how organisations can maximise the value of installing a knowledge management system and identify the culture/practices required to support the new paradigm. The academic sector can use the information from such studies to design models for knowledge management systems and change management processes that circumvent the barriers, designing the problems out of the system.

Purpose of the Study

The pilot study conducted in 1998 highlighted the concerns of participants in a knowledge system. This study will develop an outline of fundamental issues and will identify the relationships between problems, issues and areas of contention for participation in knowledge management systems. A framework developed from the issues will indicate the most critical relationships and may provide a guide for further

areas of study. It will also examine how structural issues affect cultural issues, and how perceptual issues can override cultural attitudes.

The purpose of this study is to present a coherent picture of the problems and perceived problems faced by users, which will assist managers to design a supportive structure and culture alongside the knowledge system, and assist in change management issues. The goal is to further understanding of the pressures and problems faced by all workers in the knowledge area.

Research Question

The objective of this research is to explore the possible barriers within organisations that may inhibit individuals accessing, contributing to, or using a knowledge repository. The issues covered by this study concern accessing and using the systems within the organisational support elements of culture and structure. The study intends to explore: the issues within the organisational culture that impede the full utilisation of KM systems; which issues are critical and their relationship; who are the stakeholders in the KM system that have to be considered; what issues concerning personal and group support are critical.

Definition of Terms

The context of this research is the business environment and therefore the following definitions are applied:

Barriers: elements that prevent, discourage or devalue the individual's attempts to access and use knowledge available to the organisation

- Explicit Knowledge:* defined, formalised, systemised knowledge that is available for sharing
- Failure:* unwillingness to contribute or use the system, workforce not able to demonstrate knowledge of the systems, procedures, policies, and content of the organisation's formal knowledge network
- Knowledge Management:* the capture, creation, storage, organisation and distribution of knowledge (Liebowitz, 1999, 1-6)
- Knowledge System:* method of formalising and automating management of knowledge (Hendriks & Vriens, 1999), for the purpose of this study an Information Technology (IT) based system is assumed.
- Knowledge:* "organized information applicable to problem solving. - Woolf" (Liebowitz, 1999, 1-3)
- Repository:* collection point and management tool for information and experiential input that is available to members of that community (organisation)
- Tacit Knowledge:* highly personal knowledge that is difficult to communicate or formalise, a mix of skills, beliefs and mental models (Nonaka, 1991. p28). Tacit knowledge may not be consciously evident to the person in question.
- Value:* perceived benefit to the overall community that will continue beyond the terms of the contributing individuals. This is not confined to financial benefits but encompasses broader values such as personal development, broadened viewpoint, wider knowledge base, etc

Outlining a Typical Knowledge System

A typical Information Technology (IT) based knowledge system would contain modules or repositories, each specific to a topic or area of interest, that are available to all or specific personnel. Figure 1.2 outlines the types of entries that might be found in a knowledge system for an audit firm. An Auditor would post an audit document to the repository then include a document containing notes on the audit that identify informal issues such as problems with personnel or obtaining co-operation. The documents would be available for viewing to the rest of the accounting firm. Other personnel would contribute to the repository by including relevant material such as memos, email, open discussions etc. that would build on the current information. They might identify similar issues in other audits and methods previously used to successfully circumvent problems. This would represent a knowledge base on the client and on the problem resolution ideas.

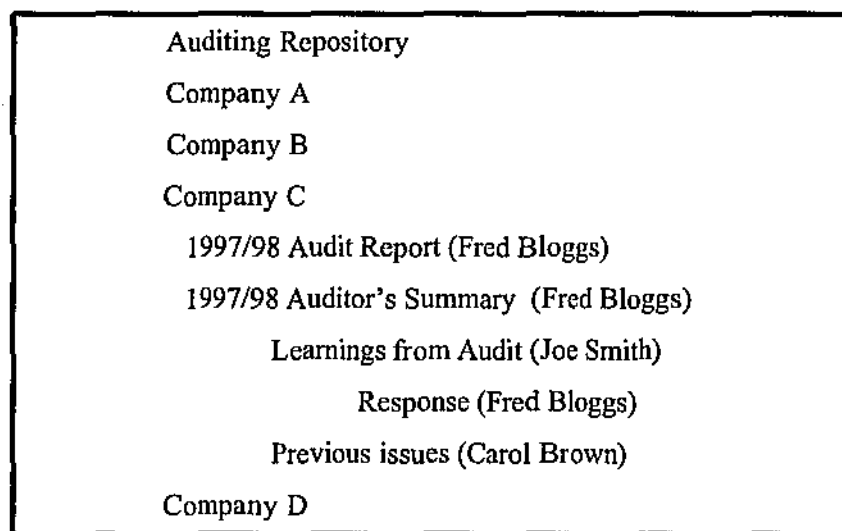


Figure 1.2 Example of a repository layout

The shared knowledge would assist other auditors working with the same client to avoid encountering similar problems, or prepare them to handle the issues in a professional manner. For example, the first level would identify the company, the

second level would identify formal documents lodged for the company, the third level might contain ancillary information to formal documents, further levels might contain information that explains issues raised, responses to questions, additional information. Together these items would give valuable insights to future auditors who may no longer have access to the original auditors. The knowledge gained from perusing the system could avoid many hours of rework on the client's files. The system provides an organisational network that works between people and across time.

The contributors to a knowledge system are identified against the documents they have originally created, however contributors that add to an existing document are not identified. For example in figure 1.2 the document Learnings from Audit was submitted by Joe Smith then Fred Bloggs submitted a Response document. It is possible that the comments in Learnings from Audit were actually a compilation of comments from different individuals who had read the audit report. Only Joe Smith would appear as the author as he was the creator of the document. Separation of, and credit for, the individual contributions can become difficult as the system grows. Although in some systems the author can be maintained in documents below the major category, authorship and therefore ownership become organisational issues.

Organisation of the Rest of the Study

The remaining chapters of this study are organised to present the information in a flowing, logical, methodological manner. To assist this process the diagram in figure 1.3 represents the chapter layout and demonstrates how the pieces fit together to form the whole document. The segments represent the logical breakdown of tasks in the research project then assign them to the relevant chapter/s covering the details for that task. For example the initial individual stages of Workplace Observation, Literature Review and Pilot Study are described across Chapters One and Two of this document.

Readers are assisted in following the flow of the document by a repetition of the inner section of the diagram at the start of every chapter. It will act as a reminder of the process employed, and through the use of a *shaded area* indicate the current focus of the text.

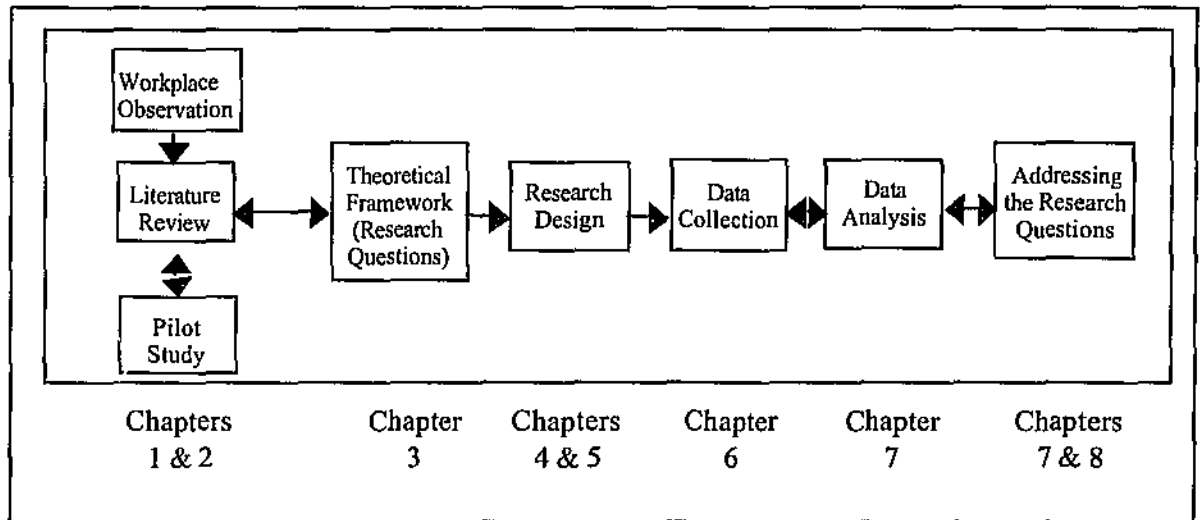
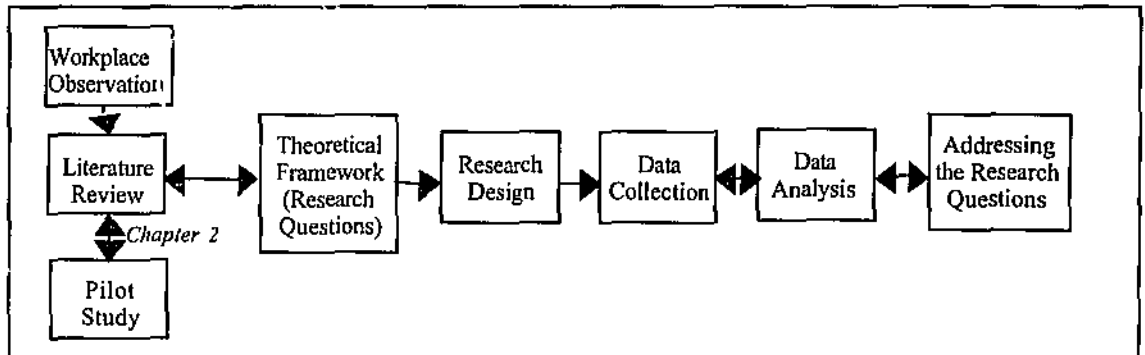


Figure 1.3 Overall organisation of the study

Chapter Two will concentrate on the literature review section of the study, highlighting the outcomes of three previous studies by highly reputable organizations. It will commence by examining current definitions of the term Knowledge Management, and addressing the lack of a shared language in the field. Barriers to KM identified in the current literature will be examined and the literature review brought to a conclusion.

CHAPTER TWO

LITERATURE REVIEW



Introduction

The literature review will concentrate on the literature published since 1990 due to the recent nature of the emergence of knowledge systems. Publications prior to 1990 have been scanned but will only be referenced where the item is of special interest for the field and has not been superseded. This review will start by defining KM for the purpose of this study, then proceed to previous research reports that have uncovered some barriers to KM. The original Harris Study (KPMG, 1998) into KM will be examined to identify the drivers for implementing a system, giving some context to the research. The KPMG (2002) report which used data from the Harris follow-up study gives a brief overview of some issues considered barriers by management. Previous research will conclude with Gabriel Szulanski's Sticky study of the reasons why knowledge is not transferred.

Then the focus will change to question the existence of a Knowledge Management language shared by all participants and therefore accepted terminology in

the area, followed by the definitions used in various literature for KM and knowledge. The examination of barriers, identified or perceived, will follow the definitions. This section will also cover the main issues raised in the literature concerning the possible and identified concerns and causative factors for KMS “failure”. The review will conclude with a look at the Internet as a knowledge management tool and the possible value that can be placed on the contributions to a system where most authors are unknown and untraceable.

Defining Knowledge Management

Knowledge exists within any organisation. Knowledge Management (KM) seeks to capture that knowledge for the organisation’s future benefit, disseminate the knowledge and use it to create further knowledge. KM was defined by Scannell and Krill (1999) as “creating, organising, and distributing knowledge” but this definition fails to give credit to the fact that knowledge is already in existence within all organisations as a continuous production from each relational process. The use of a KM system may enhance the creation of knowledge, but broadening the definition to include capture of existing knowledge would make the definition more accurate. Alexander et al (1991, p317) defined knowledge as “...refers to an individual’s personal stock of information, skills, experiences, beliefs and memories”. This description seems very fitting on a personal level, however on a business level knowledge is more contextual. A knowledge repository is specific to a topic and would hold the facts (information) on a subject plus a subjective dialogue on the tacit (personal) knowledge of individuals involved in the topic. For the purpose of this study the term knowledge within the business context will be a combination of the above definitions.

Karl Sveiby, (2004) acknowledged as a founder of KM, ponders the term Knowledge Management, stating he does not believe knowledge can be managed. Wilson (2002, p13-14) quotes other well known authors such as Drucker and Kotzer, who also

question whether it is possible to manage knowledge which is increasingly less of a finite substance and more a relational production. In this study these doubts are acknowledged but a redefinition of knowledge management is considered out of the scope of this thesis

KPMG Knowledge Management Research Report 1998

A research report on Knowledge Management released by the KPMG Management Group (1998) was based on a study by Harris and highlights research analysis which underpins the framework for this report. Harris based his 1998 research on input from senior management in 100 UK companies with annual turnovers exceeding £200 million (KPMG, 1998, p5). The KPMG report was selected for special interest as it is a comprehensive statistical report of findings from one of the few studies into Knowledge Management. The twenty page report examines the current state of KM (1998), the costs of failing to manage knowledge, outlines the drivers for a need to manage knowledge, the cost of ignoring KM, and the failure of companies to integrate KM with other company systems, such as Internet access.

The Harris study identified the most important drivers for the installation of a knowledge management system as improving profits (51%), defending market share (42%) and cost reduction (39%), i.e. they were financial drivers. The report found that knowledge management was transforming the organisation for only 10% of adopters who responded. This was a poor response that calls for investigation into the reasons behind the lack of results or barriers to full utilisation.

KPMG Knowledge Management Research Report 2000

The Harris report was updated in 2000 by KPMG (KPMG, 2000), again utilising Harris to collect the quantitative data, this time from 423 organisations across

the UK, Europe and US. The objective was to determine any changes in attitude in the intervening period. The finding was that the majority (64%) were actively pursuing KM and the report claimed that those companies with a KM strategy were in a better competitive situation than their counterparts in the study which had declined to install KM. The 2000 report (p5) noted the organisations were failing to grasp the significance of cultural and employee considerations in their KM systems. This was highlighted further in the report: "In short, the people and process issues had not been as well addressed as the IT ones." (p19).

The drivers for the KM system were found to be 32% at board level and 41% from senior management. Problems encountered by knowledge system users were categorised and clearly showed that the lack of time to participate and the overload of information were the key factors for the knowledge workers. The major reasons given by management for the failure of the systems to provide the expected benefits were a lack of involvement by the knowledge workers due to communications issues, that were not specified, and the KM system was not integrated into daily work practices.

The report concluded that organisations still had considerable ground to cover in becoming knowledge organisations, that their reported levels of involvement did not stand up to scrutiny, and that HR issues and internal communication lines required further commitment to ensure a holistic approach.

As with the first report by Harris, the main criticism that can be aimed at this report is that once again the management perspective was the focus, reports on employee failures were anecdotal. An approach that involved the actual knowledge workers may have uncovered the reasons why the uptake of the KM systems was slow and fraught with resistance. The report seems to imply that the organisations seek to disguise their issues rather than conduct an in-depth examination of the problems from a worker's perspective.

Sticky Knowledge – Barriers to Knowing in the Firm

Szulanski (2003) conducted research into the question of why knowledge is not transferred, performing 4 case studies in major corporations. The data was then categorised to produce a list of barriers to the transfer process. The impact of management styles on the transfer process was a noted issue, and the unit of study was transfers that required the coordination of many participants, omitting the data from individual transfers. The rationale for this decision was not clarified, and the impact of differentiating the transfer participant involvement level may render the study inappropriate for comparison with this study. However, the study itself involves barriers to KM and therefore must be reviewed for possible correlations.

The predictors of stickiness (barriers) were rated against 4 defined stages of the transfer process, with the highest overall rating given to Causal Ambiguity (p53). The predictors were classified relative to the source and the recipient with much emphasis on the motivation levels and the ability of the recipient to incorporate the knowledge. The main focus appears to be on the inter-relationships between management and knowledge workers, and the owners and receivers of knowledge.

An interesting outcome of the study was that the second highest rating was given to the fact that knowledge was unproven, that is the recipients were unlikely to accept the knowledge unless it was already proven. The subjectivity of this value placed on the knowledge brings the focus back once again to personal relationships as being the main inhibitor or enabler of the sharing of knowledge.

In a formal KMS the knowledge is often regarded as proven if it exists within the system as the recipient then has tangible evidence of the knowledge. Formal systems in large corporations contain such wealth of knowledge that the users are often unable to determine the value beyond the critique of fellow knowledge workers. The relationship

issues uncovered by Szulanski exist more in the upper management levels of corporations and in smaller enterprises where knowledge transfer is more personal.

Shared Language

A common language among knowledge management writers was not apparent during the research of the literature. Alexander, Schallert and Hare (1991) have addressed this issue from the perspective of education however a "business specific" set of definitions appears to be lacking. A common language would have resolved the problems encountered in the pilot study where knowledge, intelligence and data warehousing were being used interchangeably by some interviewees. Ironically the strength of such an approach to this study may be the conflicting perceptions and multiple perspectives of the interviewees that assists in revealing the conceptual confusion within such an emerging concept.

Barriers to Usage

The barriers identified in the pilot study and the KPMG research reports were the focus for further literature searches. The main issues to be covered are: time restraints; tools and training in their usage; reward systems; maintaining context; management ownership; and the relevance of failures as part of the organisational knowledge base.

Time Available to Use the System

Little of the available literature has focused on identifying the barriers encountered in implementing and running a repository. However, some barriers were identified in different sources. A survey on knowledge management implementations conducted by the Cranfield School of Management in 1997 (KPMG 1998, p16)

suggested that the barriers to knowledge systems are personal and cultural. However, the findings of the Harris study (KPMG) were that the main barrier (49%) was in finding the time to participate. It is perhaps reasonable to be cautious of the outcomes of the Harris study on the basis that the statistics indicate that most of the organisations studied were in the planning stage, actual implementation had not taken place, therefore the barriers were based on expectations. Time would indeed be expected to impinge on knowledge sharing efforts while the system is not yet fully implemented and the users are still coming to terms with the encouragement to dump their collective knowledge. Time constraints could only be considered as a barrier in a fully operable system where the participants are comfortable with, and have explored, the system. At that point time constraints would be due to reasons other than lack of system familiarity.

KM Tools and Appropriate Training

Knowledge generation without sharing is of no value to an organisation. This is both an issue of organisational culture, organisational learning and system integration. A knowledge base or system will act as a repository and dissemination centre for the knowledge however the contents need to be extracted, interpreted and applied (Ruggles, 1997, p6). Tools are required to organise, or map the knowledge for rapid retrieval of relevant information and effective use of knowledge tools requires training.

Ernst and Young (1999) are at the forefront of knowledge management research in the business world and creators of some of today's powerful tools. They see the knowledge tools as assisting them to "do what we have always done...at a bigger scale". This is contrary to the views of some of their tool users who see themselves as doing it differently, smarter. Hewlett-Packard (HP) (Davenport, 1999) questions the relevance of the old information management techniques to knowledge management.

A lack of understanding of the chosen tool can inhibit utilisation. Suma (1999) identifies poor response times and lack of training as the chief reasons why participants

fail to fully adopt the knowledge management move. Poor response times are usually an indicator that the system designer has chosen the wrong tools for the situation and while they are in themselves a barrier to usage, the problem can be designed out of the system.

Lack of training is also an understandable barrier given the recent development of the tools and therefore the small pool of resources to conduct training. Training that is focussed on tool usage without covering the limitations such as expected response times was an issue uncovered during the pilot study. Users were complaining of poor response times however a review of the actual response times revealed the delay for a search was usually as short as 2 to 5 seconds. An understanding of the technology would assist in eliminating inappropriate expectations.

Reward Systems/Incentives

Incentives were an issue raised by some writers that did not register a response in the pilot study. Davenport (1999) from HP noted organisation (structure) and culture as not only the barriers but also the facilitators of knowledge sharing. Incentives were given to participants in a knowledge system but the system facilitator suspects that without the incentives the usage would drop. Intra-unit sharing was common but inter-unit sharing was not within the culture, due in part to lay-offs. Nonetheless HP remains committed to the advancement of knowledge management.

Garvin (1993, p59) repeatedly refers to the need for an incentive system that rewards risk-taking to ensure successful implementation of a knowledge system. An alternate view is that of Nonaka and Takeuchi (1995) who perceive knowledge transfer as a process that requires management by promotion of behaviours that induce sharing. This would require a paradigm shift, not only for the managers but also for the employees. Their view highlights the complex and critical relationship between changing organisational cultures, structures and systems. Garvin (1993, p52) perceives universities and consulting firms in particular as failing to make the paradigm shift to the

extent required for KM to move an organisation to the Learning Organisation stage. Integrating KM systems without similar cultural change may result in limited benefits. From this perspective the essence of Garvin's argument is that KM systems should be the result of organisational structural and culture change rather than a tool to drive such change.

The Ernst and Young model of incentives for knowledge sharing was discussed by Hansen, Nohria and Tierney (2000) as an option for organisations using the codification model of knowledge management. The annual performance review, based on contributions to the KMS, relies heavily on accurate recording of contributions and the identification of re-use of knowledge which can be open to manipulation by the knowledge workers.

Keeping the Context/Integrity

Some writers look to the relationships between participants for the barriers to sharing or to value in the knowledge shared. Ruggles (1997, p9) states that there are three main barriers to knowledge sharing which are the temporal, spatial and social distances between the participants. In other words, that knowledge on a repository is of greater value when captured quickly, then retrieved by a person close in organisational structure and global situation to the originator. This would imply that an international company with a varied skill base would have difficulty sharing knowledge, that it would lose context and shared meaning between sites. These circumstances can be very limiting however there are knowledge management tools available to reduce the effects of these perceived barriers. For example *Knowledge Insight* is a search engine that is concept, rather than word, driven. An Intelligent Agent builds a profile of the user which is then used to search for the specific requirement within the context of the user's profile. Dynamic glossaries are another excellent example of handling the difficulties of terminology barriers.

The Relevance of Failure

Tracking the lessons learned in an organisation is one of the KM issues raised by Senge (1999, p418) as the “challenge of diffusion” in which he notes the difficulties in recording the lessons and in utilising the material gathered. The personal and emotional issues between team members were identified as possible causes, including distrust, isolation, and competitiveness.

The question of what is appropriate for inclusion in a knowledge base was an interesting issue raised by informants in the pilot study. Reference was made to the value of sharing failure as well as success. Garvin (1993, p63) refers to the importance of including failures in a knowledge system for a production site and the input from the informants in the pilot study indicate that the issue is significant to business in general. Argyris (1991) argues that successful people do not acknowledge their failures because they externalise the problems and therefore never learn from the mistakes.

Internet Contributions

While reviewing the available literature the most common of all knowledge systems, the Internet, was examined. One message board contained an invitation (Jones, 1998) to comment on why the knowledge systems respondents had access to were not successful. The replies covered incompatible cultures; trust; lack of rewards for sharing while rewarding for individual performance; inconvenience; and technological problems (response time, user interface, accessibility). These responses were interesting however the motivation of the respondents, and the credibility of their evidence cannot be weighted or valued.

Professor Emeritus T.D. Wilson from Sheffield University (2002) posted a 39 page report on his critique of KM including journal literature, web sites, and the unit contents of KM based units in business schools. Wilson concluded that KM “rests on two foundations: the management of information and the effective management of

work practices.”. He believes the culture required for effective KM is utopian and unattainable as businesses will shed human resources whenever market conditions are unfavourable. Wilson then went on to question the incentive to share knowledge when maintaining or improving your job prospects are dependent on your knowledge. The report suggested that a move away from the Harvard based business model of culture was required, a move to a culture that demonstrated understanding of human motivation was more appropriate.

During the analysis of web sites targeting the KM field, the report raises the issue that the major consultancy companies are the main propagators of KM papers and their position is not objective (p18) due to their business connections with the various hardware companies. An analysis of the business practices of the consultancies suggested the consultancies themselves were not utilising KM to the level they were recommending the business world should.

Wilson’s (2004) research demonstrates that although he is an IT academic his interest has been the human side of the IT interface, mainly information overload and knowledge seeking behaviours. His analysis of the web based KM literature demonstrates that many web sites have simply re-titled old pages as KM (p23-24) papers when their subject matter was originally information management, perpetuating the belief that KM is about IT.

Sveiby’s (2004, p2) web site also reinforces a focus on the people management side of KM, describing a knowledge focussed strategy as:

Managers implementing knowledge focused strategies tend to invest in people, training, trust, management education and to make the office environment more attractive and conducive to communication. Because the primary focus is on creating better environment for people the effect will be improved creativity, innovation, knowledge creation. This is to seek effectiveness.

The web as a knowledge resource is vast, permitting access to a range of products such as papers, electronic copies of journals, and web sites of leading identities in the knowledge management movement. The value of contributions on the web other than those of academic web sites can be questioned with regards to the motivation for the material, and the unidentifiable networks of organisations behind, and influencing, various commercial sites.

As part of the literature review the researcher made many attempts over a 6 month period to contact any individual from the Sveiby site, via email and phone. All attempts failed to elicit either an acknowledgement or a meaningful response. The global reach of the web masks the distance with which corporations and individuals can isolate themselves from readers, and from the responsibility that usually accompanies published documents. There is an irony in the inability of such knowledge management sources to fully inform this study.

Literature Review Conclusion

The literature regarding Knowledge Management fails to reach consensus in many areas such as definition of terms used, and causative factors in KM failure. The review has covered the literature that pertains to the context of this study, which is KM barriers in the business environment. The barriers identified in the literature do not cover the breadth of response received in the pilot study, and often do not fully identify the source, such as a survey. The survey's and studies conducted appear to have been quantitative in approach and therefore may not have elicited the full range of responses from knowledge workers.

Focus in the literature was on the problems of inducing people to share information and the paradigm shift required for both management and knowledge workers for this to happen. Tools were discussed lightly, but not from a user's perspective. Wilson's (2002, p12) analysis of the available literature in journals found

that the majority of papers are contained in special issues, suggesting the topic has yet to reach maturity and become mainstream.

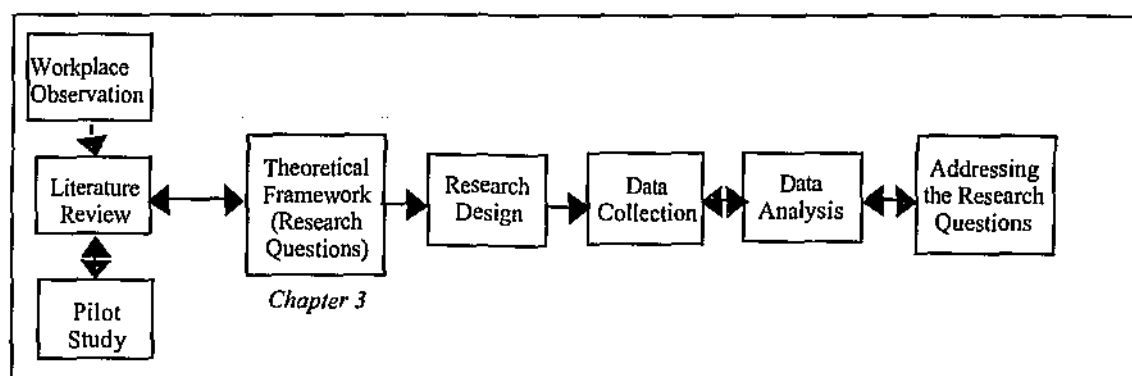
To date literature on the subject of knowledge management systems has been lacking in focus on the underlying reasons for failure in terms of poor participation in the systems. Focus has been from a management perspective rather than a user's perspective. There are references to possible reasons for failure but they are at times contrary and lack supporting evidence from formal studies. The barriers need to be identified in order to remove them or at least mitigate the outcomes. The literature lacks a qualitative study with a focus on users to illuminate participation barriers to KM system use. It is evident from the previous research that this emphasis upon the cultural interface has been lacking in most hands off system focussed studies.

To follow:

Chapter Three will now address the Theoretical Framework underlying this study, including the basic assumptions that were made prior to the study, the conceptual framework and the key research questions that arose during the process of devising the framework. The subsidiary research questions that arose, and could not be ignored, will also be covered then the relationship of the questions to the research activity will be examined. Chapter Three should satisfy the reader that the study is based on solid grounds, and that the researcher has continually questioned the relationships and relevance of the study.

CHAPTER THREE

THEORETICAL FRAMEWORK



Introduction

This chapter will cover the background to the research design, starting with basic assumptions underlying the design, then describe the conceptual framework and the relationship between the issues being addressed, finally stating the key research questions and subsidiary research questions this study attempts to address. Chapter Three is concerned with background to the framework that was used to generate the research questions at the heart of this study. The next section will examine the basic assumptions underlying this framework.

Basic Assumptions

Building the theoretical framework for research involves making assumptions about aspects of the study, including the participants and the subject under observation. These assumptions can influence the process and outcome therefore the identification of the researcher's assumption prior to design of the process is required. This section will

attempt to uncover the underlying assumptions of the research framework for this study. The assumptions are summarised below and then explained in further detail.

1. That there are variable patterns of engagement and interest in KMSs
2. That the organisations in Perth are not unrepresentative of knowledge based businesses in general
3. That large organisations require the assistance of technology to manage their knowledge

Patterns of Interest. The initial interest in the subject matter stemmed from the observation that participants in a KMS displayed varying levels of interest in the knowledge available to them through the system. Knowledge that would assist in performance of a person's tasks was sometimes ignored in preference to anecdotal knowledge from project members. It was assumed that this reluctance on the part of some users was not attributable to the culture of the particular company being observed, but due to the nature of the participant's employment scenario. The pilot study company used a mix of employment methods incorporating employees, international visiting employees, contractors and consultants in each work team.

Perth Organisations. The assumption that organisations in Perth were not unrepresentative of similar organisations world-wide stemmed from the fact that the organisations under observation were the Western Australian arms of large multi-national organisations. The people observed were of mixed nationalities, many had experience working overseas for a variety of companies in the resource sector. It was therefore assumed that they provided a sample of traits found in knowledge workers in multi-national organisations.

Use of Technology. It was assumed that any multi-national organisation with large numbers of knowledge workers would have to use information technology to organise and manage the knowledge available to them on a day to day basis. Although

Knowledge Management can occur without the assistance of technology, the size of the organisations observed, and the organisations studied for this research, would have made the effective and efficient sharing of knowledge across international borders difficult, if not impossible, without the assistance of technology.

These assumptions are fundamental to the research process described in this report. They indicate the importance of undertaking research to explore the issues underlying the inconsistencies in the use of a KMS by knowledge workers, and the possibility that outcomes from such a study might have wider application. The next section continues by describing the framework built on the assumptions.

Conceptual Framework

Having discussed the assumptions that underlie the study, this section will examine the framework on which this research is based. A study of current literature subsequent to these initial observations indicated that studies in the area of Knowledge Management are usually conducted from the functional perspective of *management*, in attempts to answer questions raised by management, often concerning business and customer impact. The Harris and Ernst & Young studies are excellent examples of this approach. As the basis of this research was the result of observation of *knowledge workers*, and the exploration of organisational and individual impact, a functional management centred framework was less appropriate. This indicated a framework specific to this study was required, rather than one developed from previous research studies in this area.

A pilot study was conducted to determine what the major issues were for the knowledge workers under observation. Appendix A lists the results of the pilot study in more detail. This section is concerned with the themes that evolved from those results, and were consequently used to create the conceptual framework for this research.

The review of previous studies in the area and the pilot research activity indicated that the critical issues and barriers associated with utilisation of a KMS can be clustered into three categories. The framework for this study is based upon the barriers to knowledge participation which can be categorised into Structural, Cultural and Individual Perceptions.

Structural Structural barriers are those imposed by the hard issues, the structure of the organisation, the procedures in the work-place, the technology, the explicit, tangible barriers. Structural issues can be modified by cultural factors.

Cultural The term cultural barriers covers less tangible more implicit problems and issues that impact on participation. This includes pressures due to multi-national communications, and those pressures brought to bear in the workplace by colleagues and management. Structural elements can impose on cultural issues.

Individual Perceptions The perceptual barriers are more personal, individual, abstract, and can overlap into cultural or structural barriers. For example a perception that management is manipulating the knowledge on the system may cause one employee to experience reluctance to participate while another may feel challenged.

The barriers themselves, and the complex interactions between the barriers, form the basis of the research questions. The apparent relationships between barrier categories is diagrammed in figure 3.1.

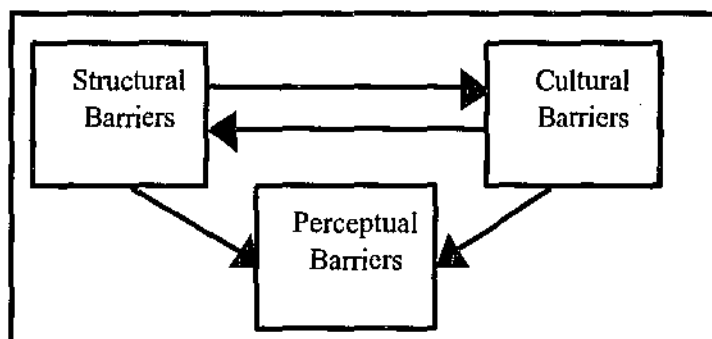


Figure 3.1 Relationships Between Categories

This diagram shows the symbiotic relationship between the structural and cultural issues in the organisation which can inhibit or support the knowledge workers, while the perceptual issues of the knowledge workers can be imposed by structural or cultural issues but do not in themselves affect the structural or cultural issues.

These categories are not mutually exclusive, an element can cross categories. For example “leaving out the negative experiences degrades the whole system” can be perceived as a cultural issue in that the culture dictates the acceptability of including negative experiences but is also perceptual, as what one individual considers a negative experience is not necessarily shared across the organisation. It could also be classified as structural if the basis of the decision lies in the management function, for example a policy of not sharing information that could be damaging if viewed by a competitor. This could in turn become a cultural issue due to the trust and pressure elements introduced by the policy.

An alternate view of the relationships is demonstrated in figure 3.2 Qualities of the Categories, where the three categories central to the conceptual framework are placed in positions of influence. The dimensions of the structural and cultural components are more easily identified and can overlap in some areas, while the perceptual components are less visible, and influenced strongly by both cultural and structural components.

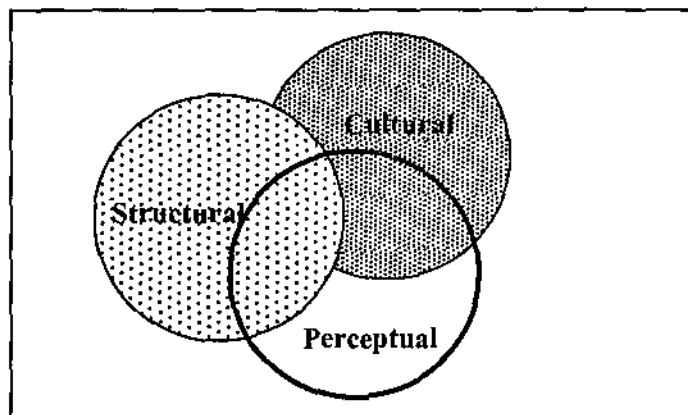


Figure 3.2 Qualities of the Categories.

The aim of the framework is not to produce mutually exclusive lines of inquiry, but to provide three broad thrusts for investigation and analysis that will enable multiple relationships to emerge from the data.

The rationale for this framework is fully explored in Chapter Four, figure 4.2 - Sub Categories from Pilot Study, where the evidence of the pilot activity is explained in greater detail. The next two sections of this chapter will continue this examination of the framework by clearly stating the key and subsidiary questions that will be addressed by the research study.

Key Research Questions

The conceptual framework for this study attempts to map the important issues that affect knowledge workers as KMSs are introduced within organisations. In each of the three conceptual areas of the conceptual framework *Key Questions* emerged for this study from the pilot experiences, and the review of previous studies. Other factors that might also impact on behaviours and provide suggestions for further areas of inquiry were categorised as the *Subsidiary Questions*. This section will examine the key issues that emerged from the framework.

Analysis of the literature review and pilot study, together with observations in offices using knowledge management systems led to the formulation of some questions about the barriers encountered or raised by users of the systems. *The key research questions* centre around the three emerging categories of: Structural, Cultural and Perceptual barriers.

- K1 What forms of **organisational structure** facilitate or inhibit the use of KMSs
- K2 What elements of **organisational culture** facilitate or inhibit the integration of and participation in the KMS(s).

K3 How do **individual perceptions** about the value, use or misuse of knowledge within the organisation impact on usage of KMSs.

Having identified the key questions to be addressed by the research, other interesting issues arose which became the subsidiary questions.

Subsidiary Research Questions

The subsidiary research questions are those that support the key questions or draw out issues that clarify and focus the collected data. The subsidiary research questions to be addressed are:

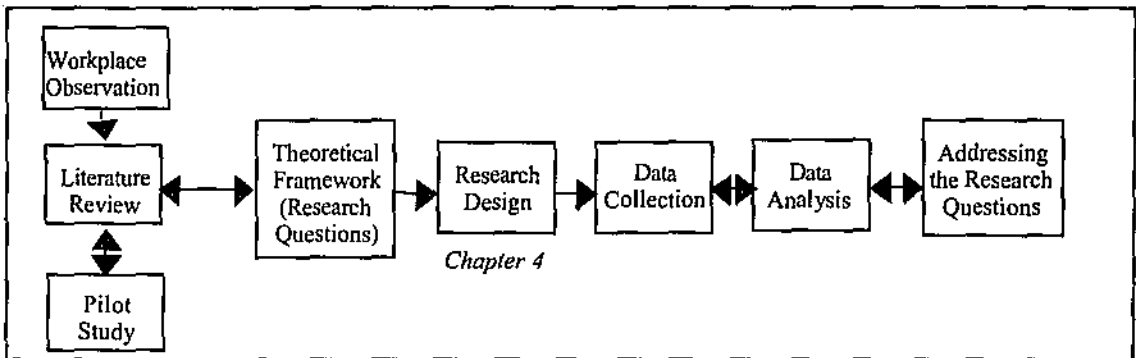
- S1** What other factors can be identified that **support/refute the claims** of current literature.
- S2** What other factors can be identified that offer **new insights into the barriers** to KMS(s)
- S3** What **encourages/discourages participants** at a personal level.

From Design to Implementation

The next chapter, Chapter Four, will relate the design of the research, including the rationale for the approach, the focus of the data, the process employed to analyse the data, ethical standards, resources, and the limitations of the study. Chapter Four should assure the reader that the researcher has carefully considered the most appropriate method of research for this objective, has examined the ethical issues concerned in the study, and has addressed the key issues in designing any academic research project.

CHAPTER FOUR

RESEARCH DESIGN



Introduction

The academic, theoretical and physical aspects of the research design phase of the project are the topics covered by Chapter Four. The chapter will describe the early part of the project when the research methodology was being determined, the reasons underlying the choice of paradigm, the factors that led to the method of data analysis, and the more physical aspects of the project - the allocation of resources, including timing estimates. As the choice of the most appropriate paradigm determined much of the research design, the paradigm issue will be discussed first.

Choosing a Paradigm

The basic choice of paradigm for this study was between qualitative or quantitative research. The choice of paradigm was dependent on factors such as the type

of study required to elicit appropriate data, the purpose of the study itself, and the focus of the data collected by the study. The researcher conducted a trial study, the pilot study outlined in Appendix A, using qualitative data after considering the options and the benefits of open data collection. At the commencement of this study the researcher re-visited the question of paradigm choice and decided to continue with the qualitative approach for reasons which will be detailed in the following sections of this chapter. First the type of investigation will be defined, then the arguments against a quantitative approach will be outlined, the purpose of the study will be examined, then the focus of the data will be discussed. The section will finish with a summary of the decision to use a qualitative approach.

Type of Investigation

The pilot study and the literature review revealed that information about the barriers to effective knowledge management was scant, and what existed was mainly personal theorisation and observation rather than formal study. Therefore, this investigation needed to uncover material that might assist in identifying the major issues involved in effective usage of a KMS. The data captured needed to be broad rather than focussed, and explorative rather than seeking to answer specific questions.

Reasoning Against a Quantitative Approach

The main thrust of a quantitative approach is to measure or quantify specific components of a field of study. The requirements of this study could not include measurement of any phenomena as the field was emergent, there was little categorisation of variables established, and therefore a quantitative approach did not seem appropriate (Hussey & Hussey, 1997, p12). Quantitative research also requires the preparation of questions or codes by which to quantify. As the study of knowledge management systems is relatively new, and the literature review did not identify any previous studies

based on the user's perspective, a quantitative approach may be considered inappropriate as there was little published material on which to base definitive questions. Finally, quantitative research requires a large sample size to improve generalisability (Hussey, p54), however the organisations with mature knowledge management systems in Australia are few in number. A large sample size for this research would not have been possible therefore any attempt to conduct quantitative research would have been heavily flawed.

Choosing Subjectivism

The selection of a subjectivist (insider) approach over an objectivist (outsider) was based on the need to elicit responses from individuals based on their unique perspective of their issues with a KMS. A subjectivist approach allows the researcher the flexibility to elicit issues

Purpose of Study

The purpose of this study is to illuminate the barriers to effective use of a KMS, using exploratory research. The study utilises grounded theory to analyse the data and identify the emerging patterns. The objective of this basic research is to elicit personal barriers to participation on a KMS, from a variety of experienced users of such a system. The intent was to find a simple set of issues that would increase the effectiveness of an organisation's KMS, and to identify the issues an organisation considering a KMS would need to explore. Figure 4.1, Establishing the Dimensions of the Issues, attempts to place the pilot studies emerging categories into perspective with regards to an organisation's ability to identify and address the types of issues that could arise in these categories. This diagram provides a framework for recognising the complexity and assessing the utility of concepts emerging from this study.

The diagram positions the categories within the dimensions to describe their level of tangibility, from tangible to intangible; the ability of an organisation to modify the barriers once identified, from easy to difficult; and the expected time frame for the organisation to identify the barriers, implement a strategy, and then achieve an identifiable change in behaviours of knowledge workers.

The structural barriers would be more tangible and therefore easier to identify and address. The cultural barriers would be less tangible but could be elicited by studying the culture and employing change management techniques to bring behaviours into alignment with the knowledge objectives. However, the perceptual barriers, whose effects may be relatively tangible, can be based in beliefs that are intangible, difficult to identify or elicit, and time consuming to address.

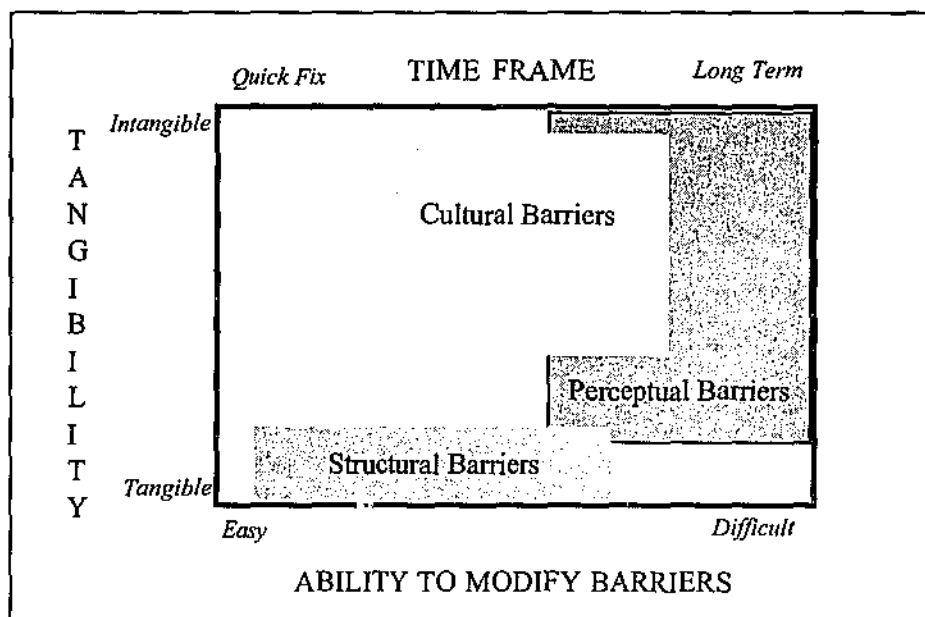


Figure 4.1 Establishing the Dimensions of the Issues

This study therefore explores these categories with the intention of identifying the main specific issues within each category which, if addressed early in the move to a knowledge based business, would assist an organisation to maximise the effectiveness of its KMS. It was therefore important to ensure that the participants in the study were able to freely express their issues in each category. In particular the category of Individual Perceptions could not elicit meaningful data if the researcher were to guide the participant through the issues, the underlying emotions had to be explored.

The study therefore required the in depth and rich investigative approach of a qualitative approach to illuminate the complex inter-relationships of structure, culture and perceptual barriers. This underpinning framework of the study also highlights the need for a semi-structured interview format in order to cover all categories, while allowing the participants to express the issues in a natural progression that mirrors their own experience of knowledge management systems.

Focus of Data

The focus of the data, or the unit of study, employed for this research is twofold. The basic unit, as described by Hussey & Hussey (1997, p 122), is an individual, a knowledge worker with experience of at least 3 years working with a KMS. However, the data was collected from 3 organisations so that issues which could be attributable to the organisations might become apparent during analysis. Therefore the secondary focus of the study was the organisations that utilise KMS technology.

A positivistic study would require more than a small cluster of individuals from three organisations to provide sufficient material for a statistical study, therefore a phenomenological approach was implied by the focus upon three clustered case studies. The design therefore fits the category of a multiple, comparative, embedded case study as described by Yin (1994).

Choosing Qualitative

A contributing factor in the choice of a qualitative approach was the researcher's prior experience with quantitative research. When confronted with a questionnaire requiring a choice from limited array of responses, the intuitive response is often not included and therefore a best-fit choice is made. Best fit choices inhibit the ability of a researcher to identify emerging issues or to elicit meaningful data in an explorative study. In this study gaining participant experiences and meanings was paramount.

Eventually the choice of qualitative over quantitative research was a matter of default due to the restrictions imposed on the study by the lack of previous similar research, by the small sample population, the availability of adequate units for a statistical study, and the need for explorative research to elicit information rather than the generation of codes to quantify a phenomena.

The paradigm chosen for this research was phenomenological¹, a qualitative study using a semi-structured approach to data collection, with a subjectivist approach and a grounded theory base to the analysis. However this research approach was constructed upon and underpinned by the findings of a pilot study

Pilot Study

This section describes the pilot study which provided the initial categories for the framework the research activity is based on. This study will leverage from the insights gained during that pilot study which was conducted prior to commencement of this research process and provided valuable input to the design phase.

The pilot study involved interviews with KMS users from 3 international resource industry companies, across 5 countries. The data collected gave a broad view of

¹ The researcher's subjectivist approach aligns with Burrell and Morgan's (1967, p28-32) Interpretive Paradigm, the Sociology of Regulation (Locke. 2001).

the areas of concern to the users. The main points raised provided prompts for questions in this research. In summary the results of the pilot study indicated the main area of complaint was the structure and management of the repository itself rather than the organisational structure. Appendix A details the pilot study responses by category.

The responses were broken down into 161 individual comments and categorised. When the responses were reviewed it seemed they were fitting into sub-categories that had not been previously identified in the study. The new view (figure 4.2) gave a clearer vision of the issues considered important to the informants. The emerging categories provided a guide of areas to cover in the data collection phase of this research. The emerging categories of structure, culture and individual perceptions are at the heart of this research design, providing the framework for the subsequent protocols.

The most discussed issues were the *repository itself*, (figure 4.2, item 4.2.1) the management of the knowledge system (4.2.2) and issues revolving around training (4.2.4) which included paradigm shifts considered vital to its effective use. The paradigm shifts were placed under the training sub-category due to the opportunity for training sessions to identify the shift the users required and commence the process.

The next most noted comments were about the *value of their contributions* and those of others, followed closely by *time related issues*. Time issues covered response time, time to contribute, and time wasted through problems encountered and quality of contributions. The results clearly indicated that previous thoughts on the barriers to KM may be failing to capture the issues most important to these users. Perhaps the quantitative approaches have driven the research outcomes toward predefined categories rather than an analysis of cultural issues. Suma came closest to the criteria identified in the pilot study by identifying poor response time and lack of training. However the pilot study indicates that the structure of the repository, the tools available and the repository management were the major issues to knowledge workers.

Knowledge Management	Structure	Repository & Tools	4.2.1
		Management of the Repository	4.2.2
		Time (wasted)	4.2.3
	Culture	Training (inc. shift in thinking)	4.2.4
		Peer Pressure	4.2.5
		Improper Use of KM System	4.2.6
	Individual Perceptions	Personal Reactions	4.2.7
		Value of Contributions	4.2.8
		The Audience	4.2.9
		Credit for Contribution	4.2.10

Figure 4.2 Sub Categories from Pilot Study

The results did not fit the common barriers listed in the literature as "causative factors" in the failure of knowledge systems. However, clear themes were identifiable which were followed-up in this study to determine the factors which require addressing by a business in order to fully utilise its knowledge system investment.

Target Population and Sample

The previous sections have justified the conceptual approach of this study and indicated that the focus is upon individuals as units of analysis, clustered within comparable yet distinct organisational cases. This section is concerned with the selection of participants for the research, including the population, the sample size, the criteria for selection of individuals, and the rationale for using a purposive and revelatory sample.

The Target Population

The target population consisted of the workers and management in Western Australian (WA) organisations that had implemented an IT based knowledge management system with mandatory participation by all staff and management. The target population did not include organisations that had recently commenced a knowledge initiative.

The WA organisations were considered to be a bounded population due to their remote location from other cities. An IT based KMS was a critical part of the research requirement as explained in previous chapters. Recent initiatives were discounted due to the lack of experience on the part of the users. It was felt that experienced users would have more to offer the research in the way of insights and reflections.

The Sample

There was no attempt within such a qualitative design to seek a random sample from which broad conclusions might be drawn. The sample was drawn from organisations for the purpose of exploring a range of perceptions on different sites and revealing the diversity that lay within organisational experience. However, to gain such a sample, basic criteria for selection were devised. To be considered for the sample organisations were required to have a minimum of 2 years exposure to a KMS of some description. Finding mature knowledge businesses in WA with users willing to participate was a difficult task for a number of reasons such as

1. organisations with a KMS do not always publicise the fact to their users
2. a KMS can be expensive and open to criticism from stakeholders
3. there is an infrastructure requirement to a KMS that medium size organisations could find prohibitive

Due to issues of confidentiality with organisations discussing the implementation of a knowledge system, the sample was selected by identifying users with a minimum of 2 years exposure to a KMS, and then requesting their participation in the research from their manager. Initially there were 5 organisation approached but the final sample came from 3 of those organisation. The sample was drawn from knowledge workers in a consulting firm in Perth and from two prominent international organisations. The target for interviews within the organisational sample was 12-18 semi-structured interviews, supplemented by observation and record scanning.

Data Analysis

As the study would produce mainly narrative qualitative material and was not based upon predetermined hypotheses, a grounded theory approach was taken to maximise the use of the unique empirical data gathered, after noting the advice of Kendall (1999, p756) that a descriptive approach that is not intend to produce theory can end after the axial coding, without proceeding to selective or theoretical coding.

The data was categorised, according to the emerging themes with the three focal areas of the research. The approach followed the guidelines of Yin (1989) and Strauss and Corbin (1990) who outline the methods for data analysis of qualitative data. The analysis phase commenced with a thematic approach to the three main question areas to build up a general summary picture. The transcripts were then subject to open coding to enable concepts and categories to appear with related grouping of properties and attributes. The third stage of the analysis comprised of an axial coding approach to specific areas of the coded data in order to build up frameworks of relationships. This involved placing responses on continual ranking process and tracing relationships between concepts.

The table, reproduced as Appendix E, generated from the coding process demonstrates the weight of the category issues for each interviewee and each company. The methods utilised for the coding were:

- identification of key phrases from the interviews, generating 714 individual issues/statements
- repetitively hand coding the 714 phrases into categories and subcategories
- using an Excel spreadsheet to sort and count the codes with regard to causal conditions, phenomenon, and context.
- a table to calculate the category issues by interviewee (Appendix E)
- hand mapping to diagram the categories to identify relationships between categories and subcategories

Triangulation was achieved by the use of observation, reference to documentation on the system usage, referral to experienced KM consultants for comment, and follow-up meetings. Patterns of relationships between the critical areas were mapped. The results were then re-examined with reference to the KM literature to determine the *generalisability* of the responses and uncover areas of *contention*.

During the data analysis phase concerns emerged about the underlying assumptions, the issue of identification of usage of a KMS became a major question. The observations of the companies were re-examined for evidence of structural (management) issues and how they impacted on the responses.

Limitations of the Design

The target sample size of 3 companies and 12-18 participants was small however the research was intended to provide insights rather than represent a population. The research focused on organisations which are undergoing unique and leading edge activities. The overall population was therefore both small and difficult to access in reality.

A semi-structured approach to interviewing introduces problems of maintaining focus during the interviews and ensuring all areas are considered. This was addressed by using the instrument described in the subsequent chapter to ensure there was general direction which enabled participants to employ the framework for discussion.

The research was based in West Australia and intended to be relevant to businesses in Perth. As it is a student study for an honours degree there were resource limitations to consider as organisations with an implemented mature KMS are not numerous.

The research does not address the different types of KMSs as the focus was primarily in structural and cultural issues of use and not technical appreciation of the tools and systems.

The study does not focus on knowledge creation, creativity and learning cultures in the broad sense but on KMS as a tool for such developing organisational cultures and as part of organisational change.

The subject of organisational sensitivity was raised in the site selection process. One site agreed to participate in the study then decided it would be prudent to reconsider their situation as they had an exclusivity agreement with a software manufacturer who had not as yet produced a viable KM tool for the market.

A KMS research and development site was selected, permission obtained, and initial discussions conducted. The site was promising from a research aspect as the users had access to leading edge technology and a high level of expertise. However, prior to the first interview, the manager of the KMS requested access to the instrument as a condition to permitting interviews to continue. This would have placed the interviewees in the position of having prior knowledge of the areas of interest and may in turn have impacted on their responses. A decision was made to forgo access to an interesting site to maintain data integrity.

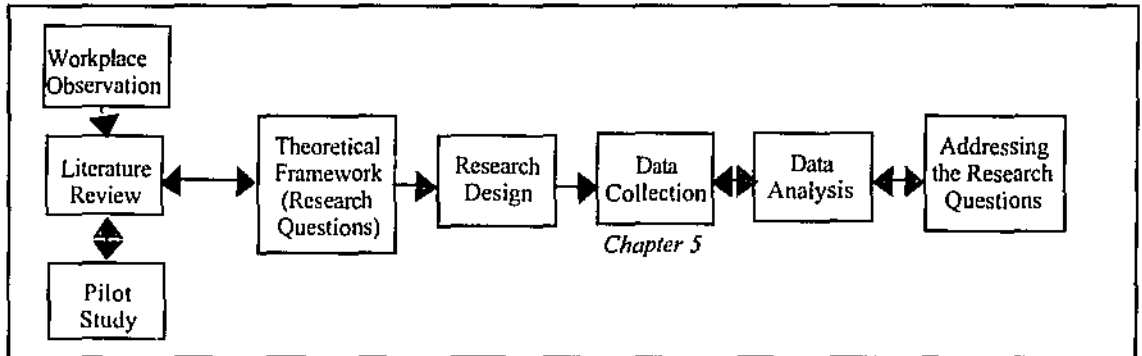
Tentative analysis of data took place during the interview phase. This may have impacted on the subsequent interviews but as the interviewees guided the interviews the impact should be minimal.

Summary

This chapter has indicated why a qualitative approach focussing on clusters of semi-structured interviews is the most appropriate research design for a study that seeks to illuminate user perspectives of the culture, systems and personal relations associated with KM systems. The text has emphasised how the emerging design is grounded upon the framework emerging from a previous pilot study. The rationale for the unit of analysis and the criteria for selecting the target sample has been described. The design forms a multiple embedded case study with clusters of participants at each site. Finally, the design has been reviewed indicating both the potential limitations and how they may be ameliorated. The next chapter will explore how the intent of this design was operationalised. Underpinning this data collection process was a sound ethical platform upon which the instruments and protocols were constructed as the theoretical design met with organisational realities.

CHAPTER FIVE

RESEARCH METHODOLOGY



Introduction

Chapter Five, Research Methodology, describes how the study moved from theory to operation of the design. The practical and ethical issues of actualising the design are reviewed, the various methods of data collection employed described, and the relevance of the research activity to the research questions revisited.

Details of the selection of the companies and participants are followed by the data collection phase, a discussion of the comparability, transferability and dependability and reliability (Trochim, 2002) issues and the resource allocation to the project.

Ethical Standards

This section will cover the ethical issues of operationalising the design of the study, and the ethical issues that arose during the research process. First it will describe

the initial considerations prior to completing the research design, followed by the ethical decisions imposed on the research and ethical issues faced by the researcher in conducting the data collection and analysis phases of the research process.

Ethics in the research process

The ethical design of the study was based on the requirements of the university and the recommendations of the various texts on qualitative research such as Sekeran (1992) Hussey & Hussey (1997), Merriam (1998), Yin (1989), Cresswell (1994), Gay & Diehl (1992), Zigmund (1997), and Strauss & Corbin (1990).

Addressing Zigmund's (1997, 64-75) concerns on ethics in business research first, the participants were engaged in private behaviours in that they would not normally expect to be under observation during their interactions with the KMS. The obligation on the part of the participant to be truthful was not elaborated to the participants. Each participant agreed to take part in the process according to the University protocol, although they were not aware that secondary data collection would involve reviewing records to compare against interviewee beliefs. While this may appear to violate their right to know what information was being collected, the researcher invoked the right to ensure the confirmability of the data collected. The right to privacy was maintained during all phases of the research, with only the supervisor and the researcher having knowledge of the identity of the organisations involved. At no time did any participant indicate any desire to withdraw from the study.

During the pre-interview preamble the participants were informed of the purpose of the study, and the university to which the researcher was aligned (Hussey & Hussey, 1997, pp37-39), and the dignity of the participant was maintained at all times. Merriam (1998, pp217-8) raised the issue of distortion of data during the data collection and analysis phases. This was addressed by ending each interview with the researcher recapping the main points raised by the participant and asking if the researcher appeared

to understand the concerns raised by the interviewee. The protocol for the interviews can be found in Appendix C.

The next section will consider the ethical issues that arose after the design of the research, during the data collection and analysis phases.

Ethical Issues that Arose

While the research design attempted to cover issues of ethical conduct on the part of the researcher and participants prior to commencement of the interview activity, it was not possible to foresee all the issues that would arise during the research process. This section will discuss some incidents and concerns that arose after the design phase, during the data collection and analysis phases.

Primary Data Collection. At the commencement of the data collection phase of the research, the individuals who had indicated they could provide data on their organisation were contacted to establish a schedule of interviews. The first issue that arose was that one of the original 5 organisations had sought advice on its participation in the study and had decided to withdraw due to a conflict of interests. The IT department at their international headquarters had signed an exclusivity contract with a software supplier. The supplier had been unable to provide adequate software to meet the needs of the basic KMS requirements of the organisation, therefore the organisation had purchased a system that was not appropriate to the terms of the contract. The organisation was concerned that the study would enable the supplier to identify an issue that could void the contract and decided to decline to continue.

The second issue that arose early in the data collection phase was also during the scheduling of interviews. Another target organisation was involved in research and design of knowledge systems. During the second contact prior to interviews they requested formal submission of the interview instrument for examination prior to interviewing personnel, as the organisation wanted to avoid discussing issues they felt

were sensitive. The researcher concluded that prior knowledge of the interview instrument would place the organisation's participants in a different position to the other participants. This had the ability to impinge on credibility issues and risk skewing the data therefore the researcher dropped the organisation from the schedule.

The withdrawal of one organisation, and the ineligibility of another, left the research with three organisations on which to base the study, instead of the initial five organisations. Discussions on the advisability of continuing were held with the research supervisor, and the outcome was a decision to continue, as three organisations would be sufficient for a qualitative study.

The Primary Data Collection Phase also uncovered ethical issues raised by the participants. A few participants, from companies A and C, had concerns about how the data would be utilised, both by the researcher and by subsequent readers of the information, and about the possibility of faulty conclusions from the analysis of the data. Company B and C participants expressed concern that the presentation of the data may allow readers to identify the companies involved in the research.

The emotive reactions of 2 participants gave cause for concern about the point at which an interview should be terminated regardless of the participants' preference to continue. One interviewee from company C wept at the relief of discovering that the concerns they had about the KMS were included in the research instrument, demonstrating that the issues were widespread and not specific to that organisation. The researcher suggested they terminate the session at that point as the interview had already produced valuable data but the interviewee felt it was important to continue, in part to release the pent up frustrations. With no previous experience dealing with such issues the researcher complied in the belief that continuation would be therapeutic.

Secondary Data Collection. Later in the research process, during the analysis and secondary data collection phases, the researcher found evidence that suggested one organisation was using the contents of the KMS in a way that was detrimental to the

participants. The participants had discussed their suspicions about the intent of management during the primary collection phase but the evidence to support their suspicions was not discovered until later. The researcher decided that the collection of the data was still valid, as it represented the interviewee's reality, but that doubts about the apparent culture presented by the organisation should be highlighted in the report.

Sampling: Characteristics of Sample Companies

There were few companies in Perth that met the criteria of having a knowledge management system in place for at least 2 years. The companies were selected on the basis that the system in place was a genuine attempt at knowledge management and not a document management system. A total of five companies were originally selected, for reasons already detailed the final group contained 3 companies.

Table 5.1 Summary of Companies

	Company A	Company B	Company C	Company C
			Site 1	Site 2
Directive for KMS	USA	England	England	England and Local
Involvement in implementation	None	None	None	High
Top Mngmnt Leadership	Low	Exclusive	Medium	None
Reward System	Informal, local	None	None	None
Industry Context	Consulting	Resources	Resources	Mining
Interview Timeframe	Jan 2000 to Mar 2002	Feb 2000 to Jun 2000	Mar 2000	May 2000 to Jul 2000

Follow-up Interviews	Feb 2003 to Nov 2003	Unable to contact	Jun 2003 to Aug 2003	Sept 2003
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The companies agreed to allow selection of the interviewees by the researcher and to respect confidentiality of the data. This was a strong issue due to the recent (within 3 years) acquisition of most systems and the companies' internal need for information on the issues surrounding usage of the systems.

Sampling: Selection of Sample Employees

Epistemological Decisions

The anti-positivism approach taken in the research acknowledges the relativity of the views and beliefs of the individuals. The grounds for knowledge were assumed to be experience over a considerable period at the individual level, and a variety of employment levels at the group level. The variety of employment levels should smooth out any irregularities caused by individual loyalty to peers, or by reluctance to expose activities contrary to company policies. The nature of knowledge work reduced the employment levels eligible for the research activity as many clerical positions involving use of a KMS were orientated towards data entry type interactions, and did not provide the range of exposure to the system required for meaningful data. Table 5.2 indicates the role titles of interviewees.

Theoretical Sampling and Natural Groups

The research strategy chosen was Theoretical Sampling which requires the research to actively select theoretically relevant groups (Glaser & Strauss, p58) as the research progresses. The theoretical sampling in this research was modified due to limitations in the population size, and therefore the samples chosen were firmed early in the data collection stage. The natural group that evolved for this research was restricted

to participants with experience on a KMS, which limited the pool of available participants.

Pre-interview meetings were held to ensure the interviewees were users of KMSs with at least 2 years experience. The majority had 4 years experience. Some interviewees had been involved since the inception of the KMS at the company, some had joined at a later stage, some had prior experience with KMSs.

Table 5.2 Role Titles

Company A	Company B	Company B	Company C
	Site 1	Site 2	
1 Chief Knowledge Officer	7 Project Management Officer	10 Special Project Coordinator	12 KM Manager
2 Senior Research Officer	8 IT Contractor	11 Consultant 3 from Company A	13 KM Support Officer
3 Senior IT Consultant	9 Mapping Supervisor		14 Mine Site Supervisor
4 HR Consultant			15 Mine Site Administrator
5 Auditor			
6 Senior Auditor			

The selection of informants was not random due to the need to gather information from people who have experience in the area of knowledge systems, especially the use of a Lotus Notes repository. Informants were selected from knowledge workers who met the criteria of being a user of at least one knowledge system for at least six months. The common factor linking the interviewees was the need to perform at the leading edge of their field. This criteria was selected due to the additional pressures that would bear on their experiences and therefore may yield deeper

insights. Creswell (1994, p148) discusses the need for “purposeful selection of informants” when putting together an in-depth interview based study.

Interviews:

The study consisted of 13 in-depth recorded interviews, collected and transcribed from 4 sites within WA. The interviews were semi-guided to ensure coverage of the three categories and nine sub-categories identified in the pilot study, plus additional prompts to ensure other issues covered in the literature but not the pilot study were also addressed. A major example of this type of inquiry line is the issue of rewards/incentives.

Observations:

Two sites permitted observation of individuals at all levels interacting with each other and the KMS(s). The researcher recorded details on usage, attitudes, and interactions. Particular attention was spent on determining when participants were choosing not to record or reference events/dialogue/information. Clarification of the underlying reasons was sought from participants in follow-up conversations.

One site, C, did not permit observation due to the high security nature of the work involved. At this site the supervisors were interviewed to get another perspective on the usage of the system. System recorded data on usage was viewed but could not be copied or removed from the site.

Another site, B2, was prepared to permit observation but the culture of the site was one of very tight self-control. After a short period (1 hour) of observation the researcher determined that the observations were not reliable due to the influence of co-workers and therefore was terminated. An interview was conducted with a previous colleague of the workers who was able to compare some data and add a new perspective to other data.

At two sites it was possible to study usage statistics from the system. The statistics were gathered on the usage rates of the participants and compared to the data gathered during interviews. Informing the participants of the intention to obtain statistics on usage would defeat the purpose of obtaining the information, therefore permission from participants was not sought.

Relationship of the Research Questions to the Research Activity

This section will examine how the primary research instrument was created from the research questions outlined in Chapter Three. The research instrument was designed by creating prompts from the results of the pilot study conducted prior to this study, categorised to fit the Key Questions. The organisation of the prompts also supports the requirements for the subsidiary questions.

The research questions provided a framework for the semi-structured interviews and the categorisation of the information received. The instrument was divided into 3 basic categories to fit the research questions. Those categories were then broken into main issues raised by the participants in the pilot study. For example the Cultural category started with the Training prompt as that was the issue most important to the pilot participants in that category. The interviews were conducted as open discussions, with prompts were to ensure the participants had covered all areas considered to be of interest to this research.

The instrument was then utilised by the interviewer to provide guidance for ensuring coverage of all areas of possible concern raised by the literature and the pilot study. Figure 5.1 displays a portion of the framework on which the interviews were based. The relationship between the modes of data collection and the research questions was based on the framework developed from the pilot study.

The research framework indicated three areas of interest: structure; culture; and personal perceptions. The research activity gathered data in these three areas through a series of semi-structured interviews using a sample drawn from experienced knowledge workers in three companies in Perth. The data was then examined and categorised according to the framework. The next section will cover the actual data collection process.

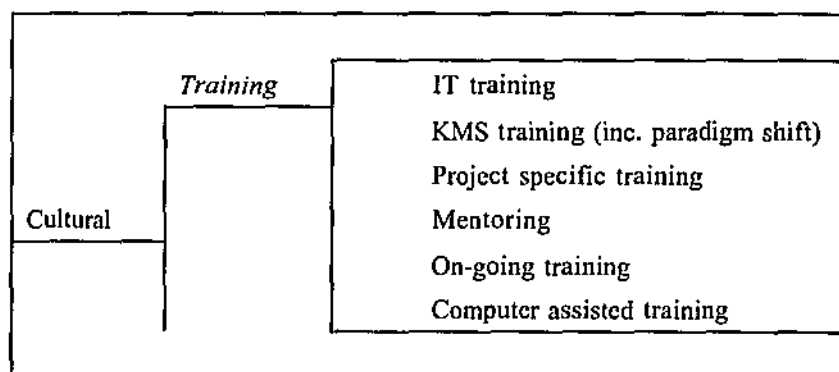


Figure 5.1 Example of Interview Instrument Section

Operationalising the Research Instruments

A quantitative approach via questionnaires may miss vital insights due to the restrictive nature of the answers. As knowledge management is a relatively new field a qualitative investigation was required to uncover barriers that may not have been identified in the literature or the pilot study. Wass and Wells (1994, p242) recommend that questionnaires are unacceptable as an instrument when the existing literature in an area under study is incomplete.

The problem of an apparent lack of a common language was neutralised by avoiding a structured style with definitive questions and answers. A semi-structured interview style provided the flexibility of allowing free expression of ideas and experiences while allowing the interviewer, at the end of the session, to guide towards

areas of interest that are not covered spontaneously. Yin (1989, p18) states that “why” is an ambivalent question in research that requires clarification and therefore qualitative research is appropriate. Walker (1987) justifies the in-depth interview as the best choice for a study in which the topic is complex, with the use of observation as a complimentary tool for this circumstance.

During content analysis the data collected was categorised in the three specific areas identified as being of interest. The data was then reviewed repeatedly to further sub-categorise the responses and identify relationships. Drivers for the respondents use of the repository were also considered, such as: contributing to the KMS; awareness of other activities in the organisation; self-promotion; need to appear to participate, etc.

The research activity focused on three main research instruments:

1. Interviews. The in-depth semi structured interviews were structured with a multiple path network of questions and prompts to both enable the interviewee to guide the discussion, and the interviewer to ensure maximum coverage. See figure 4.2 for an example of a prompt stream.

2. Observation. The observation sessions took place at the office sites used in the study under normal working conditions. Where possible the researcher was a participant observer to avoid influencing work practices (Walker, 1987). The participants were observed using the KMS and interacting with colleagues.

3. Documentary Evidence. Where possible, with the permission of the site manager, the access records for the repository were examined to compare against the beliefs of the participants.

Creswell (1994, p165) discussed the need for ethical considerations in planning and conducting the interviews. Interview protocols were drawn up prior to interviews which addressed the following issues:

- Standardised interview environment

- Pre statement to the interviewee about the project confidentiality
- Definition of Knowledge, KM and KMS to clarify the area under study.

This document (Appendix B) was produced at the commencement of each interview.

All interviews were conducted on a face to face basis. The advantage of this style is interaction between the interviewer and the interviewee, providing flexibility in adaptation of questions, clarification of answers, and the opportunity to observe body language. The face to face style also introduces negative factors, including loss of anonymity, delivery of unintentional visual prompts/bias, etc (Sekaran, 1992, p 197). The possible problems introduced by this method fail to outweigh the immense benefits mentioned for this particular research, therefore face to face was the chosen method.

The interviews were semi-structured, with prompts rather than set questions, covering the areas of structure, culture, and perceptions. Interviewees were encouraged to talk outside of the set areas. Each interview commenced with a question on what the interviewee defines as knowledge and how they identify a knowledge system from other information systems. This established a common point of reference to ensure interviewer and interviewee were focused on the same issue. Differences between the view held and the previously defined view were discussed when necessary. From this point each interview took a path determined by the interviewee.

During the pilot study anecdotal evidence became an issue to be considered. The pilot study was intended to be an exploratory study of individual's responses to the issue therefore a decision was taken after the initial interview to discard responses that were not of the first person. Informants were not warned of the inadmissibility of non-personal evidence to avoid feelings of suppression. The same criteria was applied to this research.

Data Collection Procedure

The project commenced with selection of interviewees in consultation with experts at the sites selected for study. The next step was to visit each of the sites selected for the purpose of interviewing the informants. Some interviews required pre-interview meetings to establish credibility and confirm confidentiality prior to the interview visit. Every interviewee was given a sheet explaining the research in basic terms, to avoid distortion of data, and a background of the researcher. See Appendix C for the full interview protocol utilised in every interview. During each interview a copy of Appendix C was used to provide a data checklist and prompts where necessary. Each interviewee was asked to set aside at least 1 hour for the interview, table 5.2 indicates the actual length of each interview. The interviews were taped with the permission of the interviewees, all interviewees gave permission for taping, however one session was not taped successfully due to operator error. During every interview hand written notes were taken to ensure backup for the tapes. Every set of notes and each tape were marked with a code for the interviewee which identified the company involved and the individual interviewee.

Towards the end of each interview, as the interviewee stated they had expressed all their issues, the researcher went back over the notes, stating the perceived main points of that interview, and seeking confirmation. Often the interviewees wanted to expand on the main points to ensure the researcher understood the issues, and some interviewees realised at this point that there were other issues important to them that had not been discussed during the interview.

Interviews were then transcribed and the data was analysed using a grounded theory approach to identify themes and further categories. The results were then re-examined against the literature and further literature searches conducted. The report

writing commenced during the data collection phase and continued throughout the project.

Follow-up meetings were held with most of the interviewees, however some interviewees were no longer available. The purpose of the follow-up meetings was to determine how their perceptions had changed since the original interviews and to discuss any concerns they had about the project. The new data was included in the study, then the report was completed and submitted. This process commenced in July 1999 and concluded in May 2004.

Reflection on the Data Collection Process

The data collection phase was complex, involving pre-interviews, interviews, post interview follow-up and secondary data collection where possible.

Pre Data Collection

Meetings or telephone discussions were held with interviewees to ensure they met the criteria for selection. Any concerns they had with the study were discussed. Some companies requested feedback on the data collected for the study. This was discussed with interviewees at those sites. It was agreed that the companies would have access to the thesis after completion and acceptance, but would not have access to the raw data or to any material that may allow them to identify comments made by individuals.

Some interviewees were reluctant to have the company identifiable from the interviews, only 2 voiced concern that they did not want to be identifiable by company management.

Data Collection

The data collection occurred over a period of time due to constraints on the researcher's time and the availability of the participants, including those who worked at remote sites and were only available during trips to the head office.

Post Data Collection

Additional data was collected at sites where the researcher was permitted to observe the environment, policies, and practices of the workplace. In some cases the researcher was able to explore the knowledge systems in detail. No confidential material was taken, the integrity of the systems was observed at all times. Some interviewees preferred to demonstrate issues which led to further discussions and in some cases a realisation by the interviewee that the issue did not really exist in the context in which the interviewee believed it did. For example claims that information on use of the system was not freely available were unsupported when compared to the evidence of prominent posters demonstrating in detail the actions the interviewee felt unable to complete.

Content Dependability and Credibility

Dependability of grounded theory research can be affected by changes in the context of the setting (Trochim, 2002). The instrument, which was developed from the conceptual framework as illustrated in Chapter Three, did not change through out the study however the approach did alter in later interviews in response to the reactions in earlier interviews. In particular participants were encouraged to use an interview room rather than their desk due to the level of interference from the workplace environment. Although this resulted in an inability for some participants to demonstrate their issues on the system it was felt necessary to maximise the value of the material gathered.

To ensure creditability of the data collected, each interviewee was asked at the end of the interview to comment on the areas covered by the interview. The instrument was placed on the table for the interviewee to review and they were asked to consider:

- ◆ were all areas of concern covered;
- ◆ were all aspects of topics covered;
- ◆ were any relevant or related issues left undiscussed;
- ◆ did they have any further comments to make.

All interviewees felt that the instrument and the interview covered all issues and some issues they had not considered. Each interviewee took this opportunity to express their area of main concern, with most concerns being related to the management issues, especially the need for management to accept the time cost of Knowledge Management activities when considering performance of the individual.

One interviewee expressed his reaction to the instrument with: "Cool, how did you manage to think up all this stuff" B3.

Resource Allocation

The resource allocation section will describe the actual spread of resources over the duration of the project, with a time line for the major tasks performed on the research. Looking first at the total resources for the project, there was 1 dedicated researcher, working part time, who performed most of the tasks in this study. Other resources included the research supervisor from Edith Cowan University who guided the researcher; the resources of 3 companies in Perth used during the primary and secondary data collection; the library resources used for reviewing the literature, which involved many university libraries and web sites. Table 5.3 presents the main resources and the method of employment during the research project.

Table 5.3 Resource Allocation

Resource	Usage
Researcher – ECU student	The design and implementation of the research project
Supervisor from ECU	Guidance in efficient, effective and ethical research
Libraries – various	Access to material for literature reviews, and research guidance
Internet	Access to material for literature reviews, and research guidance, plus access to international libraries and data sources.
Organisations - 3 in Perth	Use of their facilities to conduct data collection
Interviewees - 14 in total	Provided primary data and assisted in some secondary data collection
Pilot Study	Used to build framework for the research
Technology - PC and recording equipment	A PC for the planning, preparation, and report writing, plus a tape recorder for interviewing

All costs involved in the project were met by the researcher. The proposed resource allocation included the use of professional contractors for the transcription of the interview tapes, however the cost proved prohibitive and the researcher compiled the transcriptions over an extended period.

The time allocated for the duration of the project was extended due to other commitments by the researcher, and by the additional tasks that arose as the project unfolded. Figure 5.2 presents the main tasks of the research in a time line for the period. Many tasks were conducted on a part-time basis when the researcher's work commitments permitted, or when it became possible due to the requirement to perform some tasks prior to planning others.

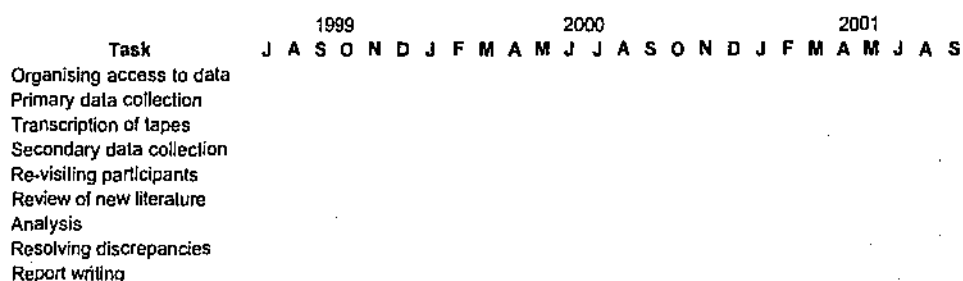


Figure 5.2 Time Line of Research

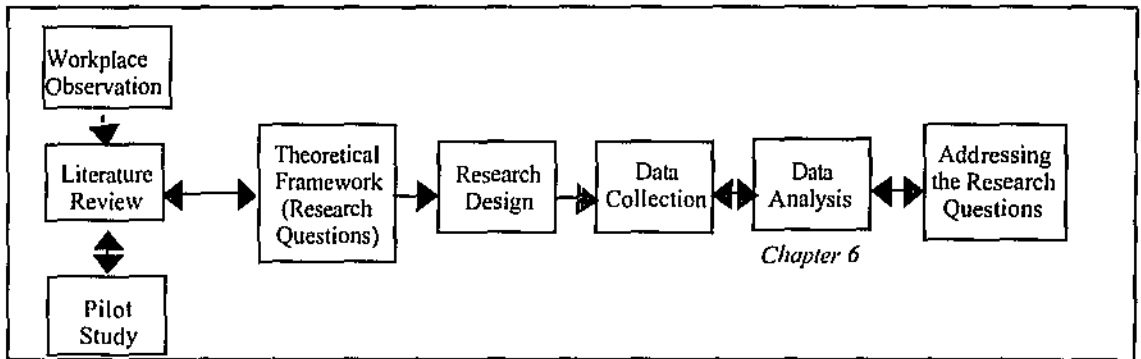
For example in Figure 5.2 the secondary data collection occurred over a period of 17 months, but the total time required to collect the data would have been approximately 6 weeks if it had been possible to dedicate the necessary resources. Secondary data requirements were identified during the primary data collection (Glaser & Strauss, 1967, p47), and in response to the analysis of the primary and secondary data, and therefore took place over much of the project. By comparison the primary data collection was straight forward, requiring the arrangements to be in place and the researcher to prepare for the designated interviews.

Concluding the Data Collection Phase

Analysis of the data was occurring throughout the data collection phase but the major analysis leading to the findings was performed after the data collection was completed. The next chapter, Chapter Six, will describe in detail the process of analysis and the actual findings the research produced from the results of the repetitive and in-depth analysis of the primary and secondary data.

CHAPTER SIX

FINDINGS



Introduction

The process of data analysis required a further breakdown in the standard diagram (above) to ensure the complexities of the process were adequately covered. Figure 6.1 below demonstrates the process expanded to enhance understanding of this chapter layout.

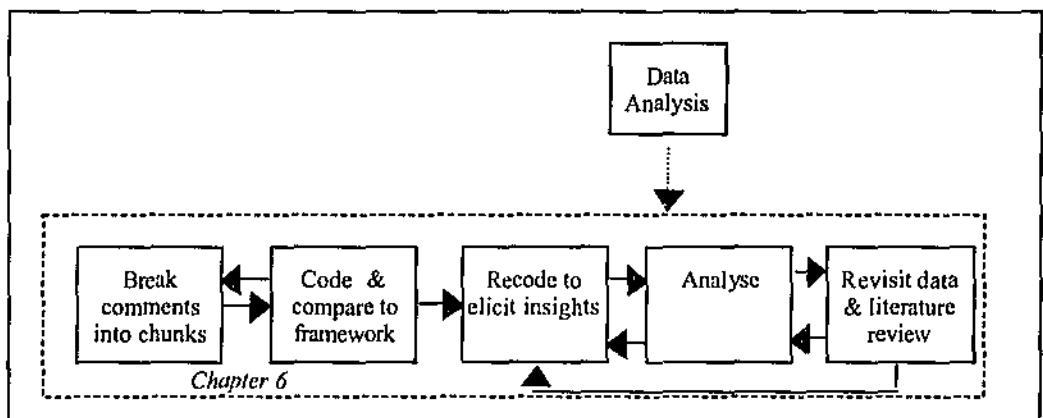


Figure 6.1 The Data Analysis Process

Chapter Six records the findings from the data collection phases described in the Research Methodology. It covers the first part of the Data Analysis Process of figure 6.1, recording the interview material after breakdown into coded items. In this chapter the data collection methods are reiterated, and the process used for data collection is described, with reference to the applicability of each data collection method to each company. The use of data within the data collection process is described and discussed. In the "Interview Findings" section an overview of responses is presented. This leads to the breakdown of interview comments starting with individual definitions of KM followed by the categorised comments. There then follows a comparison of the Pilot Study data with this central research data, and subsequently with other studies.

The findings are laid out in accordance with the instrument questions for clarity. However, the instrument was semi-structured and the interviewees were able to move from topic to topic according to their own ideas of logical progression on the subject matter. That is, the comments from interviewees were not in the order suggested by the appearance of the interview instrument. Therefore, the context of a comment may not be obvious without information from the researcher. Where necessary, information required to bring comments into context has been included.

The Instrument and Process

The instrument used in this research was developed as a result of a pilot study conducted 6 months prior to this research. The full instrument used in this research is included in the appendices. For the purposes of this chapter, a brief outline of the instrument appears in figure 6.2 below. This outline will assist the reader to identify the pattern of the report, and the areas covered by the interview instrument.

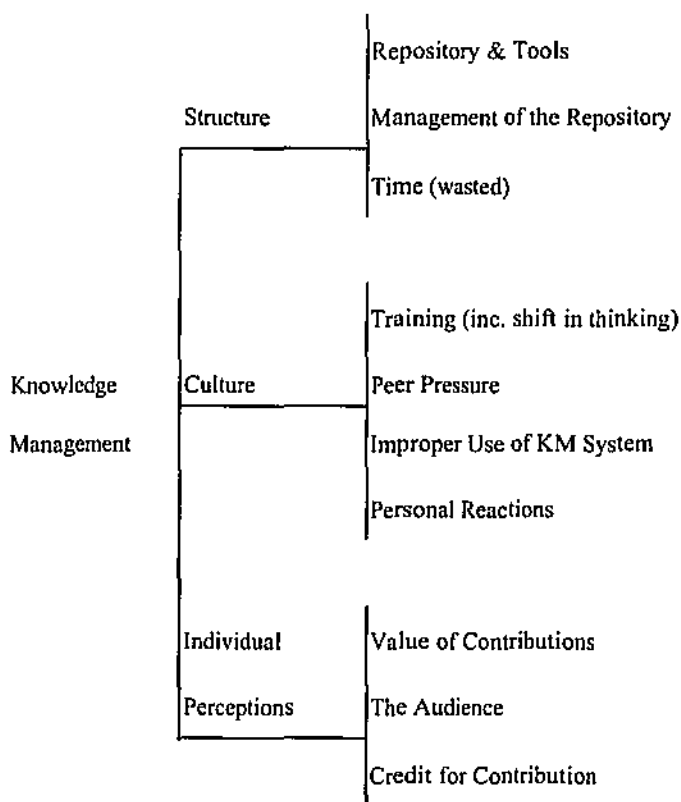


Figure 6.2 Outline of the Instrument

The outline clearly demonstrates 3 major areas of investigation, which relate directly to the research questions. There are 10 sub-categories which are used to elaborate the intent of the research instrument. A further breakdown of the sub-categories into prompts used, when required, during the interviews can be viewed in Appendix B. The prompts are not considered a necessary level of identification as most research issues were discussed by the interviewees without the researcher resorting to the use of prompts.

The data collection process was designed to ensure adequate data was obtained for triangulation purposes. As stated in the methodology section, it was not possible to use all methods of collection at each company, and the weighting of the collection methods changed in light of the amount of detail each company was willing to reveal to

the researcher. Table 6.1 demonstrates the collection process and the degree to which each phase applies to each company.

Table 6.1 Data Collection Method Usage

Data Collection Phases	Company A	Company B	Company C
1.Number of interviews	6	4	4
2. Direct Observations	High	Medium	Medium
3. Examination of the KMS contents	High	Medium	None
4. Discussions with various others	Medium	High	Low
5. Follow-up conversations with interviewees	3	3	1

Company A access was fairly open, permitting in depth examination of the KMS and the company policies and procedures. Company B access was detailed for contents but not for policies and procedures. Company C was very protective of information, there was no access to the system directly, only via an interviewee's demonstration.

Follow-up conversations took place about 6 months after the interviews. Three interviewees had left company A. Company C was going through a systems change that consumed the time of the interviewees, leaving no one available for comment. One interviewee was encountered outside of the workplace and the follow-up conversation was brief.

Triangulation of the Data

This section looks at the outcome of gathering triangulated data to determine the accuracy of the data collected during the various interview, observation and record

scanning phases. Triangulated data came from observation, physical examination of policies, procedures, and repository databases, discussions with other employees, and follow-up discussions with some interviewees. These were not discrete processes but woven together during the data collection process.

During the initial interview process it was noted that some participants contradicted their statements about work practices and about their personal reactions. The issue of the veracity of the claims by interviewees was highlighted during triangulation of the data. In cases where the contributions of the interviewees could be identified there were discrepancies between the records of the Knowledge Management administration module and the answers of some interviewees. For example one junior manager claimed to contribute regularly but there was no evidence of the manager ever making a direct contribution. When pressed for a description of the submission process, during the follow-up conversation, the interviewee admitted knowing the theory but not participating in the submission process, while being a heavy re-cycler of knowledge. He claimed a combination of lack of time, and concern about the value of his own material however the junior manager had conducted regular sessions among staff to promote the need to submit everything that could possibly be of use to other knowledge workers in the organisation.

There were a number of incidents where an interviewee was discussing a facility lacking in the particular company or Knowledge Management System, but the apparent missing facility was located during searches. One example is the lack of a guideline for submitting items to the KMS in company A. The notice board for the floor the interviewee worked on had a poster outlining the process and detailing where to go for in-depth information. The poster was also on every door on the floor, in each amenity block, and delivered to every employee's mail tray. The interviewee's comment on hearing this was that the information was over exposed and therefore ignored. In the Knowledge Management System there was a repository for policies and guidelines,

however the particular item could not be located. A quick questioning of other employees revealed that poor awareness of the existence of the clearly identified poster was widespread. Other facilities that tended to be difficult to locate for employees were: policy statements, glossaries, and white pages. In short, company reference documents were likely to fit this category of invisible aids.

Interview Findings

The details of the interview findings will be preceded by a brief analysis of responses to the instrument categories, and an outline of the interview process with a summary of the necessary variations to the process that occurred in response to issues arising during early interviews. This will be followed by the responses elicited from interviewees to the request to define the term Knowledge Management prior to commencement of the interview. The responses are then analysed by company.

The information collected during the main part of the interviews is then analysed under the categories that formed the interview instrument. This will be followed by the issues that arose during the interviews which were not covered by the instrument.

The most important issues to the interviewees will then be summarised, leading to a conclusion which gives a brief overview of the main issues.

Addressing the Data Collection Instrument

The data collection tool described in Chapter Five, and outlined in Figure 6.2, covered three main response categories: Structure, Culture and Individual Perceptions. Structure was then broken into 3 sub-categories: Repository and Tools; Management of the Repository; and Time. Culture was sub-categorised as: Training; Peer Pressure; Improper Use; and Personal Reactions. Finally the category of Personal Perceptions

was divided into the categories of: Value of Contributions; The Audience; and Credit for Contributions. During the semi-structured interviews the respondents were encouraged to talk about the Knowledge Management issues that affected them while the researcher noted which sub-categories were covered. Towards the end of each interview any sub-categories that had not already been covered were raised and the interviewee prompted to respond.

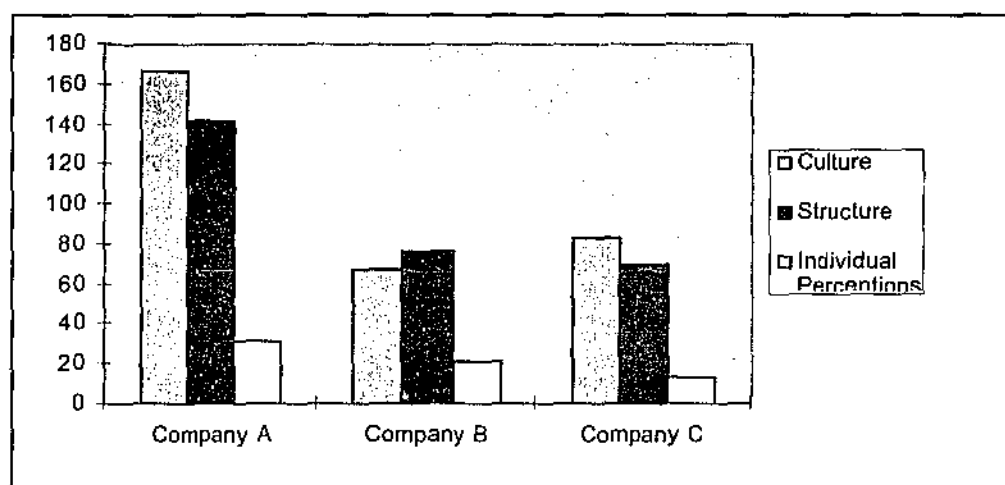


Figure 6.3 Responses per Category per Company

The graph in figure 6.3 illustrates the broad emphasis of the data collection process was on company A, with equal emphasis on companies B and C. The respective number of interviews conducted at the companies were 6, 3 and 4. Of the three main categories, the categories of Culture and Structure accounted for over 80% of the total responses from the interviewees. The next section of this chapter will outline the process used during the primary data collection phase, the interviews.

The Interview Process

The interviews were conducted over an 18 month period, with the initial interviews occurring over a 6 week period in early 2000. The process used was determined in the research design phase, as a method of collecting data with the minimal

interference by the researcher or the process. Each interviewee met the researcher prior to the interview. The interviews were conducted, where possible, in a natural setting in a quiet meeting room with an informal atmosphere. The researcher wore the same suit for all interviews, and conducted each interview in the same manner, as described in Appendix C - Interview Protocol. On two occasions the recording equipment failed, and in two interviews the tape was frequently inaudible due to noises from other sources. Figure 6.3 summarises unavoidable variations in the interviews.

Table 6.3 Summary of Interview Protocol Variations

	A 1	A 2	A 3	A 4	A 5	A 6	B 1	B 2	B 3	C 1	C 2	C 3	C 4
Conducted in Meeting room or Desk	D	D	M	D	M	M	M	M	M	M	M	M	M
Demonstrated Issues (Yes/No)	Y	Y	N	Y	N	N	Y	N	Y	Y	N	Y	N
Taped session (Y/N/Inaudible)	I	Y	Y	Y	I	Y	Y	Y	Y	N	N	Y	Y
Approximate length of interview	1.5 hr	1.5 hr	2 hr	.7 hr	1 hr	1 hr	1.5 hr	1 hr	1 hr	1 hr	1 hr	1.5 hr	2 hr

Setting. Of the 6 interviews in company A, 3 were conducted in a meeting room and the other 3 at interviewee's desks at the request of the interviewees as they preferred to demonstrate their issues. Company B used meeting rooms only as standard procedure. Two interviewees then demonstrated issues and the KMS at their desks after the interviews had completed. All interviews for company C were conducted in meeting rooms due to the security restrictions in place in the company. Two interviews were then followed by demonstration sessions in the interviewee's offices, and monitored

access to relevant documentation. Interviewees C1 and C2 insisted on a group interview. During the interview C2 left to find examples of an issue, C1 would not talk while C2 was absent except as social chit-chat.

Protocol. The full protocol used for the interviews is reproduced as Appendix C and is summarised here. The protocol followed the theme of: introduction; show statement of confidentiality and intent of researcher; elicit interviewee's definition of KM; conduct semi-structured interview; ensure all areas covered; interviewee reviews instrument; interviewer reiterates main issues for confirmation by interviewee; end interview. The protocol was strictly adhered to during the data collection phase to improve reliability, there were no variations from the protocol.

Defining Knowledge Management

At the commencement of each interview session the participants were asked to define Knowledge Management in their own words. The ability of participants to articulate a definition was regarded by the researcher as an indicator of the level of understanding and discussion of the subject of Knowledge Management within the company. All participants from company A were able to respond, 2 from company B responded, and the 4 participants from company C were all unable to define their concept of knowledge management.

Company A Definitions

The interviewees from Company A are immersed in a knowledge management system in their daily work lives. Knowledge management is discussed openly in the workplace and the company employs a team of KM advisors, with a dedicated officer to respond to knowledge requests in each office.

System that allows you to hold information to save it being mistreated, making use of knowledge that was never accessible before. In a big company you can be doing the same work without realising that work

has already been done so you save so much time and money by using knowledge management. A1

It's not perfect, it has a long way to go, don't want it to be called knowledge management, don't want it called something different, it should just be the norm, part of people's everyday work. We are so used to fads, phases, we think it will end so we are turned off to an extent, the labelling by the media and academics turn off the users, it should be seen as a life skill like computers are and the Internet is becoming for a lot of people. A2

Consolidation of organisation's information in one place, information you can act on to avoid mistakes, reduces time required to prepare for a job. A3

Knowledge Management is all about unfettering peoples minds and abilities. We live in a world where people are very protective and moving into a world of sharing is very hard for some people. The guy who heads up Knowledge in (Company A) internationally put it very well when he said that years ago, when a client wanted him to do something, he would put his head out the office door and shout out "Hey has anybody done this before?" and with 85,000 people around the world it is very difficult to do that. The only way you can stick your head out the door is with a knowledge system. It allows you to identify the person who can do that and make contact with that person. A knowledge system is an enabler rather than people keeping things to themselves. A4

Its more a documentation of internal created knowledge basically. A5

Put your knowledge in and others can use it. A6

Company B Definitions

All interviewees were selected for their exposure to knowledge management systems and therefore not necessarily indicative of the general company employee's level of familiarity with the subject. Company B had the most variation in employee awareness of the use of a KMS.

Knowledge Management is a consulting buzzword, been around for a long time without the label. B1

Knowledge Management is corporate memory, knowledge of implicit, explicit, tacit processes - encoding for retrieval, storing, providing users with effective retrieval. Knowledge Management is working and sharing together to facilitate business process. B2

Structure

In this study the category structure was used to define issues relating to organisational and technical structures, including the work structures that define the development of the knowledge systems. There were three sub-categories under structure: Repository and Tools; Management of the Repositories; and Time related issues.

Repository and Tools was the sub-category which generated the *most responses* from interviewees. Individuals felt that the *search software was not adequate*, returning errors in the find process and multiple listings of the same file:

Sometimes you search for a file you know is there but it does not appear on the list of finds and software does not handle really large documents. A1

Items that are there are not found in a search. Search engine needs refining, should only list the first find in a document. Time's wasted by finding duplicates, trash and items that are not applicable. Search engine needs to be able to leverage from other sources. A3

Tool is excellent but you get used to the tool then want more as knowledge of the system increases. There is a lot of cynicism about technology, they realise it is not the revolution they wanted, it is just enhancements. A2

Tools in use are exceptionally good, they give the ability to access a specific database or to use the intranet to search for a keyword or phrase and it will search every single knowledge base so you can be very specific so if you work in a particular area. A4

On the subject of which knowledge should be stored or accessed within the knowledge system the respondents felt that there was *no definitive answer*, the decision should be based on the projects. The interviewees clearly consider this subject to include internal and external sources, that is documents, intranet accessed information, and the internet. Company C had no input to this issue, their system consists of internal knowledge only.

There should be no borders in knowledge, see what the market has to offer which would compliment our internal knowledge. A6

Each application should leverage from the appropriate sources to suit the needs. B1

There is no Internet connection, internal information only B2

When looking at the entire platform (hardware and software) for their knowledge system users were divided, some feeling the problems occurring with the platform were an issue, others feeling grateful they had something to use for knowledge management.

The system often fails to transfer data due to hardware or software problems. C4

Complaints about the stability of the tools, the fact that they do sometimes crash, the software bugs and so on which occasionally arise, those sorts of things. Technology is an issue, we have had problems with things breaking, the server going down then suddenly the repository doesn't work any more, and because you have added layers of software and hardware more things can go wrong. B2

On a few occasions there have been searches for a document you know is there but it can't be found. I know there is a technology hitch there but then that is technology - its better than what we had. A4

Management of Repository. On the issue of who should design the systems the responses indicated that, while IT should be involved, the design should be *specified by an expert* from the project/area that will use the tool. Problems with the current system were identified as being design issues related to the lack of input from a non-IT specialist in the design phase:

Developer needs knowledge of the users, business, opportunities available before the design process; not just getting in and designing but knowing what it will be used for. Business orientation of the knowledge management system fails if an IT person designs without understanding. B1

Never mapped the needs first - just got a system then determined needs, the attitude is now changing. C4

The structure (of the system) needs redesign by a specialist, too many assumptions were made. C3

On the subject of who should manage the knowledge process, IT or people specific to the use of a system, the answers were unanimous. The management should be split between managing the technical aspects (IT) and managing the content and structure of the specific repository. The knowledge manager was expected to be IT aware but first priority was to be a *specialist in the area* of knowledge that was being captured.

The IT people should be responsible for the architecture but not the content. A3

The knowledge management manager needs some IT knowledge but should not be an IT person. A4

Manager of a knowledge system/database needs to be a specialist, not an IT person. A6

Management of knowledge management should be split between IT functions by IT person and information by specialists. B3

Time was the sub-category that explored issues relating to having adequate time to utilise the system, time wasted by getting sidetracked, and time spent on trivia or inappropriate material.

Time can be wasted especially on the internet, trivia not specific to use. B1

Time wasted by finding duplicates, trash and items that are not applicable. A3

Getting timely access to data is difficult, for example you have to put commercial reasons to the manager of database (to get access permission). A5

A lot of time is wasted, need a dedicated resource for searching or time allocated without pressure. A3

Deterrent in fact that knowledge coordinator's time is charged, aware of wasting their time. A2

Time is wasted by inappropriate material. A4

Culture

The culture category explored issues rising from the organisational culture(s) at a local, national, and international level. The issues surrounding meaningful communication with people from different national cultures as well as sub-cultures within the organisation. The category was divided into four sub-categories of: Training; Peer Pressure, Improper Use of the System; and Personal Reactions to the cultural pressures.

Training as a sub-category covered IT training, knowledge systems training, and culture shift training. Most interviewees responded regarding IT training without prompting, however, knowledge culture training required a prompt in most cases. Responses indicated that IT training was assumed to be unnecessary, that the employer expected employees to have a minimum level of IT literacy. Knowledge culture training was not addressed by the companies except on a very superficial level. Employees with a background in team work or Total Quality Management appeared to have a distinct advantage in the move to a knowledge based business.

Training was possibly not adequate, one week training, then up to me. It was another month until I was happy with my level of expertise on the system, No more formal training would have helped, needed time playing around, trial and error and new people need to be trained formally not just left with the system, training should be specific to the person and their needs/area, training gets left behind, importance is placed on developing procedures and policies for knowledge management tools. A2

IT training was really just a presentation of an overview. IT is part of an individual's background so training is not required. A3

IT training is not adequate, having IT skills is an expectation by the employer but IT is constantly changing so there is a need for training. A6

No knowledge management training provided, should be part of the initiation. A3

There is a learning curve in using the system, once through it you can appreciate the tools A6

Need training for specific projects, expected to just work with it and training resources were inadequate, learned more on the job and trainers did not know enough, no documentation, manuals written by IT for IT, eventually we produced our own training material & procedures in-house. C3

Training was not site wide, you struggle alone, not wanting to admit you do not understand the group sessions, need one-on-one training for those who do not benefit from group training. We had to develop our own support system. C4

The prompts for responses to the issue of training specific to the culture shift to a knowledge based business revealed that the *training was almost non-existent*. Some felt that an employee in a knowledge company should already have the skills required.

No training in knowledge culture, which is a problem. Don't need project specific training, catalogs and are indexes sufficient. A4

No knowledge culture training is provided, you just log in and tap into knowledge. A6

Knowledge culture training not required, you just use it. B1

Knowledge culture training, not well understood, system requires sharing to work. B2

Did not require knowledge management training for culture - already a TQM business, continuous improvement and sharing is part of the culture. C1

Extensive courses were run, it was difficult to admit not understanding. The department had professional training, then trained users went from an informal system to highly bureaucratic. C2

Peer Pressure centred on the feelings of pressure imposed on the respondent by the culture of the organisation and in particular by their work colleagues. The responses indicated a pressure to *justify time spent on the KMS*. This pressure was seen to be the cause of a lack of participation by some interviewees. Others felt that the pressure was to have a knowledge or awareness of everything available on the system.

As the KMS content was changing regularly this was not possible and therefore the expectation placed pressure on the individual.

A feeling that people notice when time is spent surfing, feel a need to justify the time. B7

Deterrent in the fact that the knowledge coordinator's time is charged, aware of wasting their time. A2

Not many discussion databases have been successful due to a failure to impart. A5

Peer pressure for me is to know everything about everything which is impossible. A2

There is some pressure to maintain awareness of what is out there but it is not acute. Pressure to participate comes from fear of not keeping abreast. A4

Pressure to maintain an awareness is forced down throat. A3

Some responses related to the pressure to produce a financial benefit for the organisation. While some interviewees felt the *pressure was applied* by management through subtle comments during meetings, others felt that the pressure came from needing to show other employees that they were contributing to the company bottom line.

You feel pressured to make a valuable contribution, it's a \$1m system but there is no show of benefit or gain. C4

You feel pressured for time to be productive from a cost/benefit perspective. A6

Pressure is for billing and charge out times, keeping to a budget. A5

Improper Use of Knowledge Management System covered the topics of using the system to judge colleagues, or as a forum for *sarcasm and complaints*. The first topic addressed is the use of the author details to assess contributions. The responses were varied, and indicated that when no other factors are present, such as time pressures, the author of a contribution is not important in the decision to read.

The subject is more important than the author in searching but results are often read according to who the author is. C1

Contributions are used to judge people you don't know, especially to judge value of outside sources. B3

You make judgments on the person's ability to help by studying their responses in the databases. I judge colleagues from their contributions, skills and abilities, from the discussion databases. A2

The author is irrelevant to the perspective of the topic, when we put something into the database we categorise it, when you are searching you might find something that sounds relevant but it is in the wrong service line (context) and you know it is not valuable. A4

Some interviewees interrogated the system for evidence of management involvement in the sharing process. The repositories displayed the names of the contributors but management often used their subordinates to enter knowledge which results in a false reading of the author list.

Management do not share information as readily as they should, improving but maybe only 70% there. A5

Most interviewees in company A admitted they were aware of sarcasm and bitching on the discussion databases but felt that was what the databases were there for. During triangulation conversations a top manager from headquarters claimed that he used the informal comments to build a profile of potentially troublesome employees. Where

employees attempted to conceal their identity within the system the executive had the administration module interrogated to identify the individuals.

Company B did not have an outlet for informal contributions so there were no issues in this area. Company C admitted they had a serious problem with misuse of the data due to a lack of system security. People were changing details that were legally sensitive and therefore potentially dangerous for the company.

Problems with discussion databases: bitching, people changing comments. C3

The subject of *management manipulation* of the contents of the repositories was not an issue for the interviewees. All but 1 interviewee felt that management had acceptable reasons for filtering data, such as protecting client confidentiality. Filtering of the KMS content was also seen as a management method of changing processes and culture.

There is control on content. A2

I'm aware that management filters information to protect confidentiality but confident that is all. A4

Protection of client information is important. A5

Management should reserve the right to filter to drive process and culture. B1

Management should not have involvement in what is appropriate, no censorship. If management are not happy they should ask the individual to remove the item. B3

Employees felt that discussion databases were for use between themselves, not subject to management perusal and therefore not considered when going through the employee evaluation process. Discussions with managers at Company A revealed that

at least 1 senior executive was taking note of negative comments in the discussion databases and using them to profile individuals.

Individual Perceptions

The category Individual Perceptions covered the nebulous issues, those that could not be compared through the system. There were 3 sub-categories: Value of Contributions; The Audience; and Credit for Contribution.

Value of Contributions explored the individuals concerns about making mistakes, filtering negative knowledge, feeling there was value in their contribution and how contributing affected their credibility within the organisation at a local, national and international level.

I have concerns that my own work is not valuable so I just do it until happy with it. When forced to contribute, you can feel it is of no importance, may never be looked at. B3

Sharing of information is not personal or witnessed and therefore does not lose value. B3

For some participants there was a difference between value in the discussion database and value of work submitted to repositories. The discussion databases hold people's questions, advice, comments, related experiences, it is the informal part of the system. The repositories contain copies of documents and is a formal process with submissions made under guidelines.

When using the discussion databases I get the feeling that no-one cares.
C1

All the time you feel as though no-one cares about your contribution. C3

I feel my own contribution is too trivial, not worth putting forward, but I know it may be important. C3

One participant questioned the ability to judge value over the broad cultural base of a multi-national organisation.

I feel part of a virtual team, my team is around the world, it's difficult to judge if the contributions are at the right level, if they are appreciated, or not. A2

The Audience covered thoughts on the range of readers, the wide distribution of contributions, and the permanent exposure of one's work. The response varied, some feeling wary of the breadth of exposure, others feeling relieved in the anonymity.

I'm wary of making mistakes on the system as it goes all the way to the board in reports. C4

I can cope with sudden exposure to a mature repository but feel intimidated by the number of systems. C1

I don't feel credibility is affected by exposing material. B3

I like having an audience that is unknown. A4

Credit for Contribution was the sub-category that explored feelings on the value of internal knowledge after it is released, and the thought that their work could be recycled without credit being attributed to the original author. This issue resulted in some *heated comments* from the interviewees.

Getting the credit for my own work is not an issue. A4

Juniors are fed the task of making submissions and therefore get the credit for work of others. B3

Some people steal your work and don't reference it. B3

I don't feel credit is given, in the corporate environment praise is slow but negative feedback is rapid. B1

People do not get the recognition they require. A2

Additional Issues

During the literary review the issue of reward systems appeared to be strong. The pilot study did not reveal any participants who felt the reward systems were an issue. This discrepancy was tested by asking participants about reward systems at the conclusion of the semi-formal interview. Company A had *trialled an incentive plan* based on the evidence of contributions.

The company has rewards of \$100 dinner vouchers. A3

Originally the company had an incentive plan for knowledge to emphasise the importance, the incentive itself was not important. Competitions like finding something specific on the intranet first for a dinner for 2. Reward plans can be a bit of fun (competitions) if you have the time, the real rewards are in international recognition and travel. Knowledge is a self-fulfilling experience, the reward is in getting the knowledge. It pays for itself, if you can get one job because the knowledge management system allowed you to get the knowledge faster than your competitor then it has paid for itself. A4

Other participants agreed on the subject of the knowledge being a reward in itself. Verbal recognition of efforts, by peers and superiors, appeared to be important to a number of interviewees.

Not a reward system (as encouragement), verbal recognition is more important. A3

The IT industry is constantly searching for knowledge, you increase skills to remain employable. Recognition by peers of your contribution is the first key reward, the second key reward is recognition by

management. Money, meals, token rewards can work as evidence of recognition. B1

Building a broader skill base. Getting in place and maintaining a performance based reporting system for the end of 1999, will determine pay. KMS in the reward system needs to be weighed with other measures. C3

Some interviewees felt that reward systems do not usually work as it is difficult to accurately assess a person's contribution. The KMS does not always record the author of an item, or the users (recycler's), just the contributor.

I don't like rewards, often the wrong person is rewarded. The personal reward is in using the system. B3

People need recognition for their contributions. a reward system was trialled but unsuccessful. I've never experienced a successful reward system. C3

Most Important Issues

At the end of each interview the interviewee was asked which were the most important (if any) issues to the individual. The responses have been grouped by company.

Company A focussed on *time issues*, being able to find the time for adequate training, for contributing to the KMS. Resources were also identified as being important in the ability of the employees to get timely access to the information they need.

Resources, it's an important part of the job, need resources to help locate information and people. A3

Timeliness is an important issues, for example anything before mid 97 may be irrelevant, it should be archived after 4 years. A4

Time and education are main problems, the cultural issues of motivation within education. There is a lack of internal customer focus, can't see indirect benefit. A5

Time is a factor in training and putting individual knowledge into the system, need time allocated regularly, behaviour needs to be supported by management and culture to be a priority A6

Company B focussed on the need for a *system designed* with an understanding of the specific issues of the users. The cultural shift to a knowledge based business was considered important, acknowledging the advantage of past experiences with team work.

Business orientated knowledge systems fail if an IT person designs without understanding. B1

Paradigm shift is important, trust in the system/structure, feeling of getting value is a mark of early adopter. People without a history of team or close work find this more difficult especially the exposure issues. New people adapt better than old employees. B2

Cultural issues are the critical part, the priority it receives. B3

Company C did *not have a clear focus*. Responses indicated the workers felt unsupported by management in their knowledge endeavours. The system was imposed on them without the necessary resources to comply with the directive to use the system.

It was imposed on the workers, they did not know what they wanted. C1

50% of workers have no access to computers except once a week. C3

Management does not recognise or realise effort involved or resources required. C4

Conclusion

The primary data collection method employed was the semi-structured interview. The results of the interview process were varied between companies and between sub-cultures. There were some issues that were causing concern across all companies, the main issue being a *lack of training* in what a KMS is and how to use it effectively and efficiently. The next most reported issue was the *pressure to utilise* the system while still performing all the other tasks required of them, that is the management *system did not support* the needs of knowledge workers.

While most respondents felt the tools they were using were not up to an acceptable standard, they were grateful to have a knowledge system to work with. Reward systems were not regarded favourably by interviewees, there were concerns about the ability of the system to correctly identify and assign credit for contributions.

The next sections review the relationship between these findings with those of the pilot study and previous research.

Data to Framework Fit

In comparing the data gathered for this study to the results of the pilot study there are clear differences in the feedback received. The main difference is that the pilot study indicated the major concerns were the KMS tools available, the repository management, and training. This study found the major issues to be *time pressures, training, and lack of resources*. Another major difference can be found in the complaints about the difficulty of access to the KMS from the pilot study. This study did not encounter complaints about ease of access, the KMS tools were fairly integrated into the company intranets.

The two studies agreed on the issues of who should manage the systems, the need for training in the concept of knowledge sharing, clarity of purpose for repositories, inadequacies in the search tools, and a lack of interest in reward systems.

The pilot study responses focussed on the knowledge system itself, whereas the comments in this study focussed more on the people issues. This could be attributed to the differences in company size between the pilot group and this research group. The pilot study was conducted among employees and agents of small (within Australia) oil industry companies. This research involved people from companies with a larger presence in Australia and therefore not as tightly knit as company groups.

Following the comparison of the study to the Pilot Study the next question was how did the study compare to studies used in the literature review.

Comparison of Findings with Other Studies

The main studies described in the literature review were the KPMG studies and the Szulanski (2003) research. The KPMG studies both focussed on the management perspective, finding that time to participate was a major factor in lack of motivation, with information overload a high contributor. As time to participate is intangible, and difficult to quantify, this focus appears to place the onus on the knowledge worker, at a perceptual and cultural level. This study coincided strongly with the findings of the 2000 KPMG study in the issue of time pressures, but not in other areas.

The secondary issue of poor communication which is not clarified in the KPMG study could refer to communication between knowledge workers, or could refer to management to workforce communications. There is an apparent projection of blame for failure onto the knowledge workers. This study reverses that finding with identification of lack of training and resources as the secondary issues for knowledge workers, implying that management failed to understand the significance of the KMS to the

workforce. While agreeing that time is a major factor, both management and knowledge workers appear to blame the other for failing to understand the significance of KMSs resulting in an apparent stand-off.

The Szulanski (2003) research highlights the importance of inter-relationships between management and workforce, and the impact of management style on the ability of the knowledge worker to retain knowledge. The current research supports this finding, especially in the secondary data, where the interpersonal issues were more open, although permitting these observations may have been the result of familiarity with the researcher in the later part of the study.

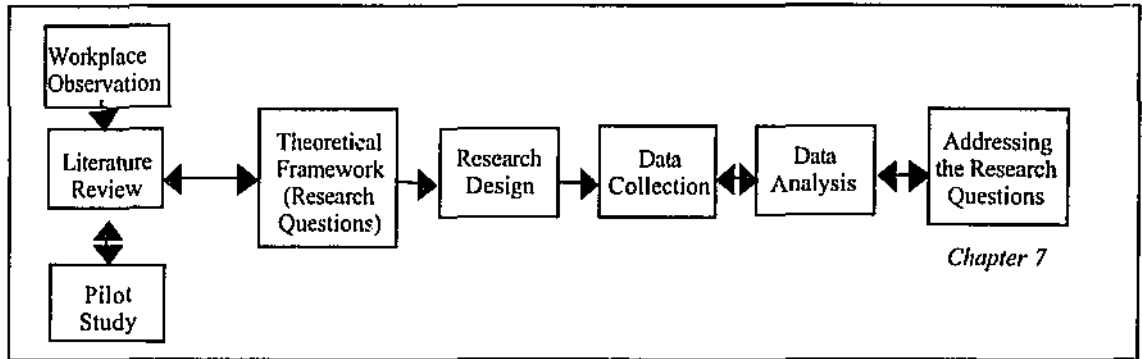
Company C workers displayed a reluctance to co-operate with the KMS at anything other than a minimum level required to retain their positions. There was clear distrust of the management which appeared to be the driver for the lack of interest and an appearance of almost pride in managing to thwart management's intent for the KMS. However, company A, which had a closer relationship between management and knowledge workers, exhibited the greatest degree of co-operation.

Szulanski's (p74) study differs in some areas, chief among them is the importance of a motivation system to encourage the knowledge workers to stop re-inventing the wheel. The participants in this study did not regard the presence of a reward system to be of importance but the cultural differences between Australian and American organisations may explain this value discrepancy.

Having presented and compared the findings from this study, the next chapter will interpret the findings to identify possible answers to the research questions.

CHAPTER SEVEN

INTERPRETATION OF FINDINGS



Introduction

Chapter Seven presents the outcome of the Data Analysis phase of the Research Process, relating to the issues raised in the initial research questions. The data was collected, examined, broken into appropriate chunks, then coded, and recoded, in a cyclic fashion to identify emerging issues that assist in addressing the research questions. This chapter will first focus on the use of a KMS within the companies and then consider the evidence of the study in relation to the research questions defined in Chapter Three – Theoretical Framework.

The findings of the study need to be interpreted in light of the context of the study. The study was conducted using interviewees from 3 companies, operating in the Perth area, which were international concerns with organisational structures that facilitate a global based business. A decision was made, during the Research Design phase, to conduct interviews at organisations with established knowledge management facilities to ensure the data captured was appropriate. The companies had different cultures and structures, with similarities between the KMS's in use. Consequently,

there are some issues that are more pertinent to some companies, and other issues that are common across companies.

In analysing the data, the issue of what constitutes use of a KMS became a tool for determining the issues surrounding the research questions. It was not possible to identify the issues that contribute to ineffective usage of the technology, without first understanding what constitutes effective usage, and how the 3 companies used in the study would rate as effective users. Therefore, the next section of this chapter will analyse the companies as users of a KMS, before going on to address the issues that emerged during the analysis phase of the research process.

Investigating the Use of a KMS

To address the key questions of the study it was necessary to define effective use of a KMS. For this purpose, the definition used is that effective use of a Knowledge Management System can be identified by evidence of the integration and sharing of knowledge across all communication levels of the organisation: Global; National; State; Project; Client.

There were 2 key indicators for assessing the use of a KMS, system based evidence of knowledge being available, and participant based evidence of familiarity with the systems. System based evidence was gathered by looking at the amount of knowledge contributed and its general level of availability, that is the number of employees with access. The participant based evidence was generated from the interviewees' responses which were then compared to system outputs. For example complaints of a lack of procedure documentation were followed by a review of the KMS for evidence of the documents. This section will review the evidence in relation to availability of knowledge for sharing and user's familiarity with the system.

Availability of Knowledge for Sharing

Availability of knowledge across the organisation was assessed by examining the KMS repositories for evidence that knowledge was available (contributed) from participants at the project, state, national and international levels. With companies A and B the researcher had access to listings of repositories, contributions, and dated usage information. Company C was more protective towards its contents, therefore the assessment was made from anecdotal evidence and direct questions put to IT managers of the systems. Table 7.1 is the summary of the assessments made on the companies by the researcher.

Table 7.1 Sharing of Knowledge

	Global	National	State	Project	Client
Company A	Regular	Integrated	Highly Integrated	Highly Integrated	Filtered
Company B	Reports only	Some	Regular	Regular	None
Company C	Reports only	Seldom	Some	Highly Integrated	None

Company A demonstrated the highest degree of knowledge sharing at all levels, in part due to the nature of the company and its claimed position as a leader in KM. There was clear evidence of tight integration of the KMS with daily routines. At the Project level people were highly motivated to share any knowledge that could be useful to a co-worker. Clients were also included in the knowledge loop, with exchanges in both directions. The project knowledge was also regularly accessed by others at the State level, on other projects. When looking at the National level the knowledge exchange was more formal, with participants considering their potential audience prior to submitting,

however the submissions were regular and comprehensive. On an International level there was a notable reluctance to share if it was not necessary. Information available from international branches appeared to be filtered, probably to protect clients. The differences in culture were apparent in the most cursory investigation. The nationality of a submission could often be quickly identified by the use of language (vernacular) and grammar. International submissions required “cleaning up” prior to recycling, for example the use of American English, eg “defense”, rather than Australian English eg “defence”, could be embarrassing if the local user failed to notice.

Company B was assessed on the commonly available KMS for the purpose of table 7.1. The special project within company B would not be an appropriate comparison as the project was an experiment in a specific KMS.

Knowledge was available on a Project level but did not seem as tightly integrated as the systems at company A. There appeared to be a few users on different projects who were high level users, that is they accessed the system and contributed regularly. At the State level the exchange appeared to be happening regularly, perhaps due to the similarities and interactions between projects. At a National level the involvement seemed to occur at a higher managerial level, which may be attributable to the clumping of projects in geographical areas contributing to an employee sense of belonging to an area. Company B did not appear to use the KMS at the Global or International level other than to make knowledge available for decision making, that is for reporting purposes.

Client knowledge exchange was not apparent, however company B has complex relationships with clients who were also competitors, which may have impacted on the willingness to share company owned knowledge. For example, a competitor could use the KMS to identify experts within the company for headhunting purposes.

Company C had a KMS that was highly integrated into project work, with specific employees being responsible for contributions. One system, which was related

to safety at sites, was available to every employee and agent of the company. This system was in regular use, being monitored by stakeholders throughout the company and its associated organisations. This is the only system that could in any way be regarded as sharing with clients. The other systems were so specific to operations that sharing with clients would not have been appropriate, without appropriate filtering of the knowledge.

At a State level some knowledge from each site was available at other sites, but appeared to be of interest to specific participants only. That is, although knowledge was available it did not appear to be accessed except by a few individuals. The National level of sharing was similar, employees felt that knowledge lost context as it moved away from the originating site. Again the safety system was the exception as the safety issues that arose in any site could possibly occur at another. Company C is owned globally by the same group that own company B and the same requirement for knowledge contributions for reporting and decision making at the international headquarters existed.

Summarising Availability of Knowledge across the companies used in the study, all 3 companies exhibited their highest level of sharing within project level activities. This could be attributed to the sense of project ownership of information, and the issues of context driven value of the knowledge. The more remote a user was from the project creating the knowledge, the lower the incidence of sharing became. That is, the trend for the frequency of usage suggested a negative relationship to the distance from the source. Figure 7.1 attempts to represent this situation in a graphical format.

It was determined that for the purpose of this research the 3 companies had demonstrated that knowledge was available for sharing and was being shared, in varying degrees, across all intra-company levels. However, external sharing of knowledge was only demonstrated in 1 company.

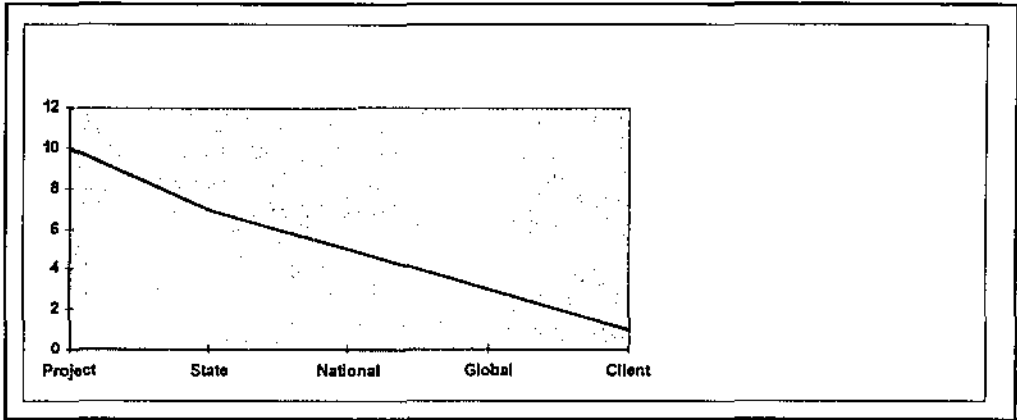


Figure 7.1 Sharing of Knowledge

Familiarity with the KMS

The second key indicator of a successful knowledge practise was determined to be the participants demonstrating firm knowledge of the dimensions of their KMS. The dimensions chosen were Content, Policies, Procedures, and People (users). Table 7.2 is a summary of the assessment of each company according to the knowledge demonstrated by the interviewees representing the company. The assessments were based on the comments during interviews after comparison with hard evidence. For example, one user claimed intimate knowledge of the company policies and procedures regarding knowledge systems but had little knowledge of the content of the KMS, indicating poor usage.

Table 7.2 Knowledge of the KMS

	Content	Policies	Procedures	People
Company A	Fairly High	Very High	Medium	Specialists Identified
Company B	High (on project basis)	None	Poor	High
Company C	High	Some	High	High

Company A had highly visible knowledge policy statements, with reiteration of their knowledge philosophy at staff and client meetings. Policy statements were distributed at induction seminars, ensuring all employees were aware of the status as a Knowledge Based Business, and their personal responsibility to participate in the system. Procedures were also distributed whenever a new procedure was developed or an existing procedure changed. The procedures were available electronically through the KMS, displayed on prominent posters, and distributed on laminated cards to every knowledge worker. Unfortunately the knowledge of the procedures was poor to medium. Staff tended to search for an “expert” whenever they needed to perform a procedural task such as submission to an infrequently used repository. One employee felt over-exposure was the issue. A request to view the cards produced evidence of confusion in most staff approached. The cards were alike in appearance, although they were colour coded. A method of collecting the cards together, for example on a metal ring, was not supplied to individuals. Staff tended to throw the cards into a desk drawer and forget their existence.

Familiarity with the people side of the KMS was limited to identification of the specialists in a given area, usually the local specialists plus the national area manager. More importance was placed on the actual content of the system. Most staff appeared to have a basic idea of what was available and knew how to use that knowledge to quickly find what they required, or to locate a resource. Content of their KMS was in a state of constant change therefore high familiarity would not be possible for a prolonged period. In summary company A was more proficient in theory than practicality.

Company B placed their emphasis on the people side of knowledge. They appeared to be very knowledgeable regarding the skills available through the knowledge workers, even if they had never met the individuals. Content knowledge was high, perhaps because the content was mainly project based and relatively static in focus although details were regularly maintained. It should be noted that content knowledge

was high in individuals with an interest in the area. Some employees had no awareness that the system existed although it was available through their office intranet.

It was in the area of policy and procedures that company B appeared to demonstrate a lack of knowledge. Policies regarding knowledge did not appear to be an issue for the employees, it was implied to be a management concern. The company ran on a fairly informal basis, and although knowledge procedures were in existence there was no evidence of familiarity. It is interesting to note that core operational procedures were tightly adhered to, with copies of procedures readily available. There was an apparent attitude that the knowledge system was there for those people who were really interested but was not mandatory. In summary staff in company B had little involvement in the management and administrative side of a KMS but knew how to get what they needed from the system.

Company C had little knowledge of the company policies regarding knowledge but were expert users, with high knowledge of the people involved, the procedures, and the system content. The company appeared to take an attitude that site staff did not need to understand why they were performing the knowledge contributions, they just needed to know how to contribute and who to address problems to. Site staff were not aware that they were using a knowledge system or what a knowledge system was. The result of this configuration is that staff appeared to feel no commitment to the success of the KMS as it was merely a tool they had to use in performing their tasks. If they did not have this tool they would have another. City staff had a different attitude to the system, however only the IT department in the city office had any involvement in the KMS other than managers monitoring contributions. This assessment was based on the site staff as the IT staff were more implementers and maintainers than knowledge users.

Summarising Familiarity with the KMS of the company's participants, the most notable issue that arose was the great difference between companies in their familiarity with the company policies with regards to knowledge and the KMS. Figure

7.2 graphically illustrates the comparison of the companies, demonstrating the disparity for familiarity of Policies and Procedures, and the similarity in rating for the dimensions of Content and People. The dimensions of content, policies, procedures, and people have been allocated a rating from 0 to 10 for each company for the purpose of this graph.

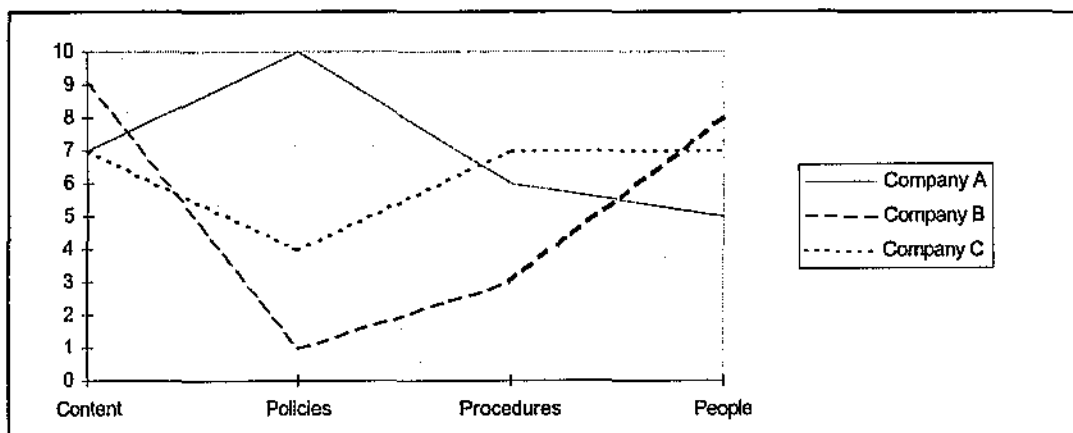


Figure 7.2 Familiarity with the KMS

Basically, the comparison illustrates that only company A users possessed a good understanding of the policies driving their usage of the system, while most users understood the basics of how to use the system, were familiar with “who” the expert users were, and had a good awareness of the range of knowledge available to them. The stronger knowledge culture at company A may account for the difference in dissemination of policies at the company.

Summary of KMS Usage in a Company

After considering the 2 key indicators of usage of an organisation’s KMS the 3 companies used for this study can be considered users of a KMS, with varying degrees of familiarity with the organisational issues driving the usage. Each company had its

strong points and weak points, with no one company being notably ineffective in usage, or notably highly effective users.

Overall, tables 7.1 and 7.2 indicate that company A appeared to share knowledge across a broader base, while company C had a higher degree of knowledge of the system contents and its participants. Company B could be regarded as highly effective as users within the special project, but on a company wide analysis there were weaknesses that detracted from effective usage.

Dutrenit's (2000, p255) study of knowledge transfer within production companies concluded that the differences between formal and informal practices indicated that knowledge remained at the level at which it was generated, that is individual, team or project level, with the organisations studied experiencing limited learning. Companies B and C tend to support this assertion, while Company A presented a more successful scenario.

The next section will focus on the issues, emerging from the analysis phase, that address the research questions of this study. The analysis will then progress to focus on the subsidiary questions, looking at the emerging issues that could indicate areas for further study.

Addressing the Key Questions

The key research questions addressed in this section explore the Structural, Cultural, and Individual Perception issues that facilitate, or inhibit, the use of a KMS within an organisation. This section identifies the emerging issues that were regarded as important by the researcher, while Appendix D - Additional Findings and Analysis contains additional issues that were important to the interviewees, or interesting to the researcher, but did not become classified as important issues in the final analysis.

The section will commence with a description of the structures encountered by the researcher at each organisation. This description is based on first hand observation, studying company documentation (such as policy documents), and discussions with interviewees and other company employees.

Structure of the Companies

The study was restricted to organisations with a technological approach to knowledge management. The structures of these organisations are necessarily focussed on global interactions and communications technology.

Company A had a management participation structure, in that the top management was also involved in day to day operations working in close collaboration with all other levels of employees. The work was external client orientated, teams were fluid, projects were short term. Policies and procedures were well documented and available to all employees. Training was conducted by a national training team with support from external providers for highly specific requirements. There was regular feedback from top management via conference calls and state to state visits. Employees were able to voice concerns directly to top management during the visits. Human resourcing was conducted at a state and national level.

Company B had a formal hierarchy with a multitude of systems in use. The orientation was internal customer focussed, production projects were long term, teams were tightly knit and very long term. The KMS was divided into two main areas of participation. The general system was available to most employees, was very informal, and consisted mainly of emails and project specific discussion databases. The study included staff on a KMS pilot project involving a team of 26 employees who had worked together as a close team for many years. The team was aware of their status as the leaders in the KM drive within the company. Although the project move to a KMS was considered successful in terms of results, it was considered by management to be a

very expensive exercise, and a decision was made to confine the highly sophisticated KMS facilities to the small team in the short term. Only the project leader interacted outside the project. Training was conducted on the job by peers on a needs basis.

Company C had a tight reporting hierarchy. The focus was on the need to provide accurate, highly detailed reports to the stakeholders. The KMS was used to provide insights into operations, and was in broad use as a tool for managing the safety system on sites. Consequently most employees had access, however only 20% had ever logged into the system. There were concerns from all participants about the security of the system as there had been occurrences of manipulation of sensitive data by users. Policies and procedures were available on a “need-to-know” basis. Training was conducted by trained users to large groups, based on their needs.

The Effect of Structure on the KMS

Although the companies had markedly different structures there were similarities. The most obvious was the global nature of the companies, and the impact that had on the decision to move to a KMS. All three companies experienced the imposition of a knowledge management system, on the local organisation, by the international headquarters.

Company A was unable to participate in the choice of system. Policies, guidelines and system structure were dictated to the organisation at a fine level of detail. The national headquarters in Sydney were able to provide minor tailoring of the system for the Australian operations. The West Australian branch had to accept the national system with no further tailoring.

This had the effect of providing employees with a set of protocols they could take anywhere within the organisation, reducing the negative effects of changing location for short periods. An employee from any office can pack up their lap top, travel to an office in another state or country, and with a minimum of reorganisation they can

resume working with access to all the usual databases. The move would be virtually seamless.

The down side to this ease of transfer is that specific projects are adapted to generic systems, which may not be suited to their particular purpose.

Company B was tailoring its general system to be project specific, with the users inputting to the design of the project repositories. Therefore a user moving to a different project would not necessarily understand the specific repository in use but would be familiar with the general system. The KMS project had purchased a generic system that was chosen by management with assistance from the project leader. The system was intended to be tailored to the needs of the project but this became too difficult, time consuming and costly, so a compromise was reached. Training was conducted by the vendors but proved to be unsatisfactory. The users then compiled their own manuals and training was conducted by expert users in a specific need area.

Company C had installed an expensive off-the-shelf product that was reputed to be designed for a similar purpose and would therefore require minimal tailoring. The product was selected by a team from the overseas headquarters based on their beliefs about the local operations. The IT team in Perth conducted a familiarisation program with site staff but did not receive the degree of co-operation they required to ensure acceptance of the new system. When the system was implemented at sites the staff were made aware of the financial investment and the need for a return on the resource. Training was conducted in group sessions. During the research staff commented that they felt uncomfortable admitting they did not understand the training so they did not ask questions or request more training. The result was users mis-using the system in the early days, forging bad habits due to lack of system knowledge, and doing whatever they could to circumvent the new system. The issues have been addressed by the IT staff, however the site staff feel there is a lack of understanding of the problems in the system and its usage, for example security issues. They have a focus on ensuring the system

appears to be viable due to management pressures to produce a payback for the investment.

Key Question K1: What forms of organisational structure facilitate or inhibit the use of a KMS

The 3 forms of company structure encountered during this research resulted in differences in attitude of users, and usage of the system. However all 3 encountered the same major inhibitor which was the organisation imposing the KMS on the users without consultation, and without adequate training in a KMS: tools, culture, and content.

Viewing the organisational structure possibilities as a continuum from very controlled to free moving, the 3 companies have been categorised as demonstrated in Figure 7.3 The Structure Continuum. Company C demonstrated the least flexible structure, while company A had a structure so flexible it could be described as fluid. Company B has been assessed for both the special project (B SP) and normal operations style (B).

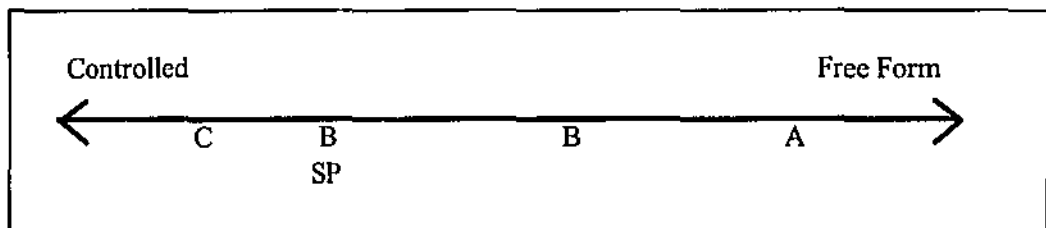


Figure 7.3 The Structure Continuum

The Fluid Structure of company A appears to offer users of a KMS more incentive to share knowledge. This may in part be due to the inability to predict where they may need their knowledge in the future so sharing becomes a form of insurance against personal loss of their knowledge. The close relationship to management allows participants to observe management involvement in the KMS. This relationship also

seems to improve the feedback on issues impacting on the workflow as employees felt they were able to contribute to the building of knowledge. The movement between projects and exposure to various teams appeared to increase user confidence in sharing implicit knowledge and enhanced identification of implicit knowledge that could be valued if it were explicit. The fluid structure results in increased familiarity with other participants in the system, on all levels.

The Project Team Structure of the KMS team in company B resulted in a team of users who were very knowledgeable about content and people but did not have a company orientation towards their knowledge building. All contributions were based on the current needs of the project staff and their internal clients. Loss of personnel would result in loss of implicit knowledge as the value of eliciting implicit knowledge had not been instilled in the individuals. While this structure promotes effective use of the KMS for each project, it fails to produce an effective KMS from a company wide viewpoint.

The Hierarchical Structure of company C ensured the staff were aware of what was expected of them, who they had to report to, what resources were available, but not aware of how to interact with the KMS in a manner effective for the individuals. Among the interviewees there was no awareness of the value of the individual's implicit knowledge. Management would not have an awareness of the depth of knowledge available from their human resources. The KMS was mainly formal knowledge captured for the company to use. This form of structure was effective from a company wide perspective with a short-term outlook, but not effective for the individuals, or for a long-term perspective.

The structures of the 3 organisations, and their respective issues with the implementation of the move to a Knowledge Based Business (KBB) reflect Marquardt and Kearsley's (1999, p19) statement of the need to move from autocratic management

to a participative style of leadership for the technology to enable an organisation to “stretch” and tap the workers as resources.

Culture of the Companies

The research design did not address culture when selecting the companies for the study due to the small number of companies in Perth using a KMS. Consequently the companies all have difference structures and cultures, with company C having a very distinct sub-culture at sites. The cultural differences were not readily quantifiable. This section will attempt to describe the cultures encountered during the research, to enable the reader to put the analysis into context.

Company A was a major organisation in the Service industry, providing consultancy services to public and private organisations, for long or short term appointments, to assist in the business improvement process. Consequently, the culture was one of customer focus and continuous improvement, requiring employees to maintain a high level of awareness of national, industry wide, and organisation specific issues while maintaining a perceived position of being at the forefront of emerging trends. There was pressure for the employees to understand their client’s cultures, and incorporate aspects of those cultures when working at a client site, while maintaining the values of the company itself.

The company attempted to ensure the culture was fairly consistent across state and national boundaries as part of their globalisation vision. This appeared to be achieved to a reasonable degree, while tolerance of the unavoidable cultural differences was very evident among staff members. For example, staff modified language in emails to avoid issues of alternate meanings for words. International glossaries and dictionaries were kept on an informal basis, and made available through the KMS.

Company B was a resource company with various sub-cultures due to remote site locations isolating staff from head office and from other projects. There was a TQM

process in place but individual projects appeared to adhere to the requirement with varying success. The cultures were very team orientated first, with company identity taking second place. The staff employed company specific jargon that isolated "outsiders" until they had been exposed to a number of different projects. For example when a consultant was given instructions on how to reach a destination upon arrival at a remote airfield the details were only understandable to people with prior exposure.

There was an apparent attitude that knowledge was for sharing with select recipients rather than displayed for all participants. Knowledge was associated with personal power and position.

Company C also had a distinct sub-culture separating staff by their physical location. The culture within the head office in Perth appeared to be one of people orientation, a customer focus, with a TQM basis. Attitudes towards the KMS were of excitement at involvement in the sharing process, that the staff were able to contribute and make a difference to the organisation.

The interviewees from the remote site were very different in their attitude to the management at head office, and to all staff who were not involved in site work. There was a belief that they were misunderstood by management, that their work was being monitored in a big brother fashion and they were being left out of the decision making process. Participation in the KMS was more a matter of compliance with strict requirements. Knowledge was submitted from a fear basis, with anything negative being either withheld or used as a weapon.

On the surface, it appeared that the culture at the site was driven by paranoia, based on shared beliefs and values rather than on facts. However, during the secondary data gathering, the researcher was inadvertently exposed to documents that clearly demonstrated the partial validity of the site staff fears about management techniques.

The result was that the researcher was uncertain of the validity of cultural observations at company C, especially the head office culture. It is accepted that head office staff may have presented the culture they wanted represented in the report.

Key Question K2: What elements of organisational culture facilitate or inhibit the integration of, and participation in, Knowledge Management.

The cultures encountered during the research raised issues surrounding the value of participation in the KMS. Although companies A and C demonstrated a high degree of integration and participation in their respective KMSs, the actual quality and quantity of the submissions differ in apparent response to the cultural forces within each company and site. Table 7.3 - Culture Based Issues provides a summary of the main differences that could be attributed to cultural factors.

Although the summary in table 7.3 seems to indicate that the extremes of variance produce the most acceptance of the KMS, the results are not conclusive and may not be indicative. The cultural variance between companies was high and many factors may contribute to the individual acceptance levels. Although company C exhibited a tight compliance to the KMS requirements that was not evidenced in the other companies, the compliance was based on fear of identification of non-compliance, rather than intelligent interaction.

Table 7.3 Culture Based Issues

Cultural Factors	Company A	Company B	Company C
Cultural variance across sites	Slight	By project	Marked
Basis of KMS submissions	Insurance	Personal	Fear
Acceptance of the KMS	Assumed	If benefit demonstrated	Compliance in operations
Formal Knowledge infrastructure	Yes	Special project only	No

The formal infrastructure for the management of knowledge at company A, and within the special project at company B, provide evidence of a shift to a knowledge-sharing culture (Wah, 1999, p145). The important follow-through with on-going training and careful selection of new hires (p152) was not apparent in any of the companies. This situation is not unusual, with a reported 19% of international companies having a knowledge system in name only (p153).

The analysis for cultural issues has been performed on the basis of individual issues rather than company cultures due to the difficulty in assigning issues directly to company cultures. The next section will take this further by looking at how the individuals perceive the KMS, and what issues arose.

There was a distinct attitude of intolerance towards the management of the KMS by the IT departments. The participants felt the system holding their knowledge belonged to them and therefore they should have the ability to drive the direction of the KMS technology. Interviewees were unanimous in wanting a non-IT person running their knowledge repositories. The IT departments were perceived as unable to understand non-technical issues, being non-sympathetic to the problems associated with using the system, and arrogant towards the expressed needs of the users. Secondary data collection involving discussions with IT personnel indicated that the IT personnel had attempted to understand requirements and believed the users did not really understand what they wanted. The IT departments had investigated the available systems prior to selection, where selection was possible, and the decisions appeared to be based mainly on turnaround times for complex searches. However, the users appeared more interested in the ability to receive accurate results, with minimum repeats, in a search quest than in the time taken for the response to occur.

The next section will analyse the responses that were attributable to the beliefs and perceptions of the individuals rather than the hard issues that could be subjected to secondary data collaboration.

Perceptions of Individuals

This section will look at the issues, emerging from the analysis phase, that cannot be compared or investigated through manual or system methods due to the personal nature of the issues. The type of issues in this section are those that individuals believed to be real, and therefore affected their interactions with the KMS. The issues centred around the use of the knowledge submitted, how management and other users were using or not using the knowledge and how that impacted on the individual and their willingness to continue to co-operate within the system.

Key Question K3: How do individual perceptions about the value, use or misuse of knowledge within the organisation impact on usage of a KMS

There were 2 main areas of concern in this category for the participants, that of management filtering the contents of the KMS, and the quality of some items in the KMS.

Management's Right to Filter. The participants were divided on the issue of management's right to filter the contents of the repositories, with many feeling it was acceptable to filter as long as it was for the right reasons, for example to protect the client. Users tended to identify what was being filtered and why, and subsequently filter their own work to avoid changes after submission. Filtering of knowledge only affected use of the KMS if the users considered the information to be used inappropriately. For example company C site workers felt that management was taking submissions out of context then passing the knowledge on in a new context that was detrimental to the individual or the project. This would impact on the future submissions, and increase the feelings of fear and abuse experienced by the site workers.

Handling of Trivia. There was disagreement on the handling of knowledge considered to be trivia by some. Users felt that trivia was difficult to define therefore the repository managers should be accepting the existence of the trivia but archiving

knowledge that was “old” or not being accessed within a specific period. Some participants noted that if they had time issues then they would avoid using the KMS due to the time required to sort through the trivia that was identified by a search query. Others felt that identification of the author of a submission often led the enquirer to discriminate, favourably or unfavourably, when considering opening the submission. Some users were wary of making submissions that might result in being classified as unworthy of pursuing, others were aware of the risk but submitted everything anyway.

Addressing the Subsidiary Questions

The Claims of Current Literature

The study started by looking at the claims of current literature on the usage of KMSs, and barriers to that usage. The literature focussed on a few issues which were expressed from a management viewpoint. This study examined the viewpoints of both management and the knowledge workers using the KMS. The first subsidiary question is concerned with the emerging issues that support or refute the claims of the contemporary KM writers.

Question S1: What other factors can be identified that support/refute the claims of current literature.

The views of the participants in the KMS supported many of the standard issues raised by writers in the field, the details of which have already been noted. However, there was a major discrepancy in the area of reward systems. While current literature claimed reward systems to be a major issue, that demanded addressing to ensure co-operation from participants, the interviewees unanimously reported a lack of confidence in the management concept of reward systems. They felt that the reward

systems imposed to date failed to adequately measure, recognise or reward the appropriate parameters of usage. Management was depending on the administration module of the systems to record usage, but the developers of the systems failed to understand the variety of transactions that can be considered as usage. The systems consequently recorded meaningless data that was then used by management as input to reward formulas. The reward systems often calculated contributions inappropriately, leaving some participants feeling undervalued, seeing their effort attributed to another person. The only reward system that interviews appeared to favour was a minor system that gave regular prizes randomly to users, or to the user/team who completed a specific KMS task first. These fun competitions were not competitive enough to generate the negative feelings that the salary based reward systems generated.

New Insights into Barriers

The next subsidiary question explored the question of what new insights into the barriers to usage of a KMS emerged from this study. There was 1 major insight that became obvious when conducting the secondary data collection phase of the research process.

Question S2: What other factors can be identified that offer new insights into the barriers to Knowledge Management

A factor affecting the usage of a KMS arose during the record comparison phase of the data collection for this study. It was noted that the administration system supporting company A was failing to account for the time spent using the KMS. That is, time had to be recorded against a code which was then used to cost the employee against a project or activity. If the time was attributable to a client the cost was then passed on to the client.

A thorough, and repeated, check of the code list found no entry for time spent using the system, either locating knowledge, contributing knowledge, or familiarisation

with the contents (surfing). Various people within the organisation were then contacted for confirmation of the fact and procedural advice. Some believed there was a code, but could not locate it. Advice received from headquarters was to use a general code if necessary.

The interviewees of company A frequently stated that time to participate was an issue in usage due to the pressure not to record administrative tasks. This pressure could be alleviated by using a code which clearly identified time spent on the KMS. And justified KMS participation

This issue was identified early in the interview process therefore the researcher was able to incorporate the issue for most participants. Companies B and C participants also reported a lack of facilities for recording time invested in the KMS.

Personal Motivation

The last subsidiary question considers the personal issues that leave a knowledge worker encouraged to participate in the KMS or causes the user to avoid participation.

Question S 6: What encourages/discourages participants at a personal level.

The strongest motivation emerging from the interview material is the enjoyment of taking part in the knowledge sharing process. Only interviewees forced to participate did not mention the benefits to the individual of participation in the knowledge system.

Exposure to a wide audience both encourages and discourages participants depending on the individual's sense of self-worth, and their confidence in both management use of the information and the integrity of the fellow users.

The attitude of management to the KMS, and the level of participation by local management, appeared to be reflected in the users themselves. Knowledge workers seemed to maintain an awareness of who was actually participating in the KMS and often informally monitored management's ability to cope with knowledge sharing. Some

felt the lack of management use was due to fear of new technology and appearing incompetent to their staff, while others had concerns that management wanted to collect knowledge but not share.

Issues of Reliability and Credibility

Critical Review of Instrument

The instrument has served as a useful and productive tool for the research process. However, further use of the instrument should consider the following three issues that have emerged during the research process and subsequent data analysis.

1. The structure section should have covered the issues of management relationships directly as this research appeared to focus heavily on the interactions with management and between management and the KMS.

2. The culture section should have directly addressed the issues of communication with international branches.

3. The instrument was based on the results of the pilot study which was conducted within the resource industry. Differences between the pilot study responses and the findings of this research could be influenced by the industry focus of the pilot study.

Critical Review of Organisational Issues

The organisations chosen for the study were companies which already had a KMS in place for a minimum of 2 years. This was to ensure the interviewees were speaking from experience, and that they had adequate familiarity with a KMS to participate in the interviews

The findings of this study reflect that basis of participant selection. Consequently the findings may assist in identifying issues relevant for consideration by a company just starting out, or contemplating embarking on the journey to becoming a Knowledge Based Business. Unfortunately the interviewee requirements also reduced the number of companies in Perth available for the study. The companies selected should be representative of similar global organisations but may not be fully representative of large Australian based businesses. Some issues may not be relevant to an Australian organisation, but most are issues that arise anywhere that people are involved in engaging with KM systems. The high degree of variance between the companies with regard to structural and cultural background may permit this study to uncover a broad range of organisational issues relevant to the acceptance of a KMS, but may be unable to recognise industry specific issues in the field.

Process used - limitations

The process selected for the management of data collection was carefully researched and designed to provide a sound basis for the analysis phase of the research process. As with many research projects the intentions of the design are not always practical in the field situation. This section will describe the issues that arose during data collection and analysis that would cause the researcher to consider alternate or back-up methods in future research projects. The main issues were the variance of the application of the instrument and the difficulties in obtaining accurate transcriptions of interview tapes.

The variance in the application of the instrument during some interviews posed a possible problem in that the ideal (and expected) situation of all interviews being conducted in identical situations was not attained. This was in part due to constraints imposed by the interviewees, in part due to organisational issues such as security, and in part due to technological problems such as the tape player jamming during or prior to

some interviews. The research design did cover the possibility of problems with tape recordings, and all interviews had notes taken throughout to support the tapes and as a back-up mechanism. What the research design failed to cover was the spontaneous changes such as the need for quiet rooms due to noisy work alcoves where neighbouring employees were taking phone calls. As office-less working environments are becoming the normal situation the research design should have considered questions, during pre-interview discussions, which would have identified problems and managed them by, for example, interviewing during normal lunch hours when nearby staff would be away from their desks.

The original intention of engaging clerical support to perform the interview transcriptions to ensure high quality of output was abandoned when transcription of the first tapes uncovered a misinterpretation of the original quote for the task. The original quote was based on an hourly unit. An assumption was made that the hour referred to the length of the interview, however it was a quote per hour of the clerical staff's time. This trebled the cost, therefore the professional transcription was abandoned and the researcher performed the transcription tasks. Ideally the transcription activity should have been separated from the researcher to ensure impartial and professional results. The outcome was transcripts with many typing errors, spelling mistakes, and punctuation was not always obvious from reading the text. Consequently more time was spent re-listening to the tapes than should have been required.

Summary of Results

The research questions have been addressed as individual issues, the companies examined with regards to the intent of each key question, and the responses of the participants have been thoroughly dissected, analysed and restructured to fit the framework and the research questions. This section will now give an overview of the

main issues that emerged from the study in an attempt to present a more cohesive view of the barriers as they may present to an organisation.

The main issue to emerge was the importance of getting the knowledge strategy worked out fully prior to taking the initiative to the general organisation. Where the organisation dictated the move to a KMS, but did not have an explicit plan or rationale, the initiative was less successful. The more remote the strategy makers were from the actual users the less effective the KMS appeared to be.

The next issue was the need to employ Change Management techniques and methodologies to take the knowledge initiative from strategy level to being an organisational tool. This includes the need for on-going change management, especially in the area of training for the cultural shift. The company that employed initial change management methodologies was the most successful, however there was only partial follow-through. The result was that new employees did not have the same level of understanding, commitment, or interaction with the KMS as the employees who were present at the change to a KBB.

Companies with a structure that is towards the fluid end of the continuum appear more able to handle the demands of a KBB. Individuals who move around the organisation, and who interact closely with management, appear to have a deeper appreciation of the benefits of co-operating with the KMS.

Individuals within such an organisation appear to handle issues and differences within a global economy without a need for management directives. People appeared more accepting of differences between cultures on an international level than on a national level. Most participants had recognised the issues and adjusted their work routines to ensure communications with other cultures were as clear as possible.

There was less tolerance of system-based issues than personal differences. Participants were willing to overlook faults in the KMS in exchange for the advantages

of having the ability to share knowledge, but were not willing to tolerate the perceived indifference of the IT departments.

The analysis of the research data indicate the factors that *facilitate* effective usage of a KMS appear to be:

1. a clear strategy, communicated effectively to the whole organisation
2. change management for the transition with follow-through
3. observable involvement by all levels of management
4. training at all levels and areas of the KMS
5. a fluid structure with supportive culture

The factors that *inhibit* effective usage of an organisation's KMS were the opposite situations to the above factors, plus:

1. an inappropriate reward system
2. IT control of the KMS and repositories
3. lack of project specific involvement in the creation of the repositories and general KMS selection

For organisations embarking on a move to a Knowledge Based Business, incorporating the factors that facilitate and avoiding the issues that inhibit the effective usage of the KMS should assist the organisation to obtain the maximum benefit from their investment in knowledge management. There are of course many other issues to contend with but these factors have emerged from the study as key indicators of success or failure.

Lessons Learned

This section of the analysis considers the issues that arose during the research process that served as a learning experience about research processes in general.

Technology fails at the most inconvenient moments. Technology issues arose during interviews when the taping equipment sometimes failed, perhaps due to operator error. During secondary data collection, when the claims of individuals were being pursued, the KMS often failed to repeat faults that had been evident and demonstrated by the interviewee, indicating that technology problems relating to the KMS are often intermittent. There was, at times, no clear indication of where some problems originate as different users get different problems arising. Operator error, and therefore a need for on-going training, could be the real issue in many cases of technology failure.

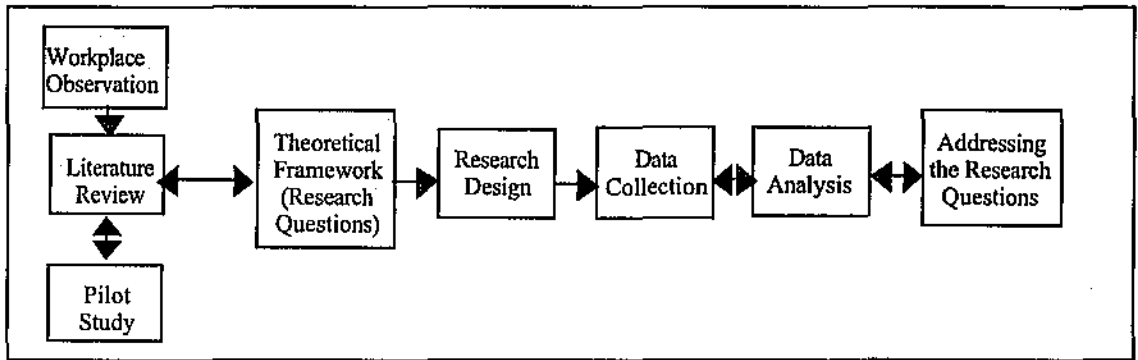
Interviewees can exhibit a tendency to contradict their own evidence, resulting in a need to conduct secondary data collection to ensure the validity of the responses during the interviews. The interviewees also had trouble at times in articulating the problems they encountered, resulting in efforts by the researcher to pinpoint the real issue prior to secondary data collection.

Subjects can have their own agenda governing the responses. During the secondary data collection phase it became apparent that many of the discrepancies could be attributed to the individual describing a scenario that met their own needs. An example is that of a knowledge coordinator who displayed discrepancies in her information that could be attributed to a need to demonstrate the importance of the role within a knowledge based business. The head office staff at company C gave a description of their KMS issues that was totally contrary to the site personnel, indicating they were possibly taking a company line in supporting the KMS, while the real users' issues were put aside as a lack of understanding.

Interviewees may have doubts about the research process, for example the underlying agenda for researcher, interference by the university, selection of material to meet unidentified criteria. Of the 13 interviewees 3 openly discussed their reservations about university research processes and intentions. Of those, 1 person contacted the researcher 3 times in subsequent months to ensure that his points had been correctly recorded and understood. There were 4 requests from participants for a copy of the final report to ensure the company had not been compromised or the data misused.

CHAPTER EIGHT

SUMMARY



Introduction

This final chapter is a summary of the information that has been presented in the report, an overview of the research process with an indication of the emerging issues that may impact on the ability of an organisation to move to being a Knowledge Based Business by integrating KM systems. The entire research process is reviewed in this chapter. Starting with the workplace observations that instigated the curiosity, followed by the literature review and the original pilot study, the rationale for pursuing this study will be presented. The theoretical framework which developed from the pilot study will be briefly described as a reminder of the context of the study. The design parameters and rationale underlying the research methodology chosen will be reviewed to determine the suitability of the design to the research problem. Data collected during the primary and secondary data collection phases will be presented in a summary format, along with the resultant analysis outcomes. This will be followed by an overview of the emerging issues as they relate to the research questions posed at the beginning of the report.

The chapter will then present the key and secondary issues that constitute the conclusion of the study, followed by some suggestions of areas for further research into the barriers to effective Knowledge Management.

Summary of Research

This research was constructed from the existing research base and a pilot study which indicated the need to provide greater illumination of the barriers that exist between KM systems and potential contributors and users. The research was built around a framework based on the results of a pilot study, then conducted over an extended period across 3 Perth based organisations of multinational origin, with global communication systems. For this qualitative approach three clusters of interviewees within three companies were carefully selected to ensure the data collected was valuable and relevant. The data collected was from various sources to ensure triangulation of data and confidence in the results. All participants were working in the knowledge area, and covered many levels and types of employment. The researcher maintained high ethical standards throughout the extensive period of interaction and analysis.

Data collected during the study was codified and analysed in accordance with accepted research methodologies. The findings were compared with the original literature review and the findings of other surveys, and interpreted in the context of this study to elicit possible answers to the research questions.

Conclusions of Research

While the participants in the study gave specific and at times emotional rationales for their acceptance and involvement levels in the KMS they were using, the study demonstrated an overall pattern that indicated some key management techniques could have been employed to make the transition to a knowledge based business

smoother and more integrated into daily work practices than was apparent. In most cases the integration of KM systems is synonymous with a greater cultural and managerial emphasis on relational issues. Focus on system aspects works against generating a culture where knowledge is networked.

Change Management strategies, and training programs in making the cultural paradigm shift required, may have hastened acceptance of the new systems and improved levels of commitment for the workforces.

There were some key relational issues that arose which could be useful to an organisation contemplating the shift at an organisational or branch level.

Key Issues

Strategy The emerging factors that impacted on the success of the KMSs indicate that the chosen strategy for moving to a Knowledge Based Business is the first opportunity to align the organisation for a successful change. Knowledge workers appeared to resent a strategy that involved the KMS being delivered to the organisation at the direction of an international board remote from the location, and with no knowledge of the specific site for delivery.

Disseminating the strategy was the next key factor, again participation in the decision making function is considered essential by the knowledge workers. Motivation is enhanced by involvement in the decision making process and through involvement of non-IT staff in the design and implementation of a system they are expected to accept ownership of.

Change Management was an issue raised by some participants as being a major factor in acceptance and yet not addressed adequately by the organisations during the entire process. Many of the complaints raised were issues that could have been averted if the process of moving to a knowledge based business had been integrated into the

business strategy, and that strategy disseminated to the staff with assistance to incorporate the required changes into their processes.

Training was identified by many participants as a key issue, but was the topic most open to interpretation. While some felt the IT training aspect of the KMS was not important, many considered the paradigm shift to being a knowledge worker to be almost impossible to negotiate without ongoing guidance. There was division on the issue of the level of expertise assumed to exist when an employee becomes a knowledge worker.

Support Issues covered a range of functions from personal support via a mentor or knowledge officer, to the more typical support issues such as IT support. Dutrenit (2000, p247) recognised the problems arising in organisations, with multiple organisational units, without a knowledge officer assigned the specific task of integration and support of knowledge. However, Brooking (1999, p157) suggests that a knowledge officer can provide an early-stage benefit but in the long term moves the responsibility away from the individual which results in reduced participation.

Having a stable platform for the KMS was raised by most participants although they recognised the issue as being beyond the control of the workers and to a degree the management. The IT team of a KMS was often the target of the knowledge workers frustrations.

In 2 organisations management was perceived as lacking in support of the intangible requirements of a KMS such as time to explore the system. All 3 organisations reported feeling that management support was expressed verbally but not followed through to policies and procedures. Management was perceived as advocating but not practicing KM.

Ongoing Issues includes training and support issues, but the focus was more on the difficulties of establishing their credentials and obtaining acknowledgement for inputs into a system that appeared to be designed to remove the worker's power base.

Adjusting the method of assessing self value within the organisation may address many of the ongoing issues by removing or moderating the feeling of devaluation that some knowledge workers experience.

Secondary Issues

Culture was the main secondary issue. An organisation's culture and subcultures impact strongly on the ability of the workforce to adjust to the KMS. Some participants felt peer pressure was either forcing them to participate involuntarily or generating reproach from co-workers when the person cooperated with the system.

Recommendations for Further Research

The study indicated emerging issues that could impact on the effective use of a KMS within an organisation employing knowledge management techniques. Some issues were supported by current literature and other research studies, other issues may require further study to determine their effect on the field of knowledge management. The main contentious issue that emerged during the pilot study and again during this research was the use of reward systems and how appropriate they were to current knowledge management practices. The issue of where power lies in a knowledge based business is another avenue of research that could change the way management approaches the move to a knowledge system.

Reward Systems were identified as an important issue in the literature review but the pilot study did not find users concerned with rewards for using the system. This research confirmed that users did not regard a reward system to be a driver in usage of the system, in fact users were wary of reward systems as they appeared to reward the wrong people, for the wrong reasons. From a user's viewpoint usage of the KMS provided rewards for many in the access to knowledge, in the ability to display personal knowledge to peers, and in the acknowledgement and feedback received from other

users. The only reward system that was acceptable to the majority of users was a minor system that provided small rewards, such as dinner for 2, on the basis of a competition involving the KMS. Once the reward system was extended to the salary it was viewed with suspicion. Users felt that the organisation that was capturing data for evaluation in the reward system was incapable of understanding the issues of knowledge workers, and the KMS itself was unable to support the organisation with appropriate data capture to identify and attribute the efforts of knowledge workers successfully.

The lack of agreement between literature and this study in the issue of reward systems could be based on cultural differences as most studies in the available literature were conducted outside of Australia. There is also the possibility that the interviewees were reluctant to discuss the issue or had not considered the possibilities prior to the research. Future research could examine:

- the basis for rewarding knowledge workers (what constitutes proof of effort)
- appropriate rewards for workers in the knowledge field
- the effects on organisation morale of inappropriate recognition of effort
- the methods knowledge workers employ to manipulate knowledge reward systems
- the effects of reward systems on the organisational culture

The Shifting Powerbase of the modern organisation could be researched to determine how much control is now in the hands of the knowledge worker, and how this will affect current management techniques (Nickols, 1999, p7). Which techniques are still appropriate in a knowledge economy, and how management can make the transition to managing knowledge workers.

Relationship Management becomes of greater importance in a knowledge organisation. Further research could examine the old strategies designed to protect the organisation from knowledge being released to competitors, and examine the possible

consequences of organisations accepting the sharing of knowledge with both customers and suppliers.

In Closing

The research conducted for this study has resulted in the generation of many questions regarding the issues faced by knowledge workers within organisations. The literature review revealed that the majority of studies are taken from a management viewpoint when in a knowledge based business it may be the strategies of the knowledge worker, rather than management, that will determine the success of the organisation. Management provides the knowledge worker with the tools but the knowledge worker is able to manipulate the tools beyond the original intention of the organisation.

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APPENDIX A

DETAILS OF PILOT STUDY RESPONSES

Structural:

All informants complained repeatedly about structural matters. The expected structural issues of environment and the internal company structure were irrelevant to the informants, the focus was on the knowledge system itself.

Searching was a problem for all informants, too many finds are listed with no indication of the structure of the finds which may guide the user to another level of searching. For example searching for the phrase “apply section 034.2” may result in 50 finds. Of those finds 35 may belong within one of the top levels of the structure with the other 15 spread across 10 other levels. Inappropriate keywords was also causing search problems in that items were not in the “find” list unless the keyword was correct.

Another major complaint was that access is not easy enough for regular use. This was tested on two repositories. Access took 3 and 15 seconds respectively and a few mouse movements. This raised the question of the expectations of the users, are they unrealistic.

The next area of concern for all respondents is in the human management or not of the knowledge system. The responses included suggestions as diverse as no human intervention to tight structured control of contributions. Other responses suggested the manager should be a user of the repository and not an IT person, should be a dedicated resource, should remove trivial items, and should be leveraging from other knowledge areas such as the Internet. Four of the six informants felt that

the manager should be the only person capable of deleting documents as a history of the repository is vital to maintaining the context of the contributions.

The purpose and structure of the repository was also a concern for most respondents. They felt it should be very specific, with the purpose and the expectations spelt out clearly for participants. The objective should not be open to interpretation. The structure should be specific to the users not a generic format for the company. The presence of empty documents were a concern for all but one user. The one user was the person who was creating all the empty documents. He felt that he was giving the other participants guidance in interesting areas to contribute to. However, the others felt that the empty documents represented an attempt to take credit for the subsequent contributions of others as only the initial creator is mentioned in the credits.

There were also some points raised by only one or two informants but that does not indicate they were not issues to the others as the format of the interview was unstructured and the respondents were not led to areas visited by others but free to make their own points. The less reported issues were the need to be Internet based on a company site to be viable, that is to reach a wider audience, large documents need abstracts, tools should be matched to the size and usage rate of the repository to avoid long waits, and the ability of others to edit an owner's work. There were contradictory contributions on the subject of archiving with two feeling archiving can make old contributions difficult to access and removes the history of current contents therefore context can be distorted, and two perceived a lack of archiving as a major drawback on a large system which could become unmanageable.

Cultural:

In the responses categorised as Cultural the problems identified were either unanimous or had only one or two supporters. This was not the case in the areas of Structure and Perceptions. The two unanimous problems were in training needs. Lack

of training in knowledge systems was the number one concern in this area, informants unanimously felt unsupported by the general organisation. The expected problem was training in using a knowledge system however the actual concern raised was training in what a knowledge system is and how to contribute effectively rather than “how to do it”. Everyone also wanted specific information on the expectations of each specific knowledge base, what was its objective. There was also a need to understand the difference between an expert system and a knowledge management system.

The other responses can be sub-categorised into problems in starting out and pressure or intimidation affecting usage. It was felt by two users that the culture pressured people into contributing, in being part of the community of users, one of the group. That they had to maintain an awareness of the contents of the knowledge base and contribute items of value. Both of these respondents were employees which may be a factor to consider. The other sub-category concerns the user’s issues when starting as a knowledge system user. The mature repository may seem intimidating, the contributions can be at such a high level of understanding that they leave the new user feeling inadequate with no concept of the possible value of their own contributions. The technology can instil fear in the individual with one respondent describing the initial session as an emotional trauma. There was an expressed need for the infrastructure and procedures to support the launching process of the repository and the start-up of each new participant. A check for procedures and supporting documentation revealed nothing, that is the repositories common to the informants were undocumented and the purpose was not clearly spelt out. These responses seem to suggest that a culture that supports tolerance, individualism and team work is required. Individualism to support the posing of views contrary to the “the norm”, sharing to encourage people not to withhold their insights and opinions, and tolerance to accept and integrate differing views.

Two informants saw the repository as being used as a forum for sarcasm and bitching, bringing into question the value and relevance of the contributions. The concern that management could use the repositories to spy on employees was also raised.

In the literature appropriate reward systems were regarded as important to the knowledge based company. In the research none of the informants raised the issue. As each interview came to a close the respondent was asked about items identified in the literature but not in the interview. Each respondent was puzzled by the question on rewards and did not see how a reward system could be designed to adequately serve a knowledge based system, it would have to revolve around other factors. This was an interesting issue that will be addressed during this study to judge its importance.

Perceptual:

The area of perceptual concerns was marked by a deficiency of unanimous responses. A few items were raised by more than one person but for the most part the concerns were only raised by one or two informants.

The items of consensus were the problems of anonymity in a larger system, the owner's name was on the repository but if the user was non known to the reader they did not always feel comfortable interpreting the contribution. Four informants felt that knowledge of the creator confers credibility or otherwise on the document. And four felt that many items were of dubious value but could not elaborate. Leaving out the negative knowledge in the experiential discourse items was felt to degrade the repository's value by four users. Misinterpretation of contributions was identified as a problem by five informants but the factors they felt influenced the problem did

differ. Factors such as cultural (international), language context, rationale for contribution, and value judgements both made and assumed.

Other response included feeling that they were being judged by colleagues based on contributions, that their thoughts were being scrutinised by the wide audience, that dirty laundry was being aired, and that there was a general fear of exposure. There was concern about the availability of some documents, that an organisation could use the repository for propaganda, could manipulate the data, or filter the repository. Two users felt that sharing their knowledge reduced their value within the organisation, and two raised the risk of having their ignorance on permanent record if they contributed. There was also expression of irritation over spelling and grammatical errors in other people's documents that one user (secretary) felt a compulsion to correct. Other users complained that the cosmetic editing of their documents was irritating. When they re-entered the repository the change icon would indicate a change but they could only find cosmetic changes, nothing of value, which wasted their time and effort. Two users also expressed personal difficulty in recording their experiences in a way they felt was meaningful and valuable to others. This did not appear to be based on lack of self-confidence but rather was a reflection on the unavoidable interpretation that any reader will automatically process during the reading.

The specific areas of influence under study are:

Structure: the environment; the industry; the internal structure; the technology; and job time constraints.

Culture: is the organisation's culture conducive to being a knowledge based organisation; are cultural pressures brought to bear on employees chasing knowledge; are the necessary skills and support available, does the culture support sharing and team work or encourage and reward individualism.

Perceptions: is the data relevant; doubts about the wholeness of the data; concerns about the motive behind the availability of the data, issues regarding value of contributions and identification of contributor.

APPENDIX B

The Interview Instrument

Appendix B is the interview instrument presented to each interviewee at the commencement of the interview, with pages 2 and 3 withheld until the later part of the session when the interviewee had an opportunity to review the pages and discuss and perceived omissions.

APPENDIX B

Knowledge Management Study

Pre-Interview Notes

This research is being conducted for a thesis at Edith Cowan University. This is an exploratory study to identify the barriers to full utilisation of KM tools and explore the relationships between barriers.

For the purpose of this study the following definitions are supplied:

Knowledge Management: the capture, creation, storage, organisation and distribution of knowledge

Knowledge System: method of formalising and automating management of knowledge

Knowledge: organised information applicable to problem solving

The following table illustrates the issues about the introduction of knowledge management systems that have been expressed by participants during the pilot study which concern the structure and culture of their organisations and their own perceptions

Knowledge Management	Structure	<ul style="list-style-type: none"> • Internet based • Empty documents • Change flag for cosmetics • Too much trouble • Tool not match to requirements • Glossaries req. for context 	
		Management of the Repository	4.1.2
		<ul style="list-style-type: none"> • Deletion of "trivia" • Search inefficient • Structure - too little, flexible • Structure - too much, controlled • Archiving Yes/No • Keywords not appropriate • Need abstracts for large docs • Not an IT person as manager • Structure specific to project • Clear project objective to follow • Should leverage from other sources 	
		Time (wasted)	4.1.3
		<ul style="list-style-type: none"> • Inclusion of inappropriate/trivia • Time available to participate • Getting lost in "looking" 	
Knowledge Management	Culture	Training (inc. shift in thinking)	4.1.4
		<ul style="list-style-type: none"> • IT training • KMS training (inc. paradigm shift) • Project specific training • Mentoring • On-going training • Computer assisted training 	
Knowledge Management	Culture	Peer Pressure	4.1.5
		<ul style="list-style-type: none"> • Forced to participate 	

Individual Perceptions	<ul style="list-style-type: none"> • Pressure to maintain awareness • Feel part of community of users • Need for valuable contribution 	
	Improper Use of KM System	4.1.6
	<ul style="list-style-type: none"> • Forum for sarcasm & bitching • Used to judge colleagues • Subject should be more important than author 	
	Personal Reactions	4.1.7
	<ul style="list-style-type: none"> • Intimidated by mature rep. • Misinterpretation of contribution • Feel need to justify time spent • Management manipulation of info., filtering, subversive • No-one cares 	
	Value of Contributions	4.1.8
	<ul style="list-style-type: none"> • Not worthy • Difficulty in contrib. bit by bit • Leaving out negative degrades • Uncomfortable about mistakes • Credibility affected 	
	The Audience	4.1.9
	<ul style="list-style-type: none"> • Unknown readers • Exposure on permanent basis 	
	Credit for Contribution	4.1.10
	<ul style="list-style-type: none"> • Sharing knowledge reduces value • Not getting credit for own work 	

Sources, at individual level and organisational level, will not be identified in the report or revealed to anyone other than the researcher without the express permission of the interviewee. Complete confidentiality is assured.

Sessions will only be taped with the permission of the interviewee. The tape will be professionally transcribed with a code to identify the interviewee. You may withdraw from the interview at any time and contact the ethics office at ECU if you have any specific concerns about this research project.

Participant:..... Date.....

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APPENDIX C

INTERVIEW PROTOCOL

Before Interview

1. Call each selected interviewee to ensure they are comfortable with being interviewed, discuss any issues they may have with the process.
2. Check that interviewee meets criteria for selection, eg length of time as a user of a knowledge systems.
3. Reassure interviewees of confidentiality.
4. Arrange time and place of interview.

At Interview

1. Ensure interview environment is comfortable and friendly. Request moving to another room if necessary. Ensure
 - water is available
 - tape recorder working
 - pen is operable
 - copy of the instrument is available for note taking but not displayed
 - mobile phones turned off

2. Place initial sheet on table (see Appendix B page 1) , with definitions covered.
3. Formal introduction of interview purpose, timing, commitment of confidentiality.
4. Allow interviewee to read first half of sheet, keeping second half covered.
5. Prompt interviewee for response to introduction section, if necessary.
6. If interviewee is prepared to continue then start the tape recorder.
7. "How would you describe Knowledge Management"?
8. Show the interviewee the second part of the sheet.
9. Discuss any issues interviewee may have with the stated definition.
- 10.Reiterate that the process is unstructured and the interviewee is to just talk about the issues they have faced and any areas not covered will be prompted.
- 11.Start the interview by asking the interviewee to talk in their own words about their experiences with knowledge management, if necessary suggest they start with the repository and tools. If appropriate suggest a demonstration of issues that arise.
- 12.When the interviewee appears to have no more to say, use the instrument as a guide and prompt the interviewee to discuss areas that have not already been covered, or that need clarification. Check that issues that seem irrelevant actually are irrelevant to the interviewee.
- 13.When the interview seems to have finished, show the interviewee pages 2 and 3 of the instrument and request a review to ensure the instrument and the interview have covered all the issues of concern.
- 14.Ask the interviewee to confirm which are the most important issues from their perspective.
- 15.Thank the interviewee and leave.

APPENDIX D

ADDITIONAL FINDINGS AND ANALYSIS

Introduction

This appendix contains additional material from the data collection and analysis phases that support the contents of the main report. A copy of the basic instrument has been included as Figure 1 for clarity.

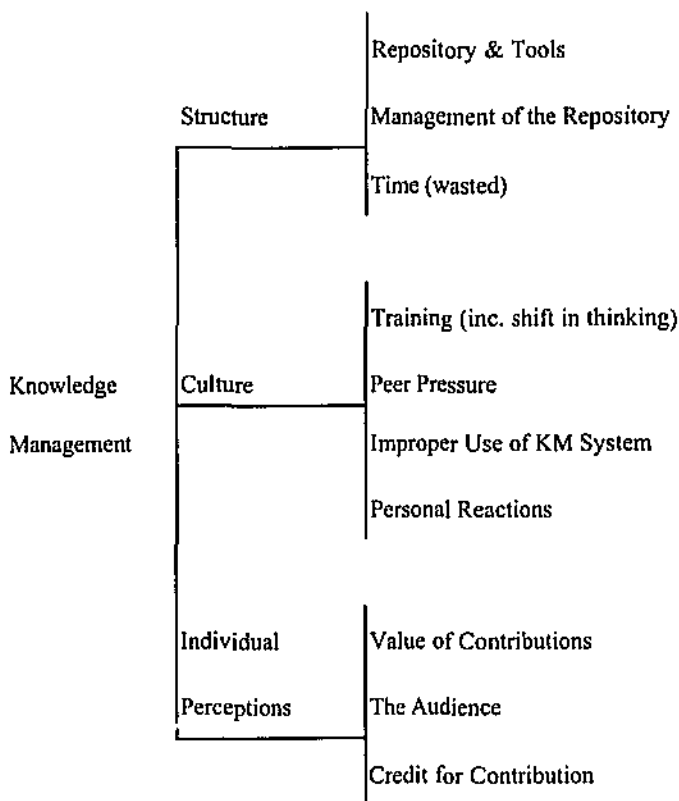


Figure 1 Outline of the Instrument

Content of Repositories

Content of the repositories explores the comments made on the actual contents of the databases and repositories rather than the tools and their use. There were remarkably few (6) comments in this section from company C. This may be accounted for by the fact that content is subject to more managerial monitoring in company C. The comments received from this company mainly concerned data integrity and version control. Respondents felt that there was a lack of safeguards to ensure data was submitted and reflected the organisational climate of negative feedback for employee transgressions. One respondent commented on the existence and circulation of a list of expert users and area specialists to assist in content control. This was also the only

company where comments were made concerning the informal use of the system for local social transactions and the expression of alternate meanings but comments all substantiated that management attempted to exerted control over such communication.

Company B responses were mainly focussed on submissions regarded as unimportant or unnecessary, and the need to record mistakes as well as successes. Company A gave varied responses but also gave weight to the need to submit knowledge on problems and failures as well as successes. While A4 was "...selective about including the negatives.", A2 stated:

Everything is about wins and war stories, not the sharing of negative experiences, people would get more out of the system if they did, you get more out of your failures than you do from evaluating your wins.

The division of repositories into discussion databases, working repositories, and power packs was popular with respondents. Archiving was a debated topic, respondents often gave contradictory views on the topic, seeming to change their minds as the interview progressed. In general archiving was considered necessary though difficult to generalise as one topic (repository) may have a longer natural life-cycle than another topic. One respondent gave great emphasis to the archiving issue, and frequently returned to the topic and stated the need for relevance criteria 3 times.

More than half the respondents stated during the interviews that they do submit items, and then at another point in the interview stated that they do not submit. When questioned about the change of statements the respondents gave varying reasons such as: they delegate the submissions (5); they intend to submit but don't find the time (3); and they get distracted while going through the lengthy process of making a formal submission (2). Post interview investigations revealed that the majority of people interviewed had only a few submissions, while 3 were regular and major contributors to the knowledge systems, and some could not be identified on the

system. The 3 regular contributors each stated that the motivating criteria for submission was “if I need it then chances are so does someone else” A4.

The existence of a whitepages document that identifies expertise and areas of interest or knowledge was important to Companies A & C while company B did not mention the topic.

During discussions on the subject of the content of the knowledge systems it became apparent that many users were not familiar with the content of their systems. In companies A and B, statements were made about the need to have problem databases and expertise databases, but when the systems were interrogated for this research, the required items were found to already exist.

Companies differed in their approaches to content management. Company A utilised all 3 levels of structure, monitoring and controlling the documents that were submitted. Company B had a policy of allowing the users to determine what would be suitable. Company C had very tight control over most systems and content, leaving staff little flexibility. Discussion databases were the only outlet at company C for expression and were consequently used inappropriately

B1 felt that over a period of time the submissions reflected changes in views and circumstances. This was considered important in understanding the context of the data and that filtering or removal of trivia would degrade the quality of the knowledge.

In company A some respondents had concerns that not all information was being “contained” A5. After one interview the respondent searched the system to demonstrate missing information but it was easily located under a slightly different title. A check of document access showed that best practice documents were regularly accessed.

Respondents were fairly evenly divided on the subject of trivia. Again there were respondents who contradicted their statements during the interview. Some felt

that the presence of trivia was a time waster, some felt that trivia was important as it gave a complete picture and could be filter anyway. One informant felt that trivia is context driven, that what is regarded as trivia one day can be important another time, “What is regarded as trivia on one pass can be realised as important later and you want to go back.” B1.

Filtering was another contentious issue. There were 4 respondents who felt that filtering information was manipulative, however all but 2 informants believed that some filtration was necessary to prevent demoralisation, protect clients, remove garbage.

Context covers responses that deal with issues regarding the understanding of the knowledge, especially the issues regarding working in a multinational organisation and reading submissions from different cultures.

In general context was not an area of great interest to the respondents. They reported experiences of misunderstandings and issues arising from the diverse mix of cultures but each informant had found their own techniques for dealing with those issues. None of the informants had received training or advice from the organisation on these issues but this did not appear to be a problem. Informants appeared to take pride in their ability to overcome misunderstandings.

It was interesting to note that most incidents used as examples involved American to Australian spelling, and vice versa, when the companies involved dealt with overseas branches that do not have English as a first language.

Knowledge workers at company A keep a dynamic glossary to reduce confusion but still found that people use terms incorrectly. One informant from company A stated that the organisation really needed to develop a glossary to assist in understanding communications, indicating that the informant was unaware of the existence of the tool. When the researcher reported the existence of a glossary the user and researcher attempted to locate the glossary but were unable to find it.

A2 had many problems with international emails and conference calls. The informant developed a habit of keeping the language simple to avoid misinterpretation but found that some people were using a range of inflections as an additional level of verbal communication which was missed or misunderstood by others.

Organisational Culture

The Culture section covers issues reported by informants that directly addressed the culture of the organisation; issues that have been categorised at stemming from cultural problems; and issues surrounding the change of cultural required to successfully implement a move to a Knowledge Based Business (KBB).

Culture in this context covers the organisational culture, inter and intra national cultures, and KBB culture.

Organisational Cultural Issues

Company A had an organisational culture that mainly supported KBB. This had been incorporated into the business over the 4 years since adoption of knowledge management technologies.

Company B had a head office culture that isolated management from the day to day business but monitored the business through knowledge management systems. The culture did not recognise the adoption of any level of knowledge management. Access to information was based on the person's position within the hierarchy. Lower management levels were unaware of the use of knowledge management systems to drill through the local server files. The highest level of access was by the parent company based in London.

Company C had the most divisive cultural forces in operation. The head office and site cultures were in strong opposition. The site subcultures worked against

attempts to disseminate and share knowledge. While the majority of employees had access to at least one knowledge system, few knew or understood the implications of the access and very few actually logged on to the system. The parent company was also mining the systems.

International Cultural Issues

Cultural differences across national boundaries were evident in companies A and C. Company B did not communicate regularly with international associates. Staff at company C felt threatened by the international exposure, receiving frequent “please explain” phone calls from London regarding issues in documents that had only been submitted 10 minutes prior to the call. This could not be verified due to lack of access to the parent company. One site management level informant reported the experience of receiving a call from headquarters while still in flight during the return from site. Site staff reported experiencing fear during the process of making a submission due to the possibility that they were submitting knowledge which would be interpreted as incomplete, inappropriate, or incorrect by top management in London.

KBB Cultural Issues

Company A had developed a strategy for cultural change at the commencement of the knowledge management project. Training in the shift to a knowledge culture was conducted for all staff present at the shift four years ago. Since then there has been no intensive or explicit training, but the issue of sharing knowledge is raised frequently at other trainings. Staff who have joined since the shift to a knowledge culture have not received training specific to the culture requirement.

Company B, looking first at the entire company, did not conduct training relating to knowledge sharing and did not address the issue in general training. The company employs TQM techniques, with team work as a critical aspect of the normal working environment, and the general feeling was that sharing your knowledge is part of TQM. Members of the specific knowledge project within company B did have

initial discussions on the need for changes in their approach to sharing knowledge, and people joining the project are given a run down on the experiences of the team in their move to the KMS for their project.

Company C did not openly acknowledge they were using a KMS, although the head office staff were aware. There was no attempt to train staff in the cultural aspects, only in using the system. Again it is a team orientated environment and sharing of knowledge is expected as a matter of course.

Management pressures can be defined as the pressures felt by individuals that can be traced back to management actions, lack of action, or strategy. Of the 39 responses related to management issues 30 came from the 2 mid-management level staff in company A. There was only 1 response that indicated a lack of pressure: "pressure from company is not acute" A4.

There were 31 management pressure responses that referred to a lack of time for effective knowledge management. Company B was not represented in this subcategory. Deadlines were referenced in 9 of the responses, for example "we have deadlines to meet, impose on search function, puts constraints on delivery" A6, "Go from one job to next, timing issue." and "Pressure is for billing and charge out times, keeping to a budget." A5. A5 also reported "Its everybody's role to find time but we need management's full support" and "Work is task orientated, no time to contribute even though management encourages use of the knowledge management system, its improving over time."

Accounting for time: Pressure to account for time was a concern for many: "Time is a factor in training and putting individual knowledge into the system" A6; "time to search but not to impart knowledge" A5. During the interview A6 made 3 direct references to the need for more time to be allocated to knowledge task: "Need more time allocated regularly."; "Need to account for every minute of time"; "Need

more support in taking time to explore.”. While A7 felt a need for time to explore without having to justify the reason: “time to participate is the last priority as no time allocated in work cycle.” and “needs time allocated for investigating new databases”.

Lack of adequate resources was another source of pressure which was felt to be a management issue by the interviewees. The issue of resources is addressed in another section. The pressure from the lack of resources was summed by C4 as: “No time or resources are devoted to knowledge capture” and “It leads to a difficult situation, need a laptop so I can work outside of work environment.” when referring to the pressure of fulfilling knowledge submission requirements while the work timetable does not allow periods of prolonged access to the system. C4 was subject to travel around the country to perform set duties and subjected to a requirement to submit knowledge to a strict timetable.

Unreasonable expectations of management were also cited with company C feeling a lack of support in performing the management imposed knowledge tasks: “feel very pressured, management do not realise how much time is required to use effectively” and “management think it can be done easily and quickly” C3; “don’t have time to document learnings - busy doing” and “no time or resources devoted to knowledge capture” C4. Company B reported they “feel no need to justify time spent on searches” B1.

There was a perceived need to demonstrate to management a monetary benefit from the knowledge system which resulted in another source of pressure. C4 noted “feel pressured to make valuable contribution, \$1m system but no show of benefit or gain”, while A6 felt it was “difficult to put a value on knowledge management time unless specific to a job”. Another monetary pressure was to allocate the knowledge time to a cost code: “time is an issue, cost of time, time has to be charged, difficult to justify half hour search instead of costed time” A2.

System pressures, those originating from the system itself, concerned mainly the issue of knowledge that appeared to have no value. The inclusion of knowledge that was regarded by users as trivia met with mixed reactions. Each interviewee that addressed the issue had a different response. The basic idea was that trivia was unavoidable as different people put different values of knowledge, and that value can change over time or changing circumstances. That was is trivia today may not be tomorrow. It was felt that trivia should be included and acknowledged that sifting through it was a source of irritation and therefore time pressure.

Author

This section covers comments made about the “authoring of documents” and other items in the knowledge systems. The comments regarding Author issues centred around the subject’s reactions to their exposure as an author and the use of knowledge submissions to assess the worth of a colleague, the assignment of “credit” for submissions.

Of the 26 individual responses 5 felt the author was irrelevant when selecting documents from the repository, especially in a multi-national company where the authors are unknown to most readers.

There were 5 statements that admitted that they do judge colleagues by the quality of their submissions, even when the employee is someone unknown to the reader. The quality of the work determined future selection of submission from the same author and suitability of the author for personal contact, eg “...make judgements on the person’s ability to help by studying their responses in the databases...” A2.

A further 5 claimed they do not judge colleagues by their submissions, that the author’s name is unreliable as some staff tend to delegate submissions to low ranking staff members therefore the author in the repository was not necessarily someone

with knowledge of, or involvement in, the actual submission. "...juniors fed the task of making submissions and therefore get the credit for work of others..." B3.

Credit for intellectual property was an issue for some respondents. There were 2 reports of work being appropriated by other employees and submitted without reference to the original author: "...some people steal your work and don't reference it...".

One respondent felt that there was a need to train employees in understanding "...where the author is coming from..." C3, while another felt that "Experts are not as valuable as the person who knows the client." A5, which implies that the reader needs an awareness of the author's relationship to the topic and the client.

There were 2 respondents who used the name of the author to determine suitable contacts to telephone for further discussions, however one noted that "...discussion databases show directly who entered the K but in the formal repository you see the responsible partner and the secretary but not the person who wrote it, who is really who you want to talk to." A2.

B1 commented on the level of self-criticism employed when deciding to submit an article then later declared a belief that "...other people are protecting their knowledge to protect their worth.".

Management. The category of Management related responses covers comments made about the effects of management styles, attitudes towards management interactions with the knowledge workers, management commitment and support issues, censorship, the need for management to perceive a financial payback, and the strategy the company's management used to implement the knowledge system. Only 1 respondent did not cover the category, the 47 comment were spread fairly evenly among most of the other interviewees with the exception of a site manager from company C who made a total of 11 comments.

Support and commitment from top management. All 3 companies reported a feeling that top level management were making all the right encouraging noises, through to edicts, on the usage of the knowledge systems however there was no confidence in an actual commitment by the top level individuals. Another frequent report was that management failed to understand the commitment in time and effort required of knowledge workers, failed to acknowledge the benefits, did not provide the resources for effective use of the knowledge system. There was a general feeling of lack of support.

Censorship was an issue for some interviewees while others felt that management had a right to censor the databases/repositories. The interviewees from company B felt the “management should reserve the right to filter to drive process and culture” B1. Company A was reported to be using censorship to protect clients: “aware that management filters information to protect confidentiality but confident that is all” A4.

Financial payback was cited as a reason the knowledge systems did not proliferate: “there is some on-site access, many have a need but it would not provide value for money spent, no hard financial benefits, only soft, difficult to justify in a production environment.” B2.

The Strategy employed for initiating a move to becoming a knowledge based business was heavily criticised. A4 appeared to have clear views on this topic and noted: “Feels like there is an IT driven focus on knowledge management systems without really thinking about the culture.”; “the right policies were not in place before the move to knowledge management systems.”; “....did not make clear to employees what they wanted to do with it (Knowledge Management).”; and “the right policies were not in place before the move to knowledge management systems.”. The interviewee summed up the strategy problems as “...should have involved more change management when converting to knowledge systems.”.

During casual conversations with some of the top level management named in the complaints in company A it became apparent that the technology aspects of knowledge systems were considered too time consuming to warrant the investment in learning at a high level. The partners felt they were more likely to improve the bottom line position (profits) by doing what they do best. They did allocate knowledge tasks to other individuals however follow-through was haphazard with the result that misunderstandings and other commitments resulted in knowledge falling into black holes.

APPENDIX E

Table of Responses by Category

	Total	A1	A2	A3	A4	A5	A6	B1	B2	B3	C1	C2	C3	C4
Author	26		6		3	2		4	1	5	2		3	
Content	47		8	1	9	8	1	4	4	6	3		1	2
Context	22		6	3	4	1		3		2			2	1
Cultural	89		9	1	21	14	3	1	15	11	7	1	5	1
Definitions	17	3	3	3	3	1	1	1	2					
Management	47		6	1	8	4	1	1	5	4	3	1	11	2
Personal	39		4	2	10	2	2	7	2	2	2		3	3
Pressure	61		6	2	7	14	9	3	3	5		1	5	6
Resources	34		3	3	7	5	1	1	2	2			1	9
Rewards	26		2	3	5		2	5		4			2	3
Structure	80	8	7	7	7	9	3	7	9	8	8	3	2	2
Tool	140	5	15	9	10	13	8	10	18	6	10	7	15	14
Training	86		7	3	4	20	7	4	8	3	5	6	12	7
Totals:	714	16	82	38	98	93	38	51	69	58	40	19	62	50