AN INVESTIGATION OF KNOWLEDGE MANAGEMENT IMPLEMENTATION STRATEGIES

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NAKKIRAN N SUNASSEE

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DECLARATION

I acknowledge that all references are accurately recorded and that unless otherwise stated, all work herein is my own.

Nakkiran Naidu Sunassee

Abstract

The world is experiencing an era which has been termed the “knowledge age” or the “knowledge economy”. In this new context, knowledge is the primary commodity, and knowledge flows are regarded as the most important factors in the economy. The management of knowledge flows within organisations has become a crucial activity because many of the activities of organisations and the broader economic and social life today are knowledge-driven. In recent years, this managerial activity has become known as Knowledge Management. Equally important are the associated Knowledge Management implementation strategies.

Driven by a need expressed by the South African Motor Vehicle Industry for a knowledge management implementation strategy tailored to their needs, this research aimed to develop a knowledge management implementation strategy suited to the needs of this industry.

Following an extensive literature survey and a study of the target industry using Duffy’s Knowledge Benchmarking Questionnaire, a model of knowledge management implementation is proposed that is suited to the needs of the South African Motor Vehicle Industry. The model consists of three main interlinked components: Knowledge Management of the Organisation, People, and Infrastructure and Processes. Furthermore, the model recommends a holistic approach to managing knowledge.

The critical success factors of the model were tested by means of a survey of industry opinions that validated certain aspects of the model and motivated for changes in others. Additionally, despite the focus of the model on the target industry, it is considered sufficiently appropriate for use by other organisations.

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Abbreviations

CBK	Centre for Business Knowledge
CKO	Chief Knowledge Officer
CSF	Critical Success Factor
IT	Information Technology
KM	Knowledge Management
SAMVMI	South African Motor Vehicle Manufacturing Industry

Chapter 1

Introduction

1.1 Background to the Study

The world is experiencing an era which has been termed the “knowledge age” or the “knowledge economy”. In this new context, knowledge is the primary commodity, and knowledge flows are regarded as the most important factors in the economy. For example, Hendricks (1999:160) states that “overestimating the value of knowledge for organisations seems hardly possible” and argues that knowledge permeates every aspect of doing business. Sage and Rouse (1999:205) also argue that information and knowledge are now the elementary resources that enhance the traditional economic resources such as natural resources, human labour and financial resources. uit Beijerse (1999) holds the same point of view and states that whereas traditional economies focused on land, labour and capital as their main production factors, in a knowledge-based economy knowledge is the primary production factor on which competitive advantage depends. Furthermore, Sage and Rouse (1999:207) point to the fact that current industrial and management initiatives depend largely on access to information, and that a noticeable trend is the shift from a product-oriented economy to a service-oriented economy, which is information and knowledge dependent.

Since rapid technological innovations are quickly bridging the gap between competing companies, there has been a trend in the industry to regard the collective knowledge of the employees as the key factor in producing innovative and competitive products. This is illustrated by Zack (1999a:125), who states "business organisations are coming to view knowledge as their most valuable and strategic resource." Nonaka (1998:22) agrees in saying that "in an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge." Similarly, Hendriks and Vriens (1999:114) state that without knowledge, organisations will not survive, and argue that an organisation that relies on knowledge depends more on its intellectual assets that the average production firm. This change of focus forces organisations to re-think the way they manage their business since the focus is no longer on technology, but on people.

The collective knowledge of the employees has become such a critical resource to the organisation that managers, and in particular IT managers, need to know how to manage that intellectual capital. For example, Liebowitz (1999:3) argues that "most managers feel that the critical asset that separates their organisation from their competitors is the knowledge assets or intellectual capital of their employees." McLean (1999a:20) agrees and emphasises that the only irreplaceable capital of an organisation is the knowledge and ability of its employees. "Knowledge is power, and shared knowledge is powerful for companies," argues McNairn (Stadler, 1999a:16). This involves a radical change in mindset, since previously managers did not encourage sharing of knowledge.

However, knowledge workers are no longer restricted by the traditional boundaries in the organisation and hence know-how is not owned by the organisation, but by the individual (Sage and Rouse, 1999:209). Therefore, managing information and knowledge, and the people who have the knowledge in this new era is vital to the survival and success of the organisation. For example, Kingston and Macintosh (2000:121) argue that management of knowledge within organisations has become a crucial activity because many of the activities of organisations and the broader economic and social life today are knowledge-driven. In recent years, this managerial activity has been known as Knowledge Management (KM).

According to Gassner and Holt (1999:52), knowledge management can be defined as the discipline that enables individuals, teams and organisations collectively and systematically to create, share and apply implicit and explicit knowledge to reach the goals of the organisation. Duffy, in Duffy, *et al*, (1999:13) defines knowledge management as "the identification, growth and effective application of an organisation's critical knowledge." Although there is no standard definition of knowledge or knowledge management, the opinions of the leading experts in the field will be used to derive a definition which satisfies the purpose of this research.

1.2 Importance of the Study

"The present state of technology does not permit true KM to be achieved without a significant human contribution . . . the best that can be achieved is a combination of culture and IT infrastructure which promotes the capture, retention, sharing and use of knowledge within, and to the benefit of, an organisation." - Butler Group (1999:3).

Knowledge Management is more than just technology and applications transforming information into data. In the words of Sage and Rouse (1999:206), organisational productivity is not necessarily improved unless the organisation pays attention to the human side of developing and managing technological innovations. Whereas it is true that there are applications that can extricate meaningful information from data, there are none that can derive knowledge from information. This is because knowledge is "awareness or familiarity gained by experience", and this definition excludes current technology from gaining knowledge. Existing technology is incapable of experiencing something, and hence KM needs to consist of a combination of technology and human experience. This leads to a situation where managers rely on their employees to acquire, retain and use the knowledge and experience which is vital to the organisation. Sage and Rouse (1999:207) argue that the potential outcome of this mutual shaping of information technology and man is knowledge capital, and this creates a need for knowledge management. Hence it is the manager's responsibility to manage this knowledge and to ensure that it grows and gets disseminated throughout the organisation.

Although the field of Knowledge Management (KM) is not new, the level of KM hype is impressive. This is mainly due to the fact that organisations are spending large amounts of money on "knowledge management programmes" and there is a proliferation of literature on that subject. For example, Jooste and Duffy, in Duffy, *et al*, (1999:I) cite Eadie who states that there were more books, reports, conferences and seminars in 1998 on knowledge management than on any other topic. White (1999:64) argues that it is necessary for KM to become the primary business objective, if it is to move beyond the status of just being a "fad". Most authors believe that knowledge is a natural progression from information, just as information is a natural progression from data, and that ultimately "wisdom" will evolve from knowledge. For example, Professor Suresh Khota, from the University of Washington, states that being involved in knowledge management is a natural progression from strategic management, and that according to him, KM is part of the strategic vision for organisational competitiveness (Stadler, 1999d:24).

The growing importance of Knowledge management in monetary value is also an important motivational factor for organisations to start looking into implementing a form of KM in their business. Romberg, in Duffy, *et al*, (1999:I) predicts that the KM applications market is expected to exceed US$ 1 billion worldwide by 2002, and the accompanying services will grow more rapidly to exceed US$ 5 billion. S Madan, a senior KM analyst from Ovum, forecasts that the worldwide market for KM software will increase from US$ 515 million in 1999 to US$ 3.5 billion by 2004, while in the same period KM services will grow from US$ 2.6 billion to US$ 8.8 billion (Unknown, 1999:16). This amounts to the KM market growing to US$ 12.3 billion by 2004, which is a clear indication of the growing importance the industry attaches to Knowledge Management.

In more concrete examples, White (1999:64) cites an estimation from James Quinn that three-quarters of the value added in manufacturing comes from information and knowledge, and that four-fifths of Levi Strauss' expenditure is not on denim or the production of denim, but on information. O'Dell and Grayson, in Jooste (1999:25), mention Texas Instruments, who used sharing of best practices in their KM initiative which allowed savings of US$ 1.5 billion in manufacturing plant costs. Similarly, Perkins, in Jooste (1999:25), gives the example of Ford Motor Company which saves

US$ 600 million every year by using web-based sharing of best practices. McLean (1999a:21) argues that globalisation has contributed to make knowledge even more important.

However, there is a tendency for KM initiatives to fail. For example, J Botkin, in Jooste (1999:26) argues that "fewer than 20% of knowledge management systems enhance the bottom line while more than 30% are outright failures." According to uit Beijerse (1999), a study by the Dutch Knowledge Management Network reports that the average company uses only 20% of the knowledge that is potentially available in the organisation. Stadler (1999b:24) reports that one of reasons for failures in knowledge management initiatives is that some organisations have started out by buying a product rather than creating a culture or a process by which knowledge can be shared. Similarly, Malhotra (2000:5) argues that confusion between information and knowledge has caused managers to invest billions of dollars in information technology initiatives that have resulted in marginal results. He argues that the primary cause is that managers do not realise that unlike information, knowledge resides in people. Nonaka (1998:23) agrees, and argues that few managers understand the true nature of the knowledge-creating company, let alone how to manage it. The reason, he argues, is that managers misunderstand what knowledge is, and what the organisation must do to exploit it.

Carlson (1999) proposes three main reasons why organisations need a Knowledge Management strategy. Firstly, he argues that due to personnel turnover, the organisation loses invaluable knowledge stored in the employees' brains. Thus, when an employee leaves the organisation, the experience and knowledge that person has acquired is lost forever. Hence a strategy is needed to capture that knowledge to re-use it in the organisation. Secondly, storing the knowledge and experience of present and previous employees allows the organisation to re-create its past successes. For example, when the management of Ford Motor Company wanted to know why its Taurus design was such a success, no one could answer, because no records about the Taurus project were kept. As a result, Ford could not use its successful project management from the Taurus project on other projects. Lastly, Carlson (1999) argues that a KM strategy allows an organisation to learn from the past, and hence to avoid making the same mistakes.

From these examples, it can be seen that KM is not just a passing hype, but is very real and helps organisations to cut back on costs and produce better products and services. Hence, there is a real need for Knowledge Management practices in the workplace so that managers can promote the sharing of knowledge and allow the organisation to acquire and retain intellectual capital. The automotive industry, for example, is highly competitive and innovative, customer needs are constantly changing, and the technology is also always changing. Therefore motor vehicle manufacturing companies need the organisation to be rich with information and knowledge to make confident and timely decisions to succeed (Miller, 1999:1).

However, there is a lack of formal procedures and strategies, technology and metrics to ensure that a knowledge management initiative succeeds. Hence, amongst other things, there is a need for implementation strategies for KM that ensures the success of the knowledge management initiative and of the business itself.

This research was started in response to a need from the South African Motor Vehicle Industry for a knowledge management implementation strategy tailored to their needs. Therefore, the aim of this research is to develop a knowledge management implementation strategy suited to the needs of the South African Motor Vehicle Manufacturing industry. The author will aim to construct a knowledge management implementation strategy which conforms to the systems approach, and which is holistic in nature. Hence, the proposed model will suit the needs of the target industry.

1.3 Statement of the Problem

This research aims to develop a knowledge management implementation strategy that will allow a motor vehicle manufacturing company to acquire, develop, enhance & retain knowledge in the organisation.

1.3.1 Statement of the Sub Problems

1. Define and explain knowledge and knowledge management.
2. Assess and discuss existing KM implementation strategies and frameworks.

3. Assess existing knowledge management practices in organisations through the use of case studies
4. Investigate existing knowledge management practices in the South African motor vehicle manufacturing industry.
5. Develop a model of knowledge management implementation strategy suited to the needs of the South African Motor Vehicle Manufacturing Industry.
6. Verify the validity of the critical success factors of the model by conducting an empirical study in the form of canvassing the opinion of industry practitioners.
7. Modify the model based on the results of the empirical study.

1.4 Scope of the Research

1.4.1 Hypotheses

The hypotheses which will be tested in this study will be derived from the theoretical Knowledge Management model which will be developed in the course of the research. These hypotheses will be identified and described in Chapter 6 of this thesis.

1.4.2 Delimitations

This research is limited to the South African Motor Vehicle Manufacturing Industry, which comprises six (6) organisations.

This research is limited to investigating the knowledge management implementation strategies, and will not focus on low-level implementation details, such as technological problems and/or discussions.
The research is also focused on the theoretical aspect of knowledge management, and will not attempt to implement the model in the organisations identified for the study.

1.4.3 Assumptions

This research assumes that the South African Motor Vehicle Manufacturing Industry regards Knowledge Management practices to be vital to their growth and survival. The research also assumes that these organisations are aware of knowledge management, and are already involved in some knowledge management practices.

1.5 Methodology

The research started with a literature review to define and assess the nature of knowledge and knowledge management. The literature was also reviewed critically to analyse existing knowledge management strategies, and case studies. A survey of the South African Motor Vehicle Manufacturing Industry was then carried out, in order to assess the state and level of KM in these organisations.

A model of knowledge management implementation strategy was then developed for the target industry based on the findings of the literature survey and the study of the target industry. This model was developed in line with the systems approach, and is holistic in nature. The Critical Success Factors of the model were then extracted, and a survey of the opinions of various South African organisations validated aspects of the model. Two aspects of the model were also modified based on the results of the study.

1.6 Summary of Results

The general contribution of this research is the development of a Knowledge Management Implementation Strategy suited to the needs of the South African Motor Vehicle Manufacturing Industry, but which can also be used by any other organisation.
A summary of the results is presented below:

- Preliminary findings from the literature showed that although many organisations are very interested in implementing knowledge management

practices, most of them rely too heavily on technological solution at the expense of the human approach. These findings were confirmed by a study of the South African motor vehicle manufacturing industry using Duffy's Knowledge Benchmarking Questionnaire (Duffy, 1999).

- It was also found that too many knowledge management strategies rely on a prescriptive approach to the problem, whereas what is needed is a balance between a prescriptive and a descriptive approach.

- The literature also revealed possible solutions to this problem, in the form of a hybrid approach combining both the prescriptive and the descriptive approach.

- The literature also recommended using the systems approach to ensure a better implementation and integration with the rest of the organisational structures and processes.

- The theoretical model developed in this research consists of three main interlinked components: Knowledge Management of the Organisation, Knowledge Management of the People, and Knowledge Management of the Infrastructure and Processes. The argument proposed by the model is that the organisation needs to balance its focus on these three subsystems in order to achieve a successful knowledge management effort. Furthermore, this produced a framework which is in line with the systems approach.

- The most important aspects of the model were then defined as the Critical Success Factors (CSFs), and were tested through the use of an empirical study.

- The study validated all of the CSFs, and two were subjected to some modifications in line with the results of the study. The CSFs are listed below:

    1. Alignment of KM strategy with Business Strategy
    2. Top Management Support
    3. Create and Manage Knowledge Culture
    4. Use of a Pilot Project

5. Create and Manage Organisational Learning
6. Manage People
7. Choosing the Right Technology

The following CSFs were confirmed without modification:

1. Alignment of KM strategy with Business Strategy
2. Create and Manage Knowledge Culture
3. Use of a Pilot Project
4. Create and Manage Organisational Learning
5. Manage People

Only two of them required minor modifications:

2. Top Management Support
7. Choosing the Right Technology

- This indicates that the reasoning behind the development of the theoretical model is sensible. However, only a full-scale implementation of the model in the South African motor vehicle manufacturing industry or another organisation can validate the model completely.

- Due to the high-level nature of the model, and its holistic approach to knowledge management, it was also noted that the model could be used not only by the target industry, but also by other organisations.

1.7 Thesis Organisation

This thesis is organised in eight (8) chapters and six (6) appendices:

Chapter 1: Introduction

Chapter 1 introduces the research area. The problem under investigation is depicted, contextual background information is provided, and the motivation for conducting the research is given. The problem statement is then divided into specific sub-

problems which will be investigated. This chapter also lists the assumptions under which the research is conducted and the delimitations of the research. Finally, this chapter presents a summary of the results and the thesis organisation.

Chapter 2: Knowledge and Knowledge Management

Chapter 2 discusses the definition of knowledge and knowledge management. The opinion of various authors regarding knowledge and knowledge management is also discussed. The two types of knowledge are introduced, as well as the concept of intellectual capital. Finally a definition of knowledge management for this research is described.

Chapter 3: Knowledge Management Implementation Strategies

Chapter 3 describes existing knowledge management implementation strategies, and analyses them according to the work of Rubenstein-Montano, *et al*, (2000). Furthermore, the author also provides a list of factors that affect the knowledge management strategies. Finally, a set of knowledge management case studies are analysed.

Chapter 4: Knowledge Management in the South African Motor Vehicle Manufacturing Industry

This chapter describes a study of the South African Motor Vehicle Manufacturing Industry with regards to the state and level of Knowledge Management present in these organisations. The aim of this study is intended to provide the author with the means to create a snapshot of the state of knowledge management in the motor vehicle manufacturing companies. The results of this study are presented, and then the findings are discussed. The results obtained from this study will help the author to construct a knowledge management strategy that will rectify the apparent shortcomings in the industry.

Chapter 5: A Model of Knowledge Management Implementation Strategy

Chapter 5 proposes a model of knowledge management implementation strategy for the South African Motor Vehicle Manufacturing industry. The model is illustrated

diagrammatically, and explained in detail. The Critical Success Factors of the model are then derived for the empirical study.

Chapter 6: Empirical Study

Chapter 6 describes the empirical study carried out to validate the model proposed in Chapter 5. The research design is explained, the hypotheses defined, and the data collection method is also explained. The results of the study are detailed, with an explanation of the acceptance or rejection of the hypotheses.

Chapter 7: Discussion of Findings and Recommendations

This chapter interprets the results of the empirical study presented in Chapter 6 and puts forward the recommendations of the author in light of these results. A general discussion of the overall results is provided, followed by a detailed analysis of the hypothesis testing process. Further discussion concerning other results is also explained. The recommendations about the proposed model are made, and finally the modified portions of the proposed model are listed.

Chapter 8: Conclusion

This chapter provides the conclusion to this research. The aim of the research is revisited, and the contributions of the research to the body of knowledge are described. Future areas of research are recommended, followed by concluding remarks.

Appendix A: Duffy's Knowledge Management Benchmarking Questionnaire

This appendix contains the Knowledge Management Benchmarking Questionnaire used for the study in Chapter 4. This questionnaire was used with permission from Professor N Duffy.

Appendix B: Detailed Analysis of the Knowledge Management Benchmarking Questionnaire

This appendix lists the detailed analysis of the study conducted in Chapter 4.

Appendix C: Knowledge Management Survey

Appendix C describes the Knowledge Management Survey used to test the model empirically in Chapter 6.

Appendix D & E: Results of the Empirical Study

These appendices contain the results of the empirical study. Appendix D describes the frequency tables, histograms and descriptions of responses to individual questions, and Appendix E contains the results of the analysis of the questions.

Appendix F: Modified Model

The last appendix contains the modified model.

Chapter 2

Knowledge & Knowledge Management

2.1 Introduction

The previous chapter introduced the research and defined the problem under investigation. This chapter explores the definitions of knowledge and knowledge management. The opinion of various authors regarding knowledge and knowledge management is also discussed. The difference between tacit and explicit knowledge is explained, as well as the concept of intellectual capital. The concept of knowledge management is also discussed, and a definition of knowledge management for the purposes of this research is attained.

2.2 What is Knowledge?

Duffy in Duffy, *et al*, (1999:13) defines knowledge as "information that is understood and applied to add value to an organisation." In the same line of thought, Zack (1999b:46) argues that knowledge must be distinguished from data and information. Whereas data represents observations and facts, information is the result of placing data in a meaningful context. Knowledge goes one step further, and according to him (Zack, 1999b:46) is "that which we come to believe and value on

the basis of the meaningfully organised accumulation of information through experience, communication or inference." Hence, in this context, knowledge is considered to be the final step in the evolution of data.

Zack (1999b:46) further refines the definition of knowledge and identifies 5 types of knowledge, which can all be made explicit: declarative knowledge, procedural knowledge, and causal knowledge. Furthermore, knowledge can either be general or specific. He defines these five types of knowledge as following:

- Declarative: the description of something
- Procedural: the knowledge about the occurrence or procedure involved in creating something
- Causal: the knowledge about the causes of events.
- General: knowledge that is broad in nature, publicly available and independent of particular events
- Specific: -knowledge that is context-specific.

On the other hand, Snowden (1999:42) warns that this model, which assumes a linear progression from data to information to knowledge, is false and misleading. He explains that unlike the transition from data to information, knowledge is not simply a higher order of information but occurs from a person's "sense-making" ability. In the same line of thought, Grey (2000) states that knowledge is "the full utilisation of information and data, coupled with the potential of people's skills, competencies, ideas, intuitions, commitments and motivation."

Similarly, Wiig (1996) defines knowledge as "the insights, understandings, and practical know-how that we all possess -- is the fundamental resource that allows us to function intelligently." Brooking (1999:5) defines knowledge as "information in context, together with an understanding of how to use it." These definitions suggest that knowledge is a property of the human mind, and which technology alone cannot achieve. This point is illustrated by Hendriks (1999:160) who states that strictly speaking, knowledge only exists at the individual level, as only individual people have knowledge. Tiwana (2000:58) agrees, and defines knowledge as being part of

the minds of people through their experiences and jobs, and lies in connections and conversations between people.

Authors such as Davenport and Prusak (1998), Zack (1999a & 1999c), Tiwana (2000), and Sveiby (2000a) also emphasise the concept that knowledge provides "increasing returns." Davenport and Prusak (1998:17) state that the knowledge advantage is sustainable because it generates increasing returns, and that unlike material assets, knowledge assets increase with use. Unlike traditional resources such as tangible goods, the more knowledge is used, the more valuable it becomes, creating a "self-reinforcing cycle" (Zack, 1999a:128). Tiwana (2000:48,92) also argues that knowledge increases in value the more it is used. Similarly, Sveiby (2000a) argues that knowledge grows when used and decreases in value when not used, and states "Knowledge shared is Knowledge doubled."

For the purposes of this research, knowledge will be defined as the human expertise stored in a person's brain, gained through experience, and interaction with the person's environment. The author concludes that knowledge is highly subjective, depending on a number of factors such as culture, beliefs, values, insights, intuitions and emotions of the individual. Furthermore, the author also concludes that as knowledge is shared and disseminated throughout the organisation, it increases in value.

2.2.1 Tacit and Explicit Knowledge

There are two types of knowledge that Nonaka, in Duffy (1999:14), recognises: tacit knowledge and explicit knowledge. Zack (1999b:46) agrees, and states that "knowledge can be tacit or explicit." Tiwana (2000:66) also distinguishes between tacit knowledge and explicit knowledge, and defines explicit knowledge as "that component of knowledge that can be codified and transmitted in a systematic and formal language…" Similarly, Nonaka (1998:27-28) defines explicit knowledge as being formal and systematic, and can easily be communicated and shared.

Zack (1999b:46) defines tacit knowledge as being "subconsciously understood and applied, difficult to articulate, developed from direct experience and action and usually shared through highly interactive conversation, storytelling and shared experience." Tiwana (2000:66) also defines tacit knowledge as being personal, context-specific knowledge that is hard to express. Nonaka (1998:27-28) argues that tacit knowledge comprises technical skills which are difficult to acquire, and a cognitive dimension which includes mental models, personal beliefs and perspectives. Tacit knowledge is therefore very difficult to articulate and communicate with others. Baumard (1999:2) agrees and states that tacit knowledge is "something that we know but cannot express." Horvath (2000) shares a similar view, although he further breaks down tacit knowledge into two distinct types: knowledge embodied in people and social networks, and knowledge embedded in the processes and products that people create.

Hendriks (1999:160) argues that knowledge is partly tangible and partly intangible, where tangible knowledge might be in manuals and patents, and intangible knowledge is the know-how of employees. Hendriks and Vriens (1999:114) also point out that the distinction between knowledge that people have and knowledge that can be represented in books, manuals, etc. is commonly considered as tacit and explicit knowledge. Gassner and Holt (1999:52) argue similarly that implicit knowledge is much more elusive to manage, control or measure. Hendriks and Vriens (1999:114) also argue that tacit knowledge is more personal in nature and involves intangible factors such as personal belief, perspective and values embedded in individual experience. Similarly, Augier and Vendelø (1999) argue that tacit knowledge is held in a non-verbal manner and is embedded in routines and culture.

Gassner and Holt (1999:52) also mention that knowledge is made up of tacit or implicit knowledge and explicit knowledge. Explicit knowledge can be more precisely and formally articulated even though it might be removed from the original context (Zack, 1999b:46). Esselaar and Miller (1999:50) also make the distinction between explicit and tacit knowledge. They argue that explicit knowledge can be recorded and reused consistently whereas implicit knowledge may be difficult or impossible to make explicit since it resides in the heads of people. Bhatt (2000) agrees and states that explicit knowledge is easy to articulate, capture and distribute

in different formats, whereas tacit knowledge is difficult to capture, codify, adopt and distribute because individuals cannot easily articulate this type of knowledge. Hendriks and Vriens (1999:114) state that explicit knowledge can also be termed public knowledge, since it covers aspects that can be represented in formal languages and transmitted among individuals.

Snowden (1999:43) distinguishes between tacit and explicit knowledge by using a five-fold classification. Firstly, the processes, documents, filing cabinets, databases and other tangible methods that encompass all the existing explicit knowledge within an organisation are named "artefacts". Secondly, he cites skills which have been acquired or developed over time and through individual and common experiences. Thirdly, heuristics are described as being one of the most valuable assets which may be articulated without the need to render them fully explicit. Fourthly, Snowden (1999:44) argues that experience is the most valuable and most difficult of the tacit assets of the organisation. Finally, natural talent, the fifth factor, is unmanageable, argues Snowden (1999:44).

Nonaka (1998:26-31) in his paper, The Knowledge-Creating Company, introduces the concept of the "Spiral of Knowledge." This concept is illustrated in the following diagram:

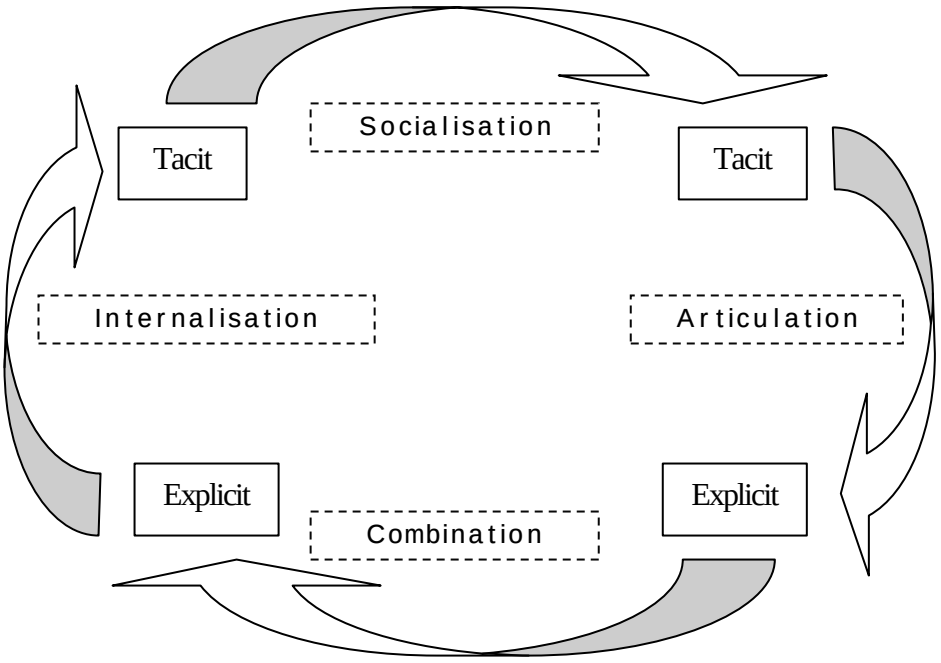

Figure 2.2.1: Nonaka's Spiral of Knowledge

Nonaka (1998:28) defines the process of sharing tacit knowledge as *socialisation*, the process of converting tacit to explicit knowledge as *articulation*, the process of combining explicit knowledge *combination*, and the process of transforming explicit into tacit knowledge *internalisation*. He argues that this process can be likened to a spiral, because after one iteration from tacit knowledge to explicit knowledge and back to tacit knowledge, the process starts at a "higher level", that is, it has increased the knowledge base of the organisation.

Hence there is a consensus among the authors in this field that knowledge can be categorised as being either tacit or explicit, and that tacit knowledge is harder to express than explicit knowledge. In the words of Michael Polyani (in Baumard, 1999:8), "we know a lot more than we can express."

2.2.2 Intellectual Capital

Sveiby (1998) and Brooking (1999) both advocate the concept of "Intellectual Capital" as being an integral part of knowledge and knowledge management. Sveiby (1998) argues that it is better to regard intellectual capital and knowledge management as "two branches of the same tree", and proposes the concept of "intangible assets" which consists of external structure, internal structure, and people's competence. Brooking (1999:16), on the other hand, defines intellectual capital as being the combined intangible assets which enable a company to function, and argues that the intellectual capital of an organisation can be broken down into four categories: market assets, intellectual property assets, human centred assets and infrastructure assets.

Duffy, in Duffy, *et al*, (1999:14) draws from Sveiby (1998), Brooking (1999) and Robson (1998) to define intellectual capital as comprising human capital (employee knowledge), structural capital (capital embedded in systems, processes and procedures), relationship capital (capital in relationships with customers are suppliers) and intellectual property (patents, copyrights, trademarks). Esselaar and Miller (1999:49) provide another view on intellectual capital. In this definition, intellectual capital is defined as "knowledge that can be converted into profit", and

comprises value creation from human capital and value extraction from intellectual assets, including intellectual property. Horibe (1999:3) broadly divides intellectual capital into three areas: human capital, structural capital and customer capital. Edvinsson and Malone (1997) agree, and state that intellectual capital is the knowledge that is valuable to the organisation and consists of human capital, structural capital and customer capital.

Hendriks and Vriens (1999:115) move one step further and recognise the existence of an "organisational memory", which stores all the knowledge acquired in the organisation and is crucial for the creation of new knowledge. This concept is also recognised by Kingston and Macintosh (2000:121) who state that the sum of all knowledge assets of the organisation can be considered to be its organisational memory. Hendriks (1999:160) argues that a main cause for many organisations that fail in leveraging knowledge is that their knowledge remains almost completely at the individual or departmental level. In most cases, this organisational memory is a fusion of technology and people, and it is of major importance to acquire, retain and disseminate knowledge throughout the organisation. For example, Sage and Rouse (1999:205) state that major growths in computing power and communications and networking have changed relationships among people, organisations and technology. Furthermore, they argue that this provides a basis for dramatic increases in learning and both individual and organisational effectiveness. Kingston and Macintosh (2000:121) agree and argue that the explosive growth in use and access to the world wide web and to corporate intranets has provided an unmatched opportunity to distribute knowledge assets throughout organisations, and even multi-national organisations.

The definitions of knowledge are numerous and varied and even more variety exists in the definitions of intellectual capital. Brooking's (1999) definition of intellectual capital is probably the most comprehensive. The concept of organisational memory (Hendriks and Vriens, 1999), (Kingston and Macintosh, 1999) & (Kransdorff, 1999) is also appearing in the literature, and is gaining importance.

2.3 What is Knowledge Management?

The literature contains a number and variety of definitions of knowledge management. For example, Ives, *et al*, (1998:273) state that knowledge management is an emerging practice, and therefore there are many different interpretations as to what KM is and how to use its potential power effectively. Most authors, however, agree on a number of factors to take into consideration when defining knowledge management.

Duffy, in Duffy, *et al*, (1999:13) defines knowledge management as "the identification, growth and effective application of an organisation's critical knowledge." Similarly, Hendriks (1999:161) states that the focus of knowledge management includes the preservation and maintenance of knowledge, which ensure an organisational memory, the identification and localisation of knowledge, the sharing and distribution of knowledge, and the development of new knowledge. In the same line of thought, uit Beijerse (1999) defines knowledge management as the achievement of organisational goals through the strategy-driven motivation and facilitation of knowledge workers to develop, enhance and use their capability to interpret data and information through a process of giving meaning to these data and information.

Stadler (1999e:21) argues that knowledge management is not just about capturing knowledge from the employees, but has more to do with using the employees' intellectual assets, and developing and leveraging these intellectual assets to create a competitive advantage for the organisation. In the same line of thought, Sage and Rouse (1999:206) define knowledge management as the organisation's capacity to gather information, generate knowledge, and act effectively and innovatively on the basis of that knowledge. Similarly, Hendriks and Vriens (1999:114) argue that knowledge management is concerned with ensuring that the right knowledge gets to the right place so that the innovative power of the organisation and its knowledge workers increases.

Esselaar and Miller (1999:49) argue that knowledge management encompasses the management of intellectual capital and its components such as human capital and intellectual assets. Furthermore, they believe that KM is an incremental approach that needs to spread through the thinking of the organisation, and is never complete. In a similar line of thought, Snowden (1999:42) defines KM as the "body of methods, tools and techniques and values through which organisations can acquire, develop, measure, distribute and provide a return on their intellectual assets." Bukowitz and Williams (1999:2) also express the idea of making more money for the organisation through knowledge management, which they define as the process by which the organisation generates wealth from its intellectual or knowledge-based assets. Liebowitz (2000:3) shares a similar view, in saying that knowledge management is the process of creating value from an organisation's intangible assets.

Robert Young, founder and chief executive officer of Knowledge Associates International argues that knowledge management involves the joining of technology, process and people, and that without technology knowledge management would not exist. Furthermore, Young believes that "KM was born from a fusion between IT and human resources" (Stadler, 1999b:19). However, she (Stadler, 1999c:33) argues that while information technology developments have brought about the field of knowledge management, the IT component of KM should always remain the subordinate of the human component. Similarly, Moore (2000:13) argues that knowledge management is not a new practice, but "is as old as civilisation itself." He also argues that technology on its own is simply an enabler and that the real power comes from a change in organisational mindset and culture.

In trying to align knowledge management with the overall business objectives, Kingston and Macintosh, (2000:121) define knowledge management as the identification and analysis of available and required knowledge assets and related processes, and the ensuing planning and monitoring to develop these assets and processes so as to meet the organisational objectives. Similarly, Gassner and Holt, (1999:52) also argue that KM is a field where individuals, teams and entire organisations are enabled to collectively and methodically create, share and apply tacit and explicit knowledge to better achieve the organisation's objectives.

On the other hand, Takeuchi (1998) proposes a contradictory view on Knowledge Management. According to him, the Japanese view of creating knowledge instead of managing knowledge makes more sense, since the Eastern cultures value tacit knowledge more than the Western cultures, which value explicit knowledge at the expense of tacit knowledge. This explains why in most Japanese organisations there is no knowledge management initiative, although these organisations were among the first to recognise the importance of knowledge as a key resource and in producing innovation (Takeuchi, 1998). As opposed to Western views on knowledge management, he advocates less control over employees and involving everyone in the organisation to create and share knowledge, which in turn fuels the organisation's innovative strategy. He quotes Ikujiro Nonaka who argues that "given a certain context, knowledge emerges naturally… give your employees a lot of latitude, do not try to control them."

This radically different philosophy is shared by Sveiby (2000b) who argues that knowledge is not something that can be "managed", and that the term to be "Knowledge Focused" is preferable. He (Sveiby, 2000c) also states that knowledge focussed managers do not manage knowledge, since this is impossible, but the environment in which knowledge is created. According to him, this space is both the intangible culture and the tangible environment, such as the office.

The most comprehensive definition of knowledge management the author has found in the literature originates from the United States Army. This definition contains a similar point of view on knowledge as Takeuchi (1998), Nonaka (in Takeuchi, 1998) and Sveiby (2000b). According to the U.S. Army Knowledge Online Strategic Plan (U.S. Army, 1999:1), Knowledge Management is "an integrated, systematic approach to identifying, managing, and sharing all of an enterprise's information assets, including databases, documents, policies, and procedures, as well as previously unarticulated expertise and experience held by individual workers. Fundamentally it is about making the collective information and experience of an enterprise available to the individual knowledge worker, who is responsible for using it wisely and for replenishing the stock. This ongoing cycle encourages a learning organisation, stimulates collaboration and empowers people to continually enhance the way they perform work." The distinction that the U.S Army makes when it

comes to the "unarticulated expertise and experience held by individual workers" suggests that they place a high value on the tacit knowledge of their people.

For the purpose of this research, the author will adopt the view of Duffy (1999) and include some of Takeuchi's (1998) and Sveiby's (2000b) arguments to propose that knowledge management is the process of identifying, growing and effectively applying an organisation's existing knowledge in order to achieve the organisation's goals, while creating an organisational culture that permits further knowledge creation. Although some authors specifically include aspects such as creating value or wealth in their definitions, the author argues that such concepts are likely to focus too much attention on financial returns while neglecting other business objectives.

2.4 Conclusion

This chapter discussed the definitions of knowledge and knowledge management. The opinion of various authors regarding knowledge and knowledge management was also discussed. The difference between tacit and explicit knowledge was explained, as well as the concept of intellectual capital. The concept of knowledge management was also examined, and a definition of knowledge management for the purposes of this research was reached. The next chapter will continue the literature survey and will deal with knowledge management implementation strategies.

Chapter 3

Knowledge Management Implementation Strategies

3.1 Introduction

The previous chapter explored the definitions of knowledge and knowledge management, and crafted a definition of knowledge management for the purposes of this research. This chapter details a framework for analysing knowledge management strategies. Existing knowledge management strategies are then analysed according to this framework. The most important factors than can affect knowledge management strategies are then discussed, followed by an analysis of knowledge management case studies.

3.2 Knowledge Management Strategies

The Merriam-Webster dictionary defines a strategy as being a "careful plan or method." In a business context, strategy is defined as a well-thought out, high-level plan that accommodates the vision and goals of the organisation. The strategy of an organisation must allow it to achieve the vision that the stakeholders have for the company. In this respect, a strategy cannot be too limiting or too detailed, rather it is a general plan which allows for alternatives should a particular plan of action

fail. This gives the organisation room to adapt to fluctuating factors such as competition, market tendencies and government legislation.

Zack (1999a: 132) states that a knowledge management strategy expresses the overall approach a company intends to take to align its knowledge resources and capabilities to the intellectual requirements of its strategy. Similarly, Seeley (2000:20) defines a knowledge management strategy as being "aimed squarely at that which gives competitive advantage… the ability to acquire and/or create new knowledge quickly." Saint-Onge, in Chatzkel (2000), states that a knowledge management strategy provides the framework within which his organisation manages new initiatives aimed at leveraging the intangible assets of the organisation. Furthermore, the strategy outlines the processes, the tools and infrastructure required for knowledge to flow effectively (Saint-Onge, in Chatzkel, 2000). King (2001:13) argues that the knowledge management strategy focuses on the "acquisition, explication and communication of mission-specific professional expertise that is largely tacit in nature to organisational participants and contexts in a manner that is focused, relevant and timely." Hence it can be seen that these authors hold similar views on what a knowledge management strategy is expected to be.

Most authors argue that KM strategies are unique to the organisations which devise them. For example, Zack (1999a:129) states that each company that he has worked with has devised an approach to knowledge management which is unique to itself. Tiwana (2000:87,160) agrees, and states that there is "no silver bullet for knowledge management", that is, there is no one right way to implement knowledge management. He also states that for knowledge management to be effective, the organisational context must be taken into consideration. Hence, a strategy which might work for a particular organisation might not work for another.

In respect of Knowledge Management Implementation strategies, there are a number of factors which are expected to be common to most, if not all of them. These are alignment of the knowledge management strategy with the overall business strategy; a focus on technology as an enabler, and not the driving force of knowledge management; and the importance of people in knowledge management. These factors will be explored in detail later in this chapter.

In addition to this, the author agrees with Rubenstein-Montano, *et al*, (2000) when they argue that most approaches to knowledge management do not adequately satisfy the knowledge management needs of organisations, and that there is a lack of cohesiveness across the various approaches. In this respect, they (Rubenstein-Montano, *et al*, 2000) recommend that all knowledge management approaches submit to the systems thinking method, which will provide the ability to view complex processes and hence respond to the needs of the organisation. Furthermore, according to them (Rubenstein-Montano, *et al*, 2000), a systems approach to knowledge management will also provide an "overseeing framework, giving a sense of direction to knowledge management initiatives, something which has been lacking until now."

In this respect, Rubenstein-Montano, *et al*, (2000) provide a classification of knowledge management approaches: prescriptive, descriptive and hybrid. Prescriptive approaches provide direction on the types of knowledge management procedures without providing specific details of how these procedures can or should be carried out. Descriptive approaches describe knowledge management, and identify attributes of knowledge management that can influence the success or failure of the initiative. Finally, hybrid approaches are a mixture of both the prescriptive and the descriptive approaches (Rubenstein-Montano, *et al*, 2000).

The author argues that applying the systems thinking approach to knowledge management strategies is advantageous because it provides standards which can be applied to different organisations and across different types of organisations. Furthermore, a systems approach will provide a holistic view of the organisation, which will help solve organisational problems in a more global way. Therefore, the author fully subscribes to Rubenstein-Montano, *et al's* (2000) concept, and will critically analyse the literature in that perspective.

3.2.1 Rob van der Spek, Arthur van Schendellaan & Robert de Hoog

3.2.1.1 Introduction

This framework consists of a cycle of four activities that focus on how to acquire, review, use and evaluate knowledge in the organisation. This cycle is supported by five factors, that outline how to manage the knowledge cycle effectively. The framework also proposes more high-level considerations, for example, the setting of strategic policies. Finally, it identifies potential bottlenecks in the implementation of this framework and recommends six daily managerial tasks that can relieve these bottlenecks.

3.2.1.2 The Framework

van der Spek, *et al*, (1994) propose a framework for knowledge management that undergoes a cycle. Their framework is illustrated in the diagram below:

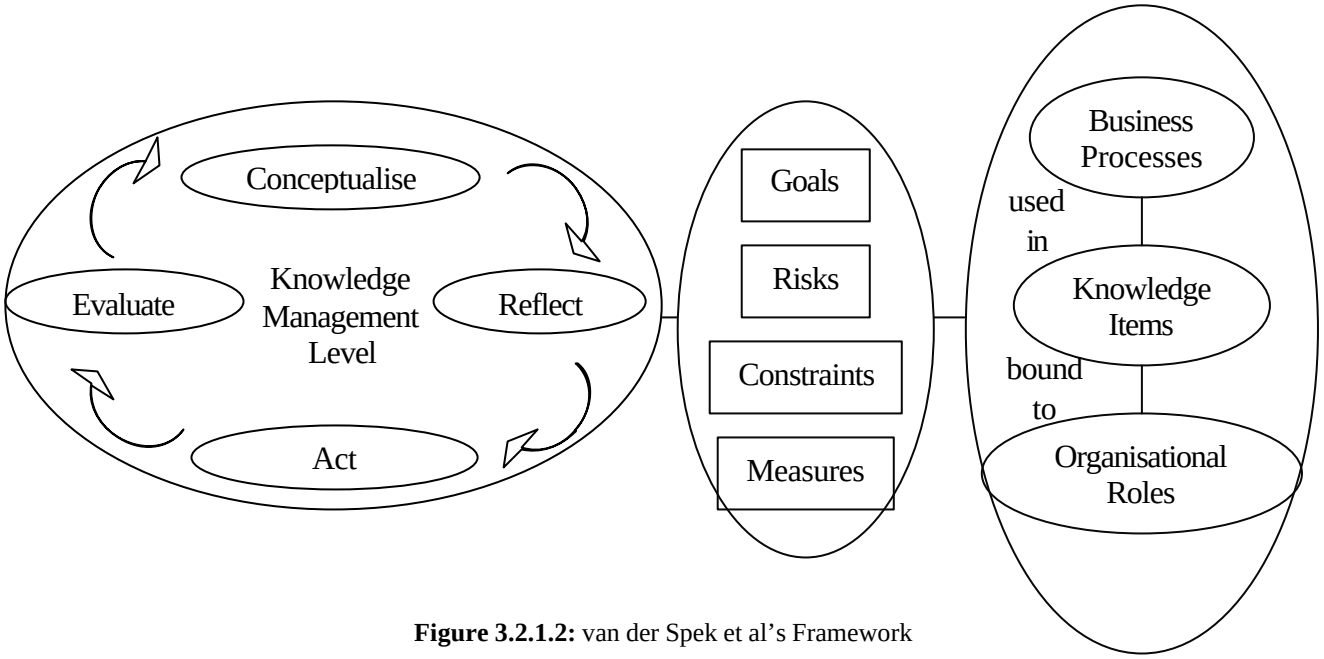

Figure 3.2.1.2: van der Spek et al's Framework

This framework (van der Spek, *et al*, 1994) comprises two levels: the *Knowledge Management* level and the *Knowledge Object* level. The *Knowledge Object* level is described as knowledge items, which are bound to organisational roles, and use business processes. The *Knowledge Management* level comprises of four activities: conceptualising, reflecting, acting and reviewing. *Conceptualising* entails obtaining

an insight into what knowledge is, by way of surveying, classifying and modelling the knowledge. *Reflecting* is the reviewing of the knowledge against a set of standards or factors, and the basic activities are assessment, evaluation and identifying bottlenecks in the organisation with regards to knowledge flows. *Acting* represents the operations carried out on the knowledge in order to improve it, typically formalising, standardising, connecting, distributing, combining and acquiring the knowledge. Finally, *Evaluating* entails assessing the effect of the previous activity in terms of the goals and objectives of the knowledge management cycle. This would comprise activities such as appraisal and evaluation.

Van der Spek, *et al*, (1994) recommend five "support areas":

- Setting goals for a knowledge management cycle;
- Establishing and evaluating risks that occur in the cycle;
- Modelling formal activities and tools for supporting the conceptualising of knowledge;
- Putting measures for supporting actions; and
- Devising techniques for appraising knowledge.

Van der Spek, *et al*, (1994) also put forward a more detailed set of activities to be carried out in terms of setting goals for the knowledge management cycle. Firstly, there must be a strategic policy for the development and application of knowledge for the benefit of the whole organisation. Secondly, the implementation of the knowledge strategy must happen with the help of all relevant parties within the organisation. Thirdly, the daily improvements of the organisation and its business processes must be geared towards knowledge use and development.

Furthermore, by identifying potential bottlenecks in the process, and drawing from the above three goals, van der Spek, *et al*, (1994) identify six daily managerial activities:

- Disclose knowledge so that all individuals can use it in their context;
- Ensure that knowledge is available where it is most effectively used;
- Ensure that knowledge is available when needed;
- Facilitate the effective and efficient development of new knowledge;

- Ensure that knowledge is distributed to the people who need it; and
- Ensure that all employees know where to access knowledge.

3.2.1.3 Classification

This framework recommends a rigorous cycle of activities to be carried out to achieve certain goals. According to the classification provided by Rubenstein-Montano, *et al*, (2000), this framework falls in the category of a prescriptive framework. Although it mentions some factors that can influence the knowledge management cycle, this is not enough. For example, van der Spek, *et al*, (1994) mention the important factor of alignment of the knowledge cycle with the objectives of the organisation, although this is insufficiently explicit. The concept of learning is also strongly emphasised.

3.2.1.4 Critical Analysis

The framework does not distinguish between the explicit and tacit forms of knowledge or how to manage these forms of knowledge. In the author's opinion, this distinction is one of the pillars of a good knowledge management strategy. Furthermore, van der Spek, *et al*, (1994) do not mention the importance of technological infrastructure, and do not recognise the importance of the organisational culture in implementing a knowledge management initiative, another major feature of a good strategy. This framework also does not mention the concept of learning for either the organisation or the individual employee, which suggests that van der Spek, *et al*, (1994) adopt the view of most Western managers that the organisation is an "information-processing" machine, and that people are not important to the overall organisation. This framework also only prescribes a single-loop feedback, which is outdated in today's knowledge economy. These are crucial factors without which any KM initiative is doomed to fail, and it is the author's opinion that this model lacks some of the most important considerations when implementing a knowledge management initiative, and is outdated when compared to the latest thoughts in the field.

3.2.2 Mentzas & Apostolou

3.2.2.1 Introduction

This framework consist of four main elements that outline how to implement a knowledge management initiative. These elements are supported by numerous factors which may affect the outcome of the initiative. There is also a strong emphasis on the alignment of the strategy with the organisation's overall goals. The framework also contains a knowledge process which details how the knowledge of the organisation should be managed.

3.2.2.2 The Framework

Mentzas and Apostolou (1998:2) provide a Knowledge Management framework that places emphasis on three main objectives:

1. The Business Context at the start of the effort;
2. The specific infrastructure and processes that have been created to support the effort; and
3. The results obtained from the initiative and the lessons learned.

Their (Mentzas and Apostolou, 1998:2) framework comprises four main elements, at the core of which lie the knowledge management processes. The framework is illustrated in figure 3.2.2 below (Mentzas and Apostolou, 1998:2):

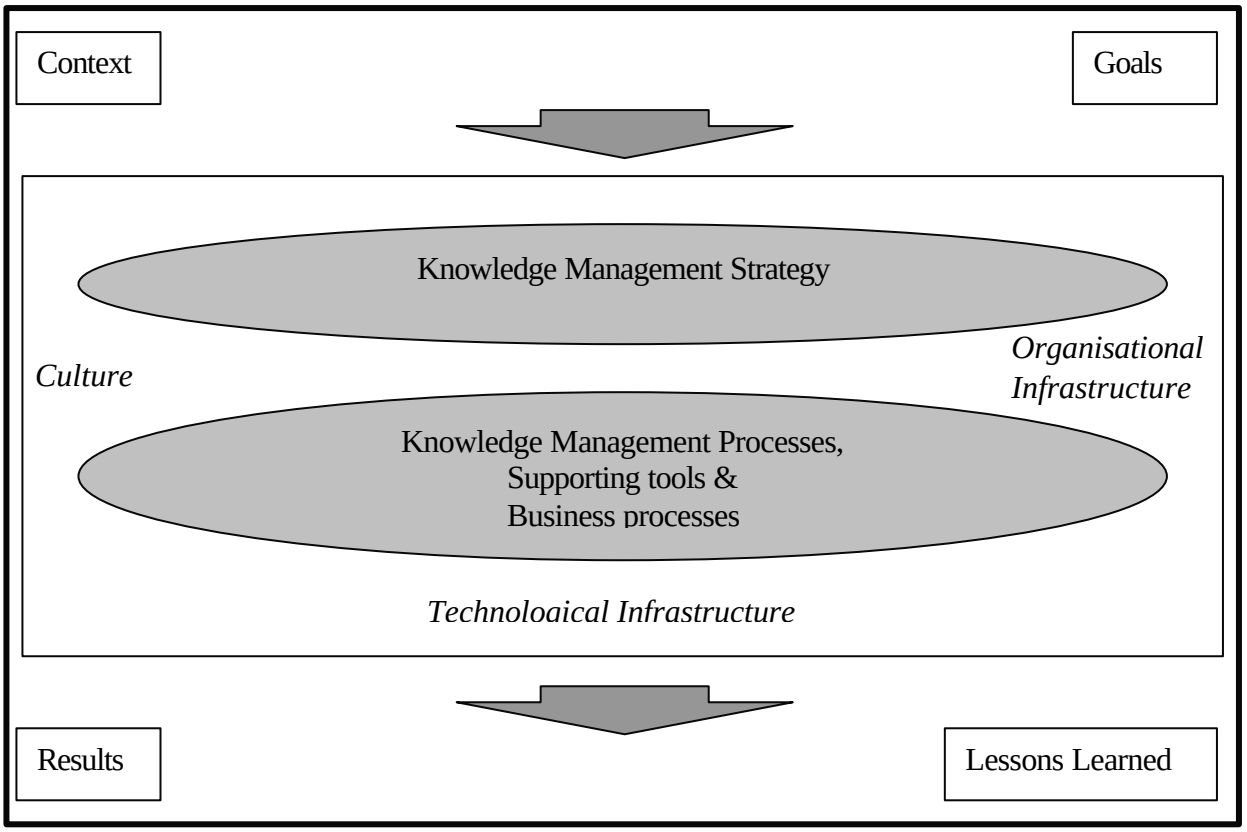

Figure 3.2.2.2: Mentzas & Apostolou's Framework

The *Context* of the framework details the most important factors and constraints on the KM initiative, and also outlines the main external & market forces and internal & infrastructural forces that cause the KM initiative. The *Goals* are those of the KM initiative, but are linked to the overall business goals of the organisation. These two factors provide the input to the framework. The *Knowledge Management Strategy* describes the criteria for choosing what knowledge the organisation plans to focus on, and how it will actually capture and share it. The *Culture* of the organisation also has a very important role to play in the framework, in that a knowledge-friendly culture is one of the most important factors in successful knowledge management projects. The *Organisational Infrastructure* represents the new roles and structures that are created to support the KM initiative in the organisation. Frequently, this would mean the appointment of a Chief Knowledge Officer and Knowledge Managers (Mentzas and Apostolou, 1998:3). *The Technological Infrastructure* refers to the process of developing, identifying and applying the right information technologies to support the initiative, with a particular emphasis on learning and dissemination of knowledge. Finally, the *Results* represents the output of the system,

whereas *Lessons Learned* can be thought of as the feedback of the framework (Mentzas and Apostolou, 1998:3).

The Knowledge Management processes in this framework are: *Knowledge Generation*, *Knowledge Organisation*, *Knowledge Development* and *Knowledge Distribution*. *Knowledge Generation* comprises identifying the relevant knowledge to the organisation and the people who can contribute to enhance that knowledge, the knowledge being acquired from within as well as outside the organisation. *Knowledge Organisation* is the process where the knowledge is organised for future representation and electronic retrieval, and also updating the knowledge repositories to avoid obsolete knowledge. *Knowledge Development* refers to the process of selection and further refinement of the knowledge to increase its value for users, after which the knowledge is seen to represent the best ideas of the organisation and the views of the experts in the field. They (Mentzas and Apostolou, 1998:3) tend to group Knowledge Organisation and Development together, mentioning the fact that "the line between organising and developing material is difficult to draw." They also mention the difference between tacit and explicit knowledge, and the difficulties in codifying the former. *Knowledge Distribution* is the process through which people gain access to material easily, and in a manner which encourages them to use and reuse the knowledge (Mentzas and Apostolou, 1998:3).

3.2.2.3 Classification

This framework describes tasks and processes needed to accomplish a Knowledge Management effort. In addition, it also mentions factors which can influence the initiative's success or failure, namely culture and organisational and technological infrastructure, and also differentiates between tacit and explicit knowledge. Furthermore, the goals of the framework emphasise the business context of the effort, as well as supporting processes and a feedback loop. Therefore, according to the classification devised by Rubenstein-Montano, *et al*, (2000), it ranks as a descriptive framework.

3.2.2.4 Critical Analysis

Mentzas and Apostolou, (1998) mention that one of the goals of the knowledge management initiative is to emphasise the business context of the organisation, and there is mention of the linkage of the knowledge management strategy to the overall business strategy, or how the initiative is geared towards helping the organisation achieve its overall goals. Although they have included a feedback loop, it is a single-loop feedback, which is somewhat outdated in today's innovative knowledge economy. The author argues that the inclusion of a double-loop feedback in a knowledge management framework is crucial for an organisation to respond to its market and competitors in an innovative and proactive manner, instead of responding to these factors in a corrective and incremental manner. In addition, although Mentzas and Apostolou (1998) differentiate between tacit and explicit knowledge, they state that they do not address "the management of tacit and explicit knowledge in a holistic manner." The author argues that this is a drawback, because the management of knowledge should address such an important issue, tacit and explicit knowledge being the main source of innovation and creativity of any organisation and should therefore be managed together, and not separately.

3.2.3 The Knowledge Research Institute

3.2.3.1 Introduction

This framework consists of a cycle of tasks which outline how to manage the knowledge of an organisation effectively. These tasks are supported by a set of implementation issues that the organisation has to deal with in order to achieve success. It does not address high-level issues such as strategic alignment of the initiative to the organisational goals, nor does it mention important factors such as culture and does not place much importance on the people in the organisation.

3.2.3.2 The Framework

Wiig (1999d) proposes a 5-step cycle for Knowledge Management which he terms 'The Institutional Knowledge Evolution Cycle'. This cycle is illustrated in the diagram below (Wiig, 1999d):

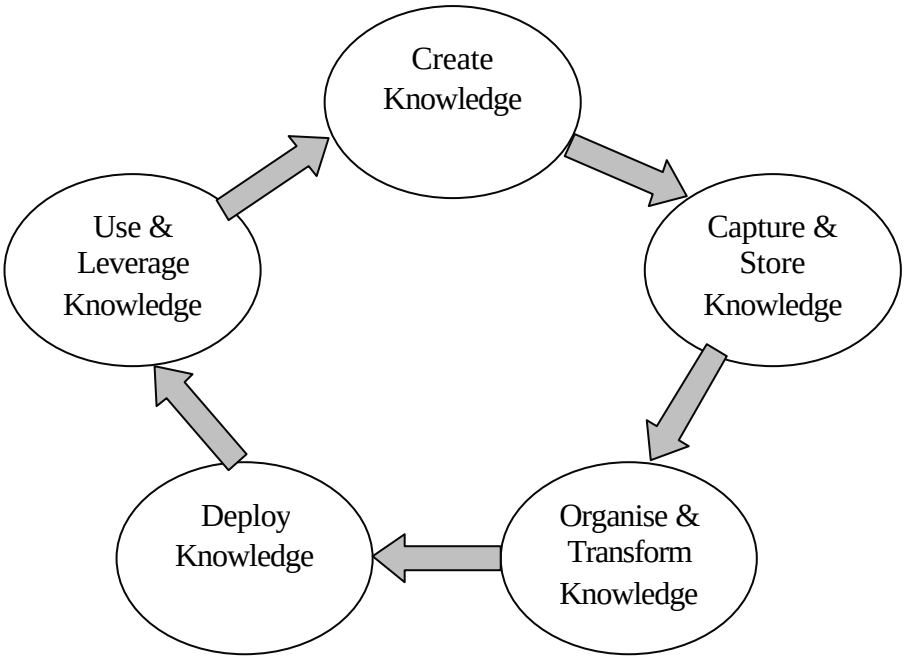

Figure 3.2.3.2: The Knowledge Research Institute's Framework

Wiig (1999d) further expands the five steps depicted in figure 3.2.3 above as follows: *Creating Knowledge* consists of learning, innovating and researching knowledge by using prior and imported knowledge; *Capturing & Storing Knowledge* is done in order to reuse, build and leverage that knowledge; *Organising & Transforming Knowledge* is carried out in order to make it more available and to instil it in the organisation; Deploying Knowledge in such a way that people, practices, technology, products and services benefit from it; and finally, *Using and Leveraging* that knowledge to act effectively to ensure the success and survival of the organisation (Wiig, 1999d).

At first, this framework does not seem to be very detailed, but Wiig (1999a:18) substantiates it with what he terms 'Comprehensive Knowledge Management', nine implementation issues that must be addressed in order for a KM initiative to succeed:

1. Create an environment of trust, ethical behaviour, mutual respect, support, and open communication about individual employees' functions, roles, and importance of contribution.
2. Develop a broad vision of the knowledge management practice and obtain buy-in from management. This vision provides the guide for creating the needed capabilities in infrastructure in for setting priorities.

3. Pursue a targeted knowledge management focus determined from knowledge landscape mapping and other insights and based on priorities that align with enterprise objectives. Undertake small and sharply focused initiative with clear benefit expectations.
4. Build a professional team and allow it to focus full-time on knowledge management. Designate a few highly competent employees to work dedicatedly with implementation.
5. Install and agree on knowledge management impact and benefit evaluation methods; impacts and benefits are often indirect and happen gradually over time.
6. Implement incentives to motivate individual employees to manage knowledge on personnel and enterprise levels, collaborate broadly, and act intelligently - to innovative, capture, build, share, and use knowledge.
7. Teach metaknowledge to everyone. When allowed to develop metaknowledge knowledge, workers at all levels demonstrate significant increases in the effectiveness and ability to develop and take advantage of improved subject knowledge.
8. Select knowledge management activities that will support the critical success factors by providing opportunities, capabilities, motivations, and permissions for individuals and the enterprise to act intelligently.
9. Create supporting infrastructure. Build upon existing capabilities and gradually add new ones as required to facilitate effective knowledge management, particularly in the chosen areas.

3.2.3.2 Classification

Wiig's (1999d) framework is clearly task-based. Although the supporting issues briefly mention the importance of aligning the knowledge management initiative with the overall business strategy, the framework itself does not emphasise it, nor does it distinguish between implicit and explicit knowledge. Although factors affecting a KM initiative are mentioned elsewhere (Wiig, 1999a:18-19), the framework itself only describes the tasks needed to accomplish a KM initiative. Wiig (199d:18) mentions the importance of cultural factors, and of employees, but does not elaborate on it. Furthermore, there is no feedback loop in the framework.

Therefore, according to the classification devised by Rubenstein-Montano, *et al*, (2000), it ranks as a prescriptive framework.

3.2.3.4 Critical Analysis

This framework does not contain the critical success factors which are essential to any knowledge management initiative, for example, the lack of emphasis on the alignment of the initiative with the business objectives and culture of the organisation. Furthermore, the omission of distinguishing between tacit and explicit knowledge is a drawback, because the management of knowledge should address such an important issue, tacit and explicit knowledge being the main source of innovation and creativity of any organisation and should therefore be managed explicitly. Hence the author argues that Wiig's (1999d) framework is not particularly suited to be classified as a well-rounded framework.

3.2.4 Floyd W Carlson

3.2.4.1 Introduction

This framework outlines steps and processes needed to build a Knowledge Management system. It also mentions factors which can influence the initiative's outcome, namely culture and organisational and technological infrastructure, and also differentiates between tacit and explicit knowledge. Furthermore, it emphasises the importance of aligning the KM initiative with the business strategy, as well as treating the initiative like any other project in the organisation.

3.2.4.2 The Framework

Carlson (1999) proposes a six-step knowledge management implementation framework:

1. Determine the Knowledge Barriers;
2. Know the organisation's Information Needs;
3. Determine a Strategy;
4. Focus the KM initiative through a Value Proposition;
5. Implement Supporting Enablers for KM; and

6. Plan, Design and Implement the system.

The first step consists of the organisation learning what barriers exist to sharing knowledge in the organisation, and plan how to overcome these barriers. Carlson (1999) recognises four different types of barriers: Organisational Structure Barriers, Boundary Barriers, Management Support Barriers and Technology Barriers. Organisational barriers refer to the structures in an organisation which preclude the sharing of knowledge. Typically, such barriers would consist of structures where there are no incentives to share, the organisational culture prefers unique ideas rather than sharing information, there are no common languages between departments to allow them to share knowledge, the organisation overlooks tacit knowledge because it focuses too much on explicit knowledge and management forces employees to share knowledge. Boundary barriers exist in the organisation and prevent knowledge flows within the organisation, typically because there is no common language or culture between departments or divisions. As with any project, a lack of management involvement and support can also cause a KM project to fail. Hence the organisation must strive to remove those management support barriers. Finally, there are Technology Barriers, where typically management expects that knowledge sharing will take place if the technology is in place. Once the organisation has identified which barriers are present in the organisation, it should then put in place the appropriate measures and structures that will overcome those barriers and allow knowledge flows to take place in the organisation (Carlson, 1999).

The second step in Carlson's (1999) framework indicates that the organisation should identify what information is needed, who has it and how and where to get this information from. One way of accomplishing this is to conduct a knowledge audit (Carlson, 1999). The third step in this framework is to align the KM project to the overall business strategy (Carlson, 1999). He proposes three models that can be used to do this: the Library Model, where a library of knowledge is constructed; Community of Interest Model, where people with common interests are brought together; and Shaping How People Learn, where the quality of people's contribution is improved.

The fourth step is to focus the KM project by choosing a value proposition (Carlson, 1999). He argues that this is a crucial step to ensure that: resources are used in the appropriate areas, the appropriate knowledge is shared in the organisation and it helps to obtain managerial support and financial backing. Carlson (1999) proposes three value propositions: Customer Intimacy, Product-to-Market, and Operational Excellence. The Customer Intimacy focuses on retaining the customers of the organisation and making sure that these customers are fully satisfied with the products and services that they purchase. The Product-to-Market proposition focuses on delivering products to the market as rapidly and as successfully as possible. Finally, the Operational Excellence proposition focuses on cost reduction and performance increase.

The fifth step in this framework consists of implementing supporting enablers for the KM project. This helps the organisation to create an environment which encourages knowledge sharing (Carlson, 1999). He identifies four enablers: Culture, Technology, Infrastructure and Measure. He (Carlson, 1999) identifies Culture as being the most important enabler, because it "can make or break the knowledge management system." Carlson (1999) also states that Measure is the most difficult and weakest of these fours enablers, since measuring the benefits of a KM project is difficult. Furthermore, Carlson (1999) emphasises that these four enablers must be appropriately balanced such that one enabler does not prevail over the others.

The last step in Carlson's (1999) framework comprises planning, designing and implementing the project. He argues that the best way to achieve this is to use a systems analysis and design methodology. Carlson (1999) also emphasises that a knowledge management project should be managed just like any other projects. Hence, all project management principles and rules should be obeyed.

Carlson (1999) also outlines a Knowledge Management Process, which details how knowledge will actually be managed throughout the organisation. This process comprises: Knowledge Generation, Knowledge Organisation, Knowledge Development and Knowledge Distribution. Knowledge Generation consists of identifying what knowledge will be used in the system, and obtaining that knowledge from users. Next, the organisation must organise this knowledge so that it can be

accessed and retrieved electronically. This knowledge then has to be refined and made more valuable to users in the knowledge development process. Finally, the knowledge acquired must be distributed throughout the organisation. It should be easy for users to access and retrieve this knowledge, and they should be encouraged to use the system (Carlson, 1999).

3.2.4.3 Classification

Carlson's (1999) framework is a hybrid one, according the classification provided by Rubenstein-Montano, *et al*, (2000). For example, it describes steps and processes needed to build a Knowledge Management system, and it also mentions factors which can influence the initiative's success or failure, namely culture and organisational and technological infrastructure, and also differentiates between tacit and explicit knowledge. Unfortunately, there is no mention of feedback loops, but Carlson (1999) acknowledges the importance of aligning the KM initiative with the business strategy, as well as treating the initiative as any other project in the organisation. The need to focus the KM initiative using value propositions is also deemed to be a very positive aspect of this framework.

3.2.4.4 Critical Analysis

This framework is regarded as comprehensive with the exception of one drawback: it lacks any feedback loop. The author argues that this represents a major disadvantage, since there is no formal mechanism for responding to changes in the knowledge management environment. On the other hand, Carlson (1999) emphasises the linkage of the knowledge management initiative with the organisational goals and also includes other factors such as culture and infrastructure. Other positive aspects of this framework include the differentiation between tacit and explicit knowledge. However, since the absence of a feedback loop is the only drawback of this framework, the author concludes that overall, it is a very good example of a proper knowledge management implementation strategy.

3.2.5 Ann Macintosh

3.2.5.1 Introduction

This framework recommends a set of activities and tasks to be carried out in order to manage the "knowledge assets" of an organisation. It also recommends using modelling techniques to manage these knowledge assets, using traditional business management techniques, and new techniques derived from the use of knowledge-based applications. This framework also details the use of Knowledge Management Roadmaps to allow the organisation to visualise its critical knowledge assets and the relationship between these assets and the future human skills, as well as the technologies in the organisation required to meet future market demands. It does not mention the linkage of the knowledge management initiative to the overall business strategy, nor does it mention the importance of employees or of the organisational culture.

3.2.5.2 The Framework

Macintosh (1999) proposes a four-step framework that details how to manage the knowledge assets in an organisation:

1. Identify knowledge assets;
2. Analyse value of knowledge assets;
3. Specify actions necessary to add value to knowledge assets;
4. Review use of knowledge;

Macintosh (1999) defines knowledge assets as the knowledge concerning markets, products, technologies and other organisations that a business possesses or needs to possess, and which enables its business processes to generate profits and add value to its products and services.

The first step consists of identifying what knowledge assets an organisation possesses (Macintosh, 1999). This entails locating where the assets are situated in the organisation, what they contain, what their uses are, what form they are in, and

how accessible they are to the rest of the organisation. The second step entails analysing how these knowledge assets can add value to the organisation (Macintosh, 1999). This can be done by examining where opportunities may lie to use these knowledge assets, the outcome of their use, the barriers to using them, and finally what value the use of these assets would bring to the organisation (Macintosh, 1999). Next, the organisation has to detail what actions are needed in order to add value to the knowledge assets. This can be done by planning what needs to be done with the knowledge assets, how to enable the users to use them, and how to monitor the use of the knowledge assets (Macintosh, 1999). Finally, the last step consists of reviewing the use of the knowledge assets to make sure that they are adding value to the organisation. She recommends finding out whether or not the use of the knowledge assets added value, how the assets can be maintained for the uses that add value, and finally whether or not the assets created new opportunities for the organisation.

Macintosh (1999) also recommends using modelling techniques to manage the knowledge assets of the organisation. She suggests a "multi-perspective modelling approach", which consists of traditional management modelling techniques and knowledge techniques. Specifically, these models need to be able to perform the following:

- Model the Business Processes,
- Model the Resources of the Organisation,
- Model the Capabilities, Roles and Authority,
- Model the Communication between Agents,
- Model the Control over Processes.

Macintosh (1999) also details the use of Knowledge Management Roadmaps, which, according to her, allow the organisation to "visualise their critical knowledge assets, the relationships between these and the skills, competencies and technologies required to meet future market demands." She argues that these road maps will serve as frameworks for supervising the knowledge management programme.

3.2.5.3 Classification

Macintosh's (1999) framework is a task-oriented one. It lists what needs to be done to implement a knowledge management initiative, without taking into consideration factors that can influence the outcome of the initiative, for example, cultural factors, and the importance of people versus technology. This framework does not mention the linkage of the knowledge management initiative to the overall business strategy, although Macintosh (1999) does mention the fact that the knowledge assets should be managed in a way that add value to the organisation. Furthermore, this framework only prescribes a single-loop feedback, in the form of a review process. Therefore, according to the classification devised by Rubenstein-Montano, *et al*, (2000), it ranks as a prescriptive framework.

3.2.5.4 Critical Analysis

The author argues that Macintosh's (1999) framework does not contain the important success factors which are essential to any knowledge management initiative, for example, the alignment of the initiative with the business objectives and taking into consideration the culture of the organisation. Furthermore, Macintosh (1999) does not distinguish between tacit and explicit knowledge, which is a major drawback. She correctly recommends the use of modelling techniques to manage the organisation's knowledge assets. Unfortunately, although she includes a "review" process, this is only a single-loop feature. The author argues that the inclusion of a double-loop feedback in a knowledge management framework is of utmost importance for an organisation to respond to its market and competitors in an innovative and proactive manner, instead of responding to these factors in a corrective and incremental manner. Hence, the author argues that Macintosh's (1999) framework is not a very good one, since it does not address the issue of knowledge management in a holistic manner.

3.2.6 Roelof P. uit Beijerse

3.2.6.1 Introduction

uit Beijerse (1999) has created a knowledge management conceptual model which has been used to analyse an organisation trying to introduce knowledge management. He (uit Beijerse, 1999:104) has tested this model, and reports that the experiment was positive, and that his model covers all the important facets of knowledge management. His model draws heavily on the 'Spiral of Knowledge' from Nonaka and Takeuchi's work, and Weggeman's 'Knowledge Value Chain' (Weggeman, in uit Beijerse, 1999:102). There is a strong emphasis on the strategic importance of knowledge and the linkage between knowledge management and the organisational goals, as well as the organisational culture.

3.2.6.2 The Framework

uit Beijerse (1999:104-106) proposes a 'conceptual knowledge management model', which is based on three main building blocks: Strategy and Mission Statement, Organisation, and Instruments of Knowledge Creation and Learning. The first building block of this model assumes that the management process is motivated by the strategy of the organisation, which is formulated for a short- to medium-term period. uit Beijerse (1999:103) argues that in terms of knowledge management this should 'result in some sort of knowledge policy'. Furthermore, in conjunction with this strategy, the organisation also needs to have a mission statement or vision, which will provide the organisation with a long-term strategy.

The second building block of the model is the organisation itself, which in uit Beijerse's (1999:103) view will act as an instrument in the knowledge management process. An important aspect of this building block is the knowledge infrastructure of the organisation, which he defines as the sum of the organisational structures and guidelines, as well as technical and non-technical facilities present in the organisation. According to him, these structures, guidelines and facilities will assist and support the learning process in the organisation. The knowledge infrastructure is illustrated below (van Heijst and Kruizinga, in uit Beijerse, 1999:103):

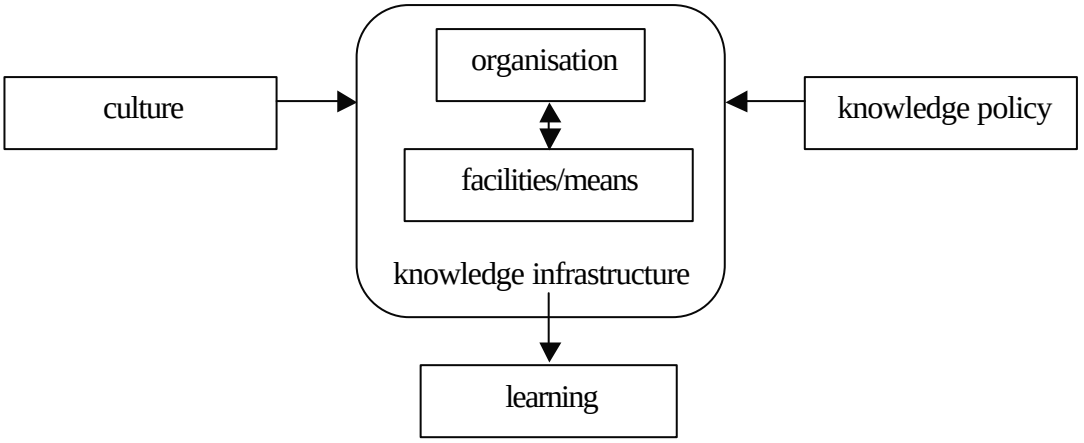

Figure 3.2.6.2a: uit Beijerse Knowledge Infrastructure

According to uit Beijerse (1999:103), the knowledge policy establishes what needs to be learned, where the learning will occur, who will learn and when. The organisational culture will resolve how this learning takes place.

The third and last building block of his model consists of instruments that are used to manage tacit and explicit knowledge. These instruments are used primarily to help knowledge creation and learning in the organisation. uit Beijerse (1999:105) classifies these instruments according to the interaction between tacit and explicit knowledge as defined by Nonaka and Takeuchi (1995), and Weggeman's 'knowledge value chain' (Weggeman, in uit Beujerse, 1999:102). Some of these instruments include: management carrying out walk-arounds, traineeships, project teams, an intranet, the Internet, benchmarking and reading reports. uit Beijerse (1999:105) defines these instruments as the 'knowledge infrastructure' of the organisation, illustrated in figure 3.2.6.2b.

uit Beijerse (1999:104) then presents his conceptual knowledge management model, which he argues covers all the important aspects of knowledge management. The model is shown below in figure 3.2.6.2b:

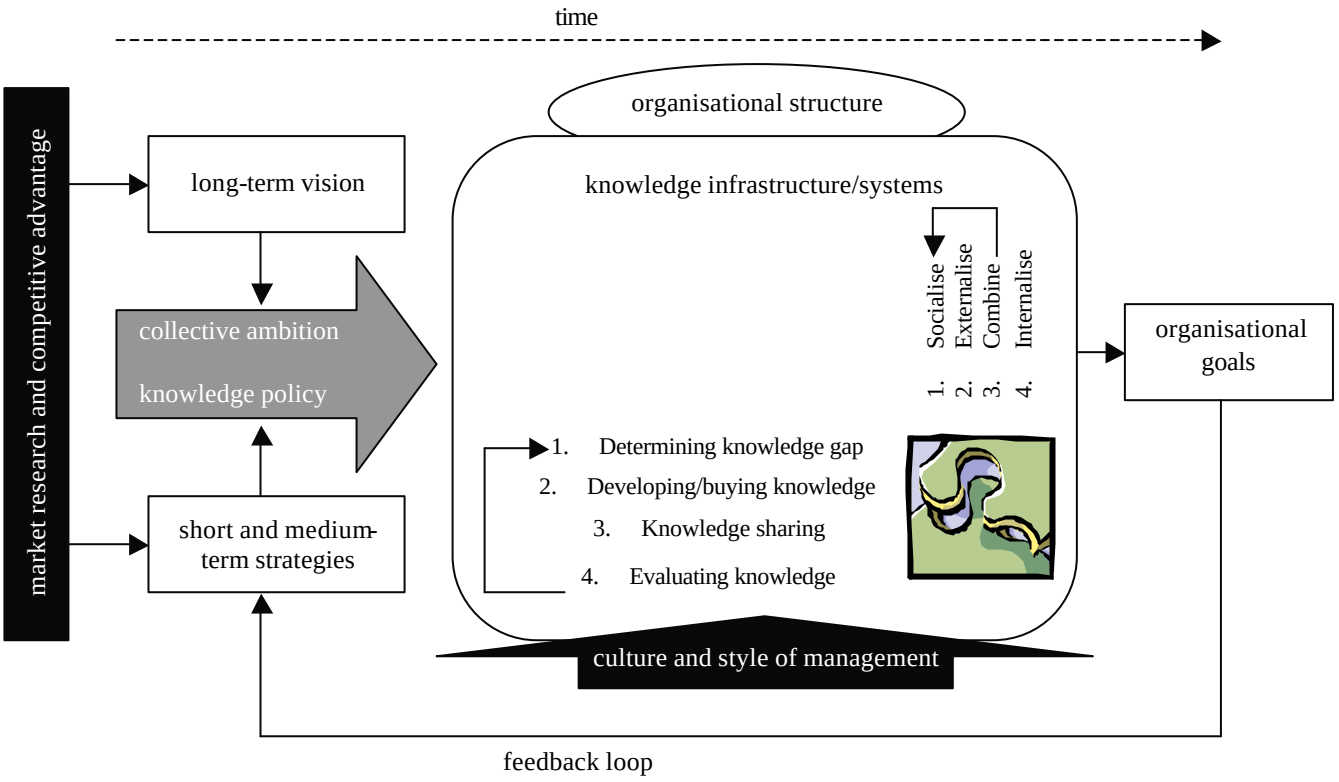

Figure 3.2.6.2b: uit Beijerse's Framework

uit Beijerse (1999:104) argues that it is crucial to any knowledge management initiative that the organisation starts by looking at its market and its competitors, particularly what its customers want and what its competitors are doing. Drawing from this preliminary analysis, management should then create a long-term vision which expresses what the organisation wants to achieve over the long term. This long-term vision will also act as the 'collective ambition' of the employees. He also recommends that together with this long-term vision, the organisation creates short- and medium-term strategies that dictates how the goals of the organisation should be achieved. Ideally, these short- and medium-term strategies should be grouped in a 'knowledge policy' (uit Beijerse, 1999:104). He defines the instruments with which knowledge is managed, and learning encouraged as the heart of his model. These instruments form the knowledge infrastructure of the organisation, which is part of the overall organisational structure.

The culture of the organisation supports the organisational structure, and is crucial for the success of the knowledge management initiative. uit Beijerse (1999:105) argues that it is very important that the organisational culture is focused on the

sharing of knowledge among employees, and that the management style of the organisation has to be stimulating and motivating and focused on sharing knowledge. At the end of this process, the knowledge is linked into the organisational goals, although he emphasises that this process is not linear, but includes a feedback loop to revise the short- and medium-term goals of the organisation.

3.2.6.3 Classification

uit Beijerse (1999) has constructed a conceptual model of knowledge management that provides details of the knowledge management process which are important for the success or failure of the organisation. For example, there is a strong emphasis on the strategic importance of the knowledge management process being aligned with the organisational goals, the importance of organisational culture, and the management style. Furthermore, he recognises the importance of having a feedback loop to make corrections to the strategies of the organisation. Therefore, according to the classification provided by Rubenstein-Montano, *et al*, (2000), this framework ranks as a descriptive one.

3.2.6.4 Critical Analysis

This framework provides a very solid model on which an organisation can build its knowledge management initiative. uit Beijerse (1999) strongly emphasises the strategic linkage between knowledge management and the organisational goals, the importance of short- and medium-term strategies, the knowledge structure, the culture and management style, and the necessity of a feedback loop. He also recognises the importance of differentiating between tacit and explicit knowledge, and the different instruments to use for determining, developing, sharing and evaluating each type of knowledge in the organisation. Therefore the author concludes that uit Beijerse's (1999) model is a very good one.

3.2.7 David J Skyrme

3.2.7.1 Introduction

Skyrme (1999) proposes a framework based on an international study of best practices in organisations over a period of one year, and his own consulting experience in knowledge management. His framework recommends approaching knowledge management through three 'layers', which each deal with an aspect of knowledge management in the organisation. Furthermore, Skyrme (1999) recommends a holistic view of knowledge management, and provides a number of strategies to achieve this, namely, the knowledge advantage, two knowledge strategies, the knowledge dimension, and seven knowledge layers. There is also a strong emphasis on the need for the knowledge management effort to be part of the overall business strategy, the importance of people and cultural factors, and other issues that will affect the success of the effort.

3.2.7.2 The Framework

Skyrme (1999) proposes a framework made up of three layers: Enablers, Levers and Foundations. The framework is illustrated below (Skyrme, 1999):

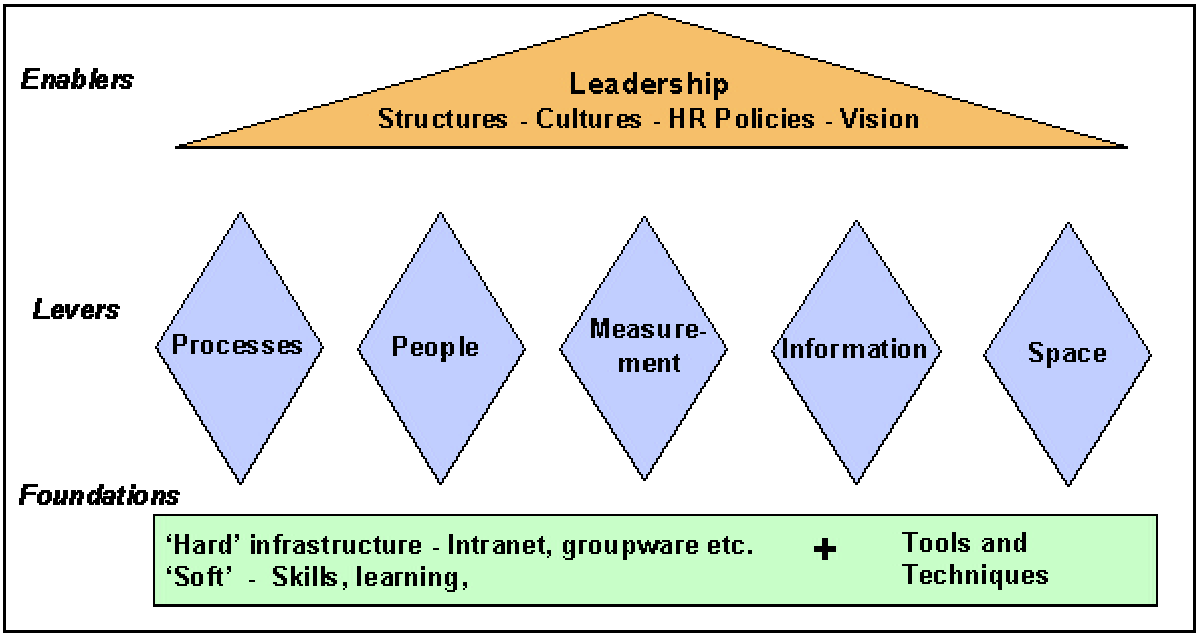

Figure 3.2.7.2: Skyrme's Framework

The top layer is made up of the enablers of the framework. The most important enabler is organisational leadership (Skyrme, 1999). The organisation should appoint a senior 'knowledge champion', and the senior management team should be aware that knowledge is strategic to the organisation's success. Furthermore, the senior management teams should be responsible for propagating this vision to the rest of the organisation. They should also ensure that the proper organisational structures and human resources policies are in place to support the knowledge management effort. Finally, senior management should ensure that the organisational culture encourages knowledge sharing (Skyrme, 1999).

The second layer of Skyrme's (1999) framework consist of a number of 'levers', that intensify the contribution of knowledge in the organisation. The levers are: the processes which ease the knowledge flows in the organisation, the effective handling of information, and the measurement systems. At this point, he points out the difference between tacit and explicit knowledge, and argues that the management of each type of knowledge is very different, hence the inclusion of the two other levers, people and space. Skyrme (1999) argues that because tacit knowledge is located in people's heads and is personal, managing this type of knowledge also means managing people, as well as the environment in which they work.

The last layer of this framework offers the organisation the capability to embed the knowledge into the organisation's infrastructure (Skyrme, 1999). This infrastructure has two thrusts, a 'hard' one and a 'soft' one. The hard infrastructure deals with the information and communications infrastructures that allow knowledge sharing, while the soft infrastructure takes care of developing knowledge-enhancing roles, skills and behaviours. This layer also comprises tools and techniques for enabling knowledge capture, organising and sharing (Skyrme, 1999).

Skyrme (1999) points out that an effective knowledge management effort should adopt a holistic view of the organisation and ensure that there is appropriate balance between the various layers. In order to achieve this, he also recommends analysing the organisation's 'knowledge advantage', choosing between two 'knowledge strategies', dealing with the 'knowledge dimension', and focusing on seven 'knowledge layers'.

The Knowledge Advantage

Skyrme (1998) argues that there are three ways in which knowledge can be used in the organisation to provide a strategic advantage:

1. Knowledge in Products
2. Knowledge in People
3. Knowledge in Processes

Skyrme (1998) argues that an organisation can use knowledge to create more advanced products that can justify premium prices, thus ensuring an advantage over its competitors. Secondly, the people in the organisation should become a part of the 'learning organisation', where their personal knowledge becomes a part of the organisation. Thirdly, the processes in the organisation can be enhanced by using the best practices of a team or section of the organisation and replicating them throughout the entire organisation, thus reducing costs of production.

Knowledge Strategies

Skyrme (1998) argues that there are two main types of strategy that an organisation can use to develop its knowledge assets: Use the Existing Knowledge, and Create New knowledge. He reports that during a study of international best practices, managers often complained that they wasted resources 'reinventing the wheel' or failed to solve a customer's problems, because they did not know that the knowledge they needed was already available in another part of the organisation. He also reports that one of the first things that organisations do when starting a knowledge management initiative is to create or enhance an intranet.

The second type of knowledge strategy that organisations use is to create new knowledge, and produce new products and services from new and creative ideas. Skyrme (1998) notes in his study that there already exists a large pool of creativity in organisations, but that management should not lose these creative ideas and should allow them to arise where they can be used. He (Skyrme, 1998) argues that this strategy is the most difficult, but properly managed can bring success to the organisation.

Knowledge Dimension

Skyrme (1998) also argues that one of the realistic problems of building knowledge strategies is the complicated nature of knowledge itself. He argues that this is because knowledge takes two forms: explicit and tacit. The difficulty lies with tacit knowledge, which, unlike explicit knowledge, is harder to express and codify. There are two complementary methods of keeping the organisation's knowledge in-house:

1. Converting Tacit to Explicit Knowledge
2. Enhancing Tacit Knowledge flows in the organisation

The first method focuses on converting tacit knowledge into a more explicit form, usually in the form of documents, processes and databases. Skyrme (1998) points out that this method is typical of many European and American organisations, and labels it a 'Western tendency.' The second method tries to enhance tacit knowledge transfers through better human interactions, hence the knowledge is disseminated throughout the organisation and becomes part of the organisation, not only the individual. Skyrme (1998) argues that social activities support this type of knowledge transfer, and can ignite the generation of new ideas and knowledge. However, he also recommends having sound human resources management in the form of a challenging work environment, personal development plans, proper motivation and suitable reward and recognition plans.

Knowledge Layers

Skyrme (1998) also differentiates between seven different 'knowledge layers', sections of the business where key knowledge activities can differentiate an organisation:

1. Customer Knowledge
2. Stakeholder Relationships
3. Business Environment Insights
4. Organisational Memory
5. Knowledge in Processes
6. Knowledge in Products and Services
7. Knowledge in People

In the first layer, Customer Knowledge, some of the key activities include developing deep knowledge-sharing relationships, understanding the needs of the customers' customers, articulating unmet needs, and identifying new opportunities. The activities in the Stakeholder Relationships layer include improving knowledge flows between suppliers, employees, shareholders and the community and using this knowledge to create key strategies. The activities for the Business Environment Insights include a methodical scanning of the political, economic, technological, social and environmental trends, an analysis of the organisation's competitors and marketing intelligent systems. Skyrme (1998) recommends sharing knowledge, creating best-practice databases and directories of expertise, publishing documents, procedures and discussion forums online and building an organisational intranet in order to promote Organisational Learning. In the Knowledge Processes layer, the organisation should embed its knowledge into the business processes and use it in its managerial decision-making process. The activities in the Knowledge in Products and Services layer include embedding knowledge in products and surrounding these products with knowledge, for example, user guides, and enhanced knowledge-intensive services. For the last layer, Knowledge in People, he recommends organising knowledge-sharing fairs, innovation workshops, and creating expert and learning networks and communities of knowledge practice.

However, Skyrme (1998) warns that it is the employees of an organisation and the process of the organisation that will ensure the success of the knowledge management initiative, not its strategic content. Therefore he recommends seven best practices that will contribute to the success of the knowledge management programme:

Firstly, there must be a clear and explicit linkage between the knowledge management strategy and the overall business strategy. Skyrme (1998) recommends that the knowledge management strategy should be another layer of the business strategy instead of bring separate from it. The organisation must also investigate in what ways does its knowledge add value to its business strategy, and also what knowledge can be derived from the business strategy.

Secondly, the organisation should be knowledgeable about knowledge (Skyrme, 1998). Management should have a deep understanding of knowledge, and what advantages it can bring to the organisation. Furthermore, there should also be the distinction between tacit and explicit knowledge, and how these two forms of knowledge fit into the product plans, marketing plans, strategic initiatives, annual budgets and personal development plans (Skyrme, 1998).

The third best-practice that the organisation should have is a convincing vision and architecture. Skyrme (1998) proposes that the knowledge aspect of the organisation should guide management's decision-making.

Skyrme's (1998) fourth best-practice is to promote knowledge leadership and champions. The organisation should advertise the enthusiastic proponents of knowledge management throughout the firm, and top management should emphasise the importance of organisational knowledge to the business success.

The organisation should also have methodical knowledge processes. Management should have processes for capturing knowledge, organising it and disseminating it throughout the organisation. Furthermore, Skyrme (1998) argues that there should also be processes that improve knowledge creation and innovation. Lastly, management should create procedures that protect the knowledge assets of the organisation.

The sixth best-practice is a well-developed knowledge infrastructure. Skyrme (1998) states that people and information should be readily accessible through the corporate intranet. Furthermore, the intranet should allow access to information from outside the organisation, particularly concerning customers, suppliers and experts. He also recommends pursuing a 'soft' infrastructure, for example, the organisational culture should allow for innovation and creativity, and management structures should be flexible and adaptive. Management should also recognise and reward individuals and teams who contribute to enhancing the organisational knowledge.

Finally, Skyrme (1998) recommends putting into place suitable measurements for knowledge. The organisation should measure the contribution of knowledge, in the form of intangible assets, and also knowledge flows within the organisation.

3.2.7.3 Classification

This framework is a descriptive one, according to the classification provided by Rubenstein-Montano, *et al*, (2000). This is because Skyrme (1998 & 1999) presents a framework that deals with the issues that affect knowledge management, and provides recommendations on how to address these issues. For example, he (Skyrme, 1998) clearly mentions the importance of aligning the knowledge management effort with the business strategy, the need to explicitly express a vision for the organisation to follow, and the importance of the people in the organisation. Although he (Skyrme, 1999) makes no mention of feedback loops, the other attributes of this framework classify it as a descriptive one.

3.2.7.4 Critical Analysis

This framework contains all the necessary factors that a good knowledge management framework should have. For example, the linkage of the knowledge management strategy with the business strategy, the need for a vision, the importance of people, and the importance of the infrastructure of the organisation. Skyrme (1998) also recognises the importance of distinguishing between tacit and explicit knowledge, and even recommends managing these two types of knowledge differently. Furthermore, by identifying the key activities in the seven knowledge layers, the organisation can successfully use knowledge to add value to its products, people and processes. Unfortunately, Skyrme (1998) fails to recognise the need for a feedback loop, although there is mention of the importance of organisational memory and measuring knowledge flows in the organisation. However, since this is the only negative aspect of this framework, the author concludes that it is a very good one.

3.2.8 Jay Liebowitz

3.2.8.1 Introduction

This framework recommends carrying out a number of activities in order for an organisation to successfully implement a knowledge management initiative. It also recommends a number of techniques that can be used to complete those tasks. The emphasis of this framework is on creating a 'continuous learning cycle', which allows the organisational intelligence to grow. This in turn will ensure the success of the knowledge management initiative of the organisation. The framework does not mention the importance of the strategic linkage between knowledge management and the business plan, nor does it deal with cultural factors in detail. Furthermore, there is no mention of the importance of people and technology and their impact on knowledge management.

3.2.8.2 The Framework

Liebowitz (2000:6) proposes an eight-step knowledge management framework that builds the organisational intelligence of the company. The strategy is illustrated below in figure 3.2.8.2:

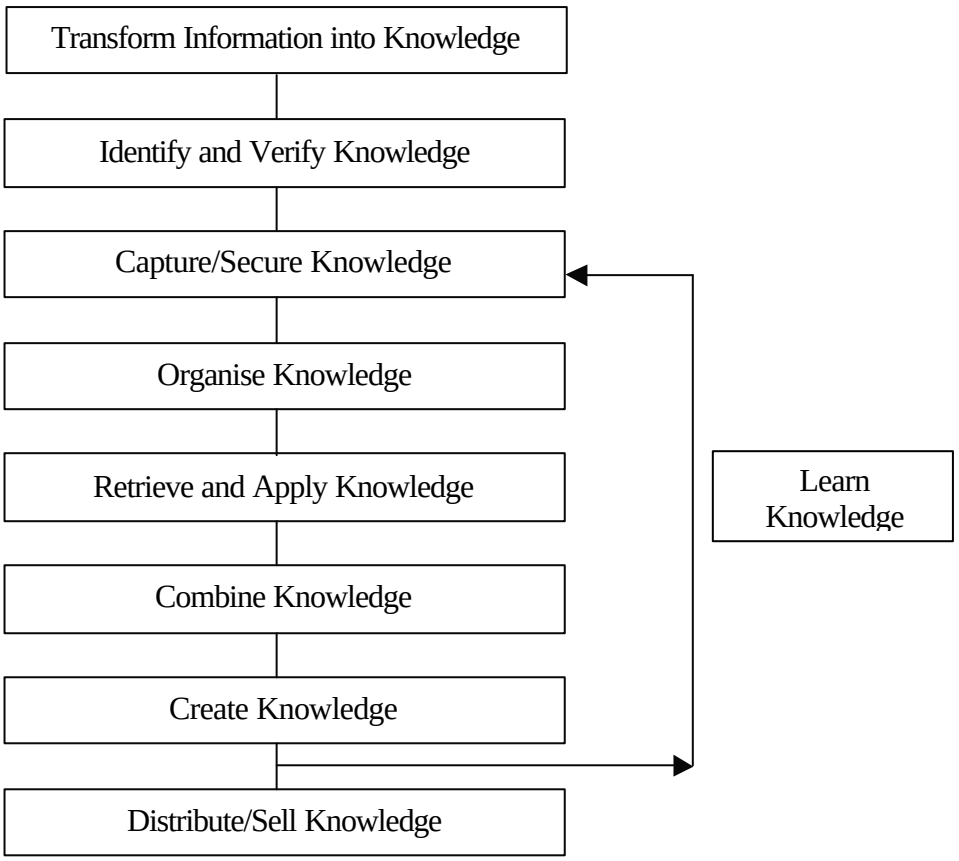

Figure 3.2.8.2: Liebowitz's Framework

Liebowitz (2000:6) defines the first step of the framework as that of transforming information into knowledge. This process, according to him, involves creating and converting useful data and information into knowledge. Liebowitz (2000:6) cites rules of thumb used in the decision-making process as an example of useful data. He (Liebowitz, 2000:14) argues that a crucial ingredient in creating knowledge is the ability of an organisation to draw on the tacit knowledge of its employees and to convert it into explicit knowledge. According to Liebowitz (2000:11-12), techniques such as interviews, observations, simulations and informal exchanges can be used to extract tacit knowledge.

Secondly, other types knowledge need to be identified and verified, such as metaknowledge, procedural knowledge, declarative knowledge and episodic knowledge. The third step is to capture and/or acquire the knowledge identified during the previous step, and to secure it within the organisation (Liebowitz, 2000:6). He (Liebowitz, 2000:20) suggests using interviews, protocol analysis, questionnaires and surveys, observations and simulation and learning-by-doing techniques in order

to capture this knowledge. Liebowitz (2000:21) also mentions some of the ways by which this knowledge may be articulated:

- Anecdotes
- 'War' Stories
- Case Studies
- Lessons Learned
- Best Practices
- Failures and Successes
- Heuristics
- Value-added relationships

This knowledge must then be stored in a repository in a way it can be distributed, and where users can access and retrieve it. Liebowitz (2000:29) cites four approaches for this process: the 'knowledge attic', where users add, analyse and retrieve information passively. The second approach is the 'knowledge sponge', where knowledge is actively captured and stored, but still distributed passively. The third approach, 'knowledge publisher', involves passive collection of knowledge, but active analysis and dissemination. Fourthly, the 'knowledge pump' requires active collection, analysis and dissemination of the knowledge (Liebowitz, 2000:30).

Next, the users should retrieve knowledge from the repository and use it in their own context. Liebowitz (2000:31) lists this step as being a crucial element for the knowledge management initiative to be successful. He (Liebowitz, 2000:32) lists four types of learning that can take place at this stage: individual, team, organisation and customer. Individual learning takes place when the responsibility of learning is on the individual; Team learning involves task-focused groups of employees who share the responsibility of learning; Organisation learning involves sharing team successes and achievements through learning networks throughout the organisation; and Customer learning involves the organisation learning more about the customer (Liebowitz, 2000:32).

The next step involves the users combining the knowledge they have accessed with their own personal knowledge in their context in order to create new knowledge.

Liebowitz (2000:39) proposes some tools and techniques that can be used to help in this process: idea processing systems, decision support systems, and groupware. This new knowledge can then be captured in Step 3, illustrated by the Learn loop in figure 3.2.6.2, and it can either be distributed throughout the organisation or sold (Liebowitz, 2000:6). The process of creating new knowledge which then feeds back into the framework creates a continuous cycle where the organisation is always creating new knowledge. Liebowitz (2000:41) also points out that in order for the knowledge management initiative to be successful, a continuous learning culture needs to be present in the organisation.

Liebowitz (2000:39) argues that knowledge distribution can involve transferring knowledge internally and externally to those who could benefit from the use and application of that knowledge. He also recommends setting up a knowledge management team which will be responsible for analysing and disseminating this knowledge to the relevant users. Tools such as intelligent agents can be used to assist in this task, and techniques such as data mining and knowledge discovery techniques can also be used to identify trends, relationships and new information and knowledge (Liebowitz, 2000:40).

3.2.8.3 Classification

This framework is classified as a task-based one. Liebowitz (2000) lists the tasks that the organisation must accomplish to achieve a successful knowledge management initiative. Although there is some mention of cultural factors, it is not explicit or in depth. There is also no mention of the importance of people versus technology. Furthermore, there is no mention of the importance of the strategic linkage between a knowledge management initiative and the overall organisation strategy. Although this framework explicitly includes a feedback loop, in the form of learning knowledge, it is only a single-loop feedback. Therefore, according to the classification devised by Rubenstein-Montano, *et al*, (2000), it ranks as a prescriptive framework.

3.2.8.4 Critical Analysis

The author does not consider Liebowitz's (2000) framework to be a sound one. The author argues that this framework does not contain the critical success factors which are essential to any knowledge management initiative. For example, there is no mention of the importance of linkage between knowledge management and the business objectives. More importantly, the cultural factors are not explored in detail. Furthermore, he only recommends a single-loop feedback. The author does not view this favourably, in the light of the innovative nature of knowledge and organisational learning. Although Liebowitz (2000) distinguishes between tacit and explicit knowledge and mentions the importance of the former, the author concludes that his framework is not a very good one.

3.2.9 Douglas Weidner

3.2.9.1 Introduction

This framework is comprised of three main phases. These phases are further broken down into a set of tasks and activities to be carried out to ensure successful knowledge management in the organisation. There is a very strong emphasis on the strategic importance of knowledge management, and of linking knowledge management with the overall business objectives. He (Weidner, 2000) also stresses the importance of involving people in the knowledge management process, and of creating an organisational culture which fosters knowledge sharing.

3.2.9.2 The Framework

Weidner (2000) recommends a knowledge management framework which consists of three phases:

Phase 1 : Create Strategic Plan;

Phase 2 : Design/Justify Improvement Initiatives; and

Phase 3 : Implement Measurable Results.

Each of these phases is then broken down into a number of steps that need to be carried out to ensure the success of the knowledge management framework. Phase 1 lists the following steps:

1. Promote Knowledge Management Leadership
2. Create Vision
3. Develop Strategies
4. Link Plans
5. Get Buy-In

The first step, promoting KM leadership, is further broken down into a number of tasks, the first of which is to Establish a Knowledge Imperative (Weidner, 2000). This task comprises the following activities: Preparing the case that knowledge management will improve the situation of the organisation, and highlighting the need for change; Building a consensus about starting a knowledge management initiative, since knowledge management is still a new area; Developing communication/awareness program to create an awareness of the knowledge management initiative throughout the organisation; Providing a knowledge management insight into the vision-creation process of the organisation, in order to clarify its vision.

The second task is to define a knowledge management framework and infrastructure. This involves three activities, the first of which is to create a knowledge management framework. The framework will provide top management with a map, upon which they will rely in order to stay on course throughout the initiative. Secondly, the organisation must create an enrichment capability for that framework. This will allow management to enhance the framework during the later stages of the implementation, and to build a vision for what the organisation is able to achieve. Thirdly, management must also provide a means of delivering the framework to those who will be directly affected by the implementation of knowledge management (Weidner, 2000).

The second step, creating a vision for the organisation, involves defining a mission statement for the organisation in terms of knowledge management and outline performance targets which are based on satisfying the stakeholders of the

organisation (Weidner, 2000). Thirdly, the organisation must develop strategies, and focus on those that aim at improving the organisation. Specific knowledge management programs should also be part of these strategies. The fourth step requires management to link the plans of the initiative. This is especially important if the initiative is started in a business unit or in a company which is part of a larger organisation (Weidner, 2000). Finally, he emphasises that management must obtain commitment from all parties involved in the initiative in order for it to succeed or to simply detract opponents of knowledge management.

Phase 2 of Weidner's (2000) framework comprises the following six tasks:

1. Perform Enterprise Integration
2. Engineer Processes
3. Manage Knowledge
4. Start other Improvement Initiatives
5. Develop Initiative Business Cases
6. Review and Approve Initiatives

The first task entails eliminating the functional and technical obstacles in the organisation. The organisation's processes should then be integrated, particularly the business and information processes through shared data and interoperable systems. Weidner (2000) also emphasises integrating human resources and organisational structures. Secondly, he recommends engineering the organisation's processes through using management and technical methods to design or redesign these processes. The organisational structures and culture should also undergo the same procedure. Weidner (2000) argues that this task will optimise processes and value chains within the organisation. The third task consists of managing the knowledge of the organisation through the following activities:

1. Design KM Technical Infrastructure
2. Design KM Organisational Infrastructure
3. Provide 'Best Practices' Input
4. Design KM Initiatives

The first activity, designing the technical infrastructure of knowledge management, involves building standards for data transfer, the information and communication

backbone, and should be organised as part of the Enterprise Integration task mentioned above. The second activity consists of detailing the roles and responsibilities for the chief knowledge officer, and other main knowledge management workers, such as process experts, subject matter experts and knowledge engineers. The third activity provides management with the means to continuously introduce new knowledge management methods, techniques and tools. The last activity consists of designing knowledge management initiatives that will leverage the organisation's tacit, explicit, structured and unstructured knowledge. Weidner (2000) argues that ideas for such initiatives will come from lessons learned, proven methods and best practices from the organisation.

The fourth task of Phase 2 will required management to start other improvement initiatives throughout the organisation, or this can also be used to hold strategic developments, for example, new products, strategic partnerships, new marketing channels or acquisitions. The fifth task consists of developing business cases for every initiative that is started in the organisation. This will allow management to evaluate the different initiatives and choose alternatives. Finally, the initiatives should be reviewed and approved by management.

Weidner's (2000) third phase of his knowledge management framework, Implementing Measurable Results, includes only two activities: Managing Change and Evaluating Performance. Managing change involves creating strategies and plans to enable changes which have been authorised and approved to be implemented in the organisation. Secondly, management should compare the actual and planned achievements of these implementations, identify the reasons for any variance and correct them.

3.2.9.3 Classification

Weidner's (2000) framework is highly detailed. It starts by constructing a high-level schema of knowledge management, and by recommending tasks and activities that will directly influence the success or failure of the knowledge management initiative. In particular, there is a strong emphasis on preparing strategic plans, linking those plans to the overall business plans, building awareness in the organisation and

involving people in the process. The last phase of the framework is considered to be a feedback loop. Therefore, according to the author, Weidner's (2000) framework ranks as a descriptive one on the Rubenstein-Montano, *et al*, (2000) classification.

3.2.9.4 Critical Analysis

Weidner's (2000) framework is a very detailed one, and provides a good approach to knowledge management. Unfortunately, it does not differentiate between the explicit and tacit forms of knowledge or how to manage these forms of knowledge, nor does it mention how to manage these different types of knowledge. Furthermore, even though the last phase of the framework is considered to be a feedback loop, it is only a single-feedback loop, and the author argues that this is insufficient in the knowledge economy. However, his framework contains the crucial factors such as strategic linkage of knowledge management with the business, the importance of people, and little emphasis on technology. Therefore the author concludes that this is a good knowledge management framework.

3.2.10 Ganesh D Bhatt

3.2.10.1 Introduction

Bhatt (2000) proposes a framework that combines a 'Knowledge Development Cycle', consisting of four knowledge development phases. He also recommends implementing a set of organising strategies plans which will ensure the success of the knowledge management initiative. These organising strategies are derived from manufacturing and operational environments, where they are used to ensure the quality of products and processes. There is a strong emphasis on the role of the individuals in the organisation under the premise that organisational knowledge is derived from individual knowledge, and that organisational learning can only take place through individuals. He also places much importance on the continuous nature of knowledge development by stating that the organisation should be constantly learning and developing its knowledge base.

3.2.10.2 The Framework

Bhatt (2000:16) proposes a framework that combines organising strategies, used in manufacturing processes and products, and the different phases of his 'Knowledge Development Cycle'. When used in the knowledge development phases, these organising strategies are termed 'knowledge strategies'. He (Bhatt, 2000:17) defines the Knowledge Development Cycle as comprising Knowledge Creation, Knowledge Adoption, Knowledge Distribution and Knowledge Review and Revision. He argues that while at an individual level, knowledge creation and adoption are sufficient to constitute a knowledge development cycle, at an organisational level, the phases of knowledge review and revision and knowledge distribution are important to ensure conversion of individual knowledge to organisational knowledge. The knowledge development cycle is illustrated below:

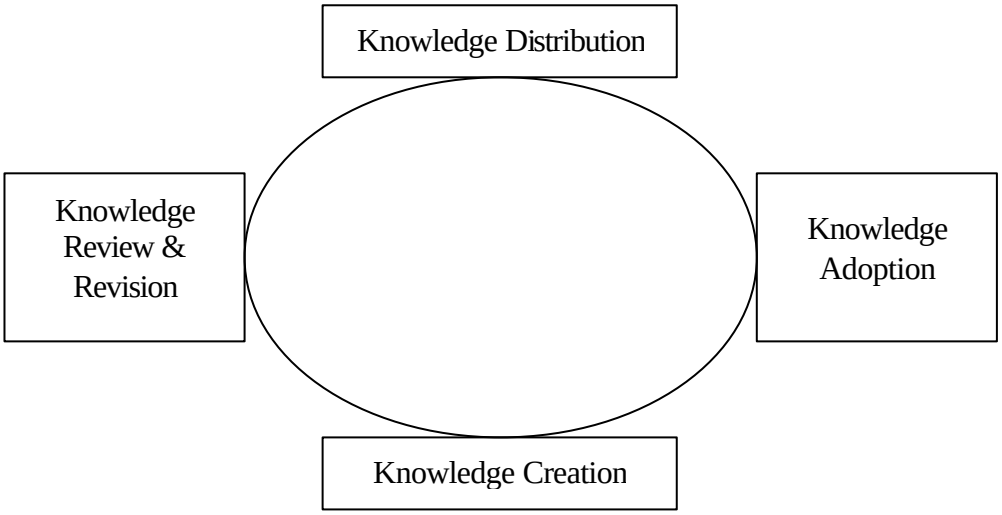

Figure 3.2.10.2a: Bhatt's Knowledge Development Cycle

Bhatt (2000:18) does not include particular directions in these four phases of the knowledge development cycle because he argues that there are several feedback and feedforward loops that take place simultaneously at different phases. This makes it difficult to show the direction of the knowledge flows clearly (Bhatt, 2000:18). He also argues that all the phases of this cycle are interdependent, for example, knowledge creation depends on knowledge adoption.

Bhatt (2000:19) argues that Knowledge Creation can only take place through individuals, who acquire new knowledge and pass it on to a group, and the latter then

distributes it to an organisational level. He also proposes that Knowledge Creation is not a methodical process which can be planned or controlled, but is continuously evolving and growing. This process can be assessed on its uniqueness and adaptive flexibility to assist the solution of a problem in different contexts (Bhatt, 2000:19). Furthermore, he proposes that new knowledge can only be created when individuals abandon rigid thinking and assumptions and manage to look at situations in an innovative manner.

The next phase in the Knowledge Development Cycle is Knowledge Adoption. Bhatt (2000:19) argues that since Knowledge Creation is a very difficult process, organisations usually tend to substitute it with the acquisition of knowledge from other sources and adopting it for their own use. Organisations who choose to do this have the advantage of not taking the risks of creating and managing a knowledge creation process, thereby saving a lot of resources of the organisation. He reports that subject to an organisation's business objectives, there are three strategies that can be used to adopt knowledge: Imitation, Replication and Substitution. Imitation can be seen as a defensive strategy for an organisation, but in markets where customers are fashion-oriented rather than product-oriented, this may be a successful strategy. Replication occurs when the organisation reproduces the experience acquired during a particular project to other projects throughout the organisation, for example, a best practice learned in one manufacturing plant can be adopted by other plants to cut costs or save time on production. An organisation can also produce alternatives to fashionable products or services with similar functionalities.

The third phase of the Knowledge Development Cycle is Knowledge Distribution. Bhatt (2000:20) argues that before knowledge can be used at the organisational level, it needs to be distributed and shared throughout the organisation. This dissemination of knowledge is dependent to a large extent on the organisational culture and the level of explicit knowledge already present in the organisation (Bhatt, 2000:20). He argues that traditional management techniques of control and authority will find it difficult to disseminate knowledge in the organisation. This is because it is more difficult for social groups to form in informal contexts, where most of the individual knowledge is converted into group and organisational knowledge. Although traditional management structures reduce disturbances, they also restrict the

distribution of knowledge horizontally across the organisation and across teams. Bhatt (2000:20) argues that if knowledge distribution channels are informal, knowledge can be disseminated quickly and honestly. He also mentions the importance of converting tacit into explicit knowledge, and argues that organisations should create an atmosphere that makes it simpler for this process to take place.

The final phase in Bhatt's (2000) cycle is the Knowledge Review and Revision phase. He subscribes to the idea that an organisation is a distributed knowledge system constituted of knowledge components or clusters. The most important property of these clusters is that they can be reviewed, revised and reconfigured (Bhatt, 2000:20). Therefore, an important task for management is to constantly review and replenish knowledge clusters in the organisation. Bhatt (2000:20) argues this should be carried out because the review and revision of knowledge clusters is crucial to deal with environmental stimuli, solve organisational problems, and evaluate the applicability and risk of knowledge in current situations. He also argues that if this process is not carried out, a large part of the organisation's knowledge, if not used, can easily be forgotten or ignored. This phase of the knowledge development cycle is of particular importance to organisations which deal in very dynamic technological and globally competitive environments.

Bhatt (2000:21) then deals with the organising strategies in the four phases of the knowledge development cycle:

a. Organising Strategies in the Knowledge Creation phase.
b. Organising Strategies in the Knowledge Adoption phase.
c. Organising Strategies in the Knowledge Distribution phase.
d. Organising Strategies in the Knowledge Review and Revision phase.

In the first instance, the organising strategies used during the Knowledge Creation phase are: Probe and Learn, and Consistency. Bhatt (2000:21) argues that this phase is the most chaotic and unmethodical phase of the entire knowledge development cycle. He also argues that since the success of the knowledge creation phase is not assured, probing and learning through experiments can provide important insights during this phase. The process of probing and learning is an iterative one, which

provides the opportunity for the organisation to narrow its field of focus in successive steps as it comes closer to the final product (Bhatt, 2000:21).

However, if management is only concerned with improving the existing knowledge instead of creating new knowledge, Bhatt (2000:21) suggests structured processes such as idea generation, screening, selection, development, testing and commercial launch. During idea generation, the organisation tries to create several potential concepts, which are then screened for their feasibility. Some potential ideas are then selected, and developed further to create new products or practices. These prototypes are then tested for technical and market potential, and successful ones are then introduced on a full-scale in the market (Bhatt, 2000:21). He states that this process is more centred on analysis and creating a successful product or process on the first try.

On the other hand, in a discontinuous knowledge discovery process, the emphasis is more on probing and learning than in analysis (Bhatt, 2000:21). He argues that it is because a discontinuous knowledge creation process is unmethodical and contains more uncertainty and ambiguity in searching for the correct combination of knowledge elements.

The second organising strategy that can be applied to the Knowledge Creation phase is knowledge consistency. Bhatt (2000:21) argues that despite the need for the knowledge creation process to make use of methods such as free association, lateral thinking and provocation, there is also a need to keep the knowledge created consistent. This is because consistent knowledge will provide the rest of the organisation with a standard frame of reference to assess the applicability of that knowledge in different contexts.

During the second phase of the knowledge development cycle, the Knowledge Adoption phase, Bhatt (2000:21) proposes two organising strategies: Knowledge Reusability and Knowledge Validity.

Whereas Knowledge Creation is an unstructured process, Knowledge Adoption is a structured process, since a large extent of the knowledge that the organisation adopts

is already well established. During this phase, the organisation needs to create efficient ways to categorise, store and catalogue knowledge (Bhatt, 2000:22). The organisation is also trying to standardise knowledge by capturing and storing routines, knowledge objects and modules that are common across a number of projects (Bhatt, 2000:22). These common knowledge items can then be used and reused throughout the organisation, instead of creating new knowledge thereby saving time and money to the organisation.

Bhatt (2000:22) also argues that the validity of knowledge is crucial during the knowledge adoption phase, since if the knowledge is not valid, it is very likely to result in wasted time and effort. He defines knowledge validity as the degree to which the knowledge base of the organisation produces socially acceptable solutions to the problems of the organisation. In order to validate their knowledge, organisations can use methods such as matching the acquired knowledge with the required specifications and problems (Bhatt, 2000:22). He also suggests some ways of validating knowledge: adaptability of knowledge for modification and revisions so that knowledge can be easily used for current and future organisational problems; adequacy of knowledge to provide different perspectives on the organisational issues; coverage of knowledge to detailed conceptualisation of solutions to problems; robustness of knowledge to map different levels of problems with correct solutions; and the modularity of knowledge components to help control the focus of the knowledge base of the organisation.

During the Knowledge Distribution phase of the cycle, Bhatt (2000:23) argues that the way employees interact with each other may have a direct consequence on the knowledge base of the organisation. He (Bhatt, 2000:22) also argues that the distribution of knowledge throughout the organisation provides an opportunity for individuals to unravel the reasoning behind the knowledge. This leads to the individuals becoming aware of the 'fundamentals of organisational knowledge', and they can re-invent knowledge based on these fundamentals (Bhatt, 2000:23).

The second organising strategy is Media Selection for the distribution of knowledge throughout the organisation. Bhatt (2000:23) argues that a major factor that affects the distribution of knowledge is the source of the knowledge, and the capacity of the

receiver to interpret the meanings of the message. He also argues that if the source is not trustworthy and its intentions are not clear, receivers will need to check the authenticity and reliability of the message. Therefore, the role of the receivers is extremely important, and if they fail to make sense of the knowledge and fail to understand the relevance of this knowledge, this knowledge will go to waste (Bhatt, 2000:23). Thus it is very important that is the knowledge to be distributed is complex, the medium used should be as complex as to handle that level of complexity in the message (Bhatt, 2000:23). He lists face-to-face communication as the richest medium, followed by telephone, email, and printed media.

For the last phase of the cycle, Knowledge Review and Revision, Bhatt (2000:23) recommends the following strategies: Reinterpreting the knowledge base, and Self-managed teams.

Bhatt (2000:23) states that developing knowledge is not a simple task that can be accomplished in a single step, but requires continuous improvements based on experiments and prototypes until it can be adopted in the organisation. Therefore, the knowledge base of the organisation needs to be constantly reviewed and refined, making the knowledge more active and relevant to the organisation (Bhatt, 2000:23). He argues that using self-managed teams in a determined and collaborative situation can provide the organisation with many opportunities to manage the knowledge review process. This use of teams in a collaborative environment is particularly useful to organisational learning within the organisation.

Finally, Bhatt (2000:24) proposes a framework that is composed of the knowledge development cycle and the knowledge strategies mentioned above. The framework is shown below:

Knowledge Processes				
Strategic Actions	**Knowledge Creation**	**Knowledge Adoption**	**Knowledge Distribution**	**Knowledge Review & Revision**
Plans	Experimentation	Standardisation	Diffusion	Refinements
Control Mechanisms	Consistency	Reusability	Information Access & Retrieval	Thoroughness
Measurement Goals	Early checks to eliminate inconsistencies	Early checks to find relevance of existing knowledge	Flexible format in information/knowledge representation	Checks to refine knowledge
Issues	Freedom to experiment	Knowledge Storage	Infrastructure connectivity	Training & expertise
Prime Objectives	Innovation	Interpret past in terms of current realities	Assessing changing knowledge requirements & relevance	Collaboration & peer support

Table 3.2.10.2b: Bhatt's Framework

During the Knowledge Creation phase, the main objective of the organisation is to innovate, while providing opportunities for experimentation. There should also be measures in place to eliminate inconsistencies, since this phase is unmethodical and chaotic (Bhatt, 2000:25). In the second phase, the organisation should acquire and standardise knowledge, so that the organisation can re-use this knowledge to save time and effort. By standardising the knowledge, the organisation is also ensuring that the knowledge base will be used by the entire organisation without any inconsistencies or conflicts. The organisation should also try to modify and apply past and existing knowledge to current situations (Bhatt, 2000:24).

During the third phase, the knowledge infrastructure and the media through which the knowledge will be disseminated are important. If the employees of the organisation have an equal opportunity to access, retrieve and share knowledge with each other, the organisation will be able to produce innovative products and processes (Bhatt, 2000:25). The objective of this phase is to evaluate the changing knowledge requirements of the organisation, and its relevance to the business. In the last phase, the knowledge acquired by the organisation should be tested under

different scenarios. A process of peer reviews, and clarifying knowledge fundamentals will contribute to making the knowledge active and relevant to the current organisational situation (Bhatt, 2000:24). While the emphasis should be on collaboration and peer support, the organisation should also be thorough in its review of the knowledge base.

3.2.10.3 Classification

Bhatt (2000) proposes a framework that is thorough and that combines four knowledge development phases with a number of strategies aimed at promoting knowledge management in the organisation. Although the Knowledge Development Cycle is task-oriented, the framework itself recommends a number of strategies that can affect the outcome of the knowledge management initiative. He mentions that the knowledge flows of his cycle have no specific directions because there are several feedback and feedforward loops, but these are not explored in more detail. However, there is a strong emphasis throughout Bhatt's (2000) work on the importance of individual and organisational learning. Furthermore, his framework includes a notion of double-loop learning, when he mentions that individuals create new knowledge by 'breaking down rigid thinking and assumptions' and 'generating new realities'. Therefore the author ranks Bhatt's (2000) framework as a descriptive one according to the Rubenstein-Montano, *et al*, (2000) classification.

3.2.10.4 Critical Analysis

Bhatt's (2000) framework is very detailed and comprises a set of strategic steps to be used in a knowledge management initiative. However, there is no mention of the importance of linking the knowledge management initiative to the overall business strategy, nor is there the specific mention of a feedback loop. The author argues that these are very serious drawbacks. However, he correctly places a very strong emphasis on the importance of individual and organisational learning through challenging rigid thinking and assumptions. The author regards this aspect of double-loop learning favourably. Bhatt (2000) also recognises the difference between tacit and explicit knowledge, and places much importance on the individuals in the organisation, and their roles in the knowledge development phases. Therefore the author concludes that this framework is a very good one.

3.3 Discussion of the Analysis of Knowledge Management Strategies

It is the author's opinion that the framework proposed by van der Spek, *et al*, (1994) is not sufficient to ensure a successful knowledge management effort. It lacks some of the most important considerations when implementing a knowledge management initiative, and is outdated when compared to the latest thoughts in the field. For example, it fails to distinguish between tacit and explicit knowledge, does not mention any form of organisational or individual learning, and does not even deal with the organisational culture.

The framework put forward by Mentzas and Apostolou (1998) is slightly better, since it mentions the importance of the organisational culture and the difference between tacit and explicit knowledge. However, they do not emphasise the importance of the linkage between knowledge management and the business strategy, which in the author's opinion is not acceptable.

Wiig's (1999d) framework is not a very good one, since it does not mention any of the critical success factors which are essential for a successful knowledge management effort. For example, he fails to address the issue of tacit and explicit knowledge, the alignment of the knowledge management effort with the business strategy, and the culture of the organisation. On the other hand, Carlson's (1999) framework is a good one, despite its lack of any type of feedback loop.

The author regards Macintosh's (1999) framework to be lacking in some aspects. For example, she does not mention aligning the knowledge management effort with the business goals, nor does she take into consideration the culture of the organisation. Therefore the author concludes that her work is not particularly good.

According to the author, uit Beijerse (1999) has proposed one of the best frameworks in the literature. He includes all the necessary success factors, such as alignment with the organisational goals, importance of culture, and the necessity of a feedback loop. Skyrme's (1998 & 1999) work is also a very good one. He (Skyrme, 1998 &

1999) also includes the necessary success factors needed for knowledge management. Despite the fact that there is no feedback loop, the rest of the framework is based on solid principles.

Liebowitz's (2000) framework is not a very good one. The author argues that it lacks some of the important considerations needed to create a successful knowledge management programme in the organisation. Weidner's (2000) framework is better, and deals with the important issues of knowledge management, despite the fact that it does not differentiate between tacit and explicit knowledge or how to manage them.

The author therefore concludes that Bhatt's (2000) framework is the best one in the literature. It includes all the necessary critical success factors, and is the only one that includes a double-loop feedback mechanism. Despite the fact that he does not mention the linkage between knowledge management and the organisational goals, the emphasis on individual learning and organisational learning are deemed to be excellent factors. The table below illustrates the classification of the strategies described above:

STRATEGY	CLASSIFICATION
3.2.1 van der Spek et al	Prescriptive
3.2.2 Mentzas and Apostolou	Descriptive
3.2.3 KRI	Prescriptive
3.2.4 Carson	Hybrid
3.2.5 Macintosh	Prescriptive
3.2.6 uit Beijerse	Descriptive
3.2.7 Skyrme	Descriptive
3.2.8 Liebowitz	Prescriptive
3.2.9 Weidner	Descriptive
3.2.10 Bhatt	Descriptive

Table 3.3: Classification of KM Strategies

3.4 Factors Affecting Knowledge Management Strategies

Following the analysis of the existing knowledge management implementation strategies, the author argues that the following factors are vital to provide a successful knowledge management implementation. These factors should form the core of any knowledge management implementation strategy.

3.4.1 Alignment with Business Strategy

When an organisation decides to implement a KM strategy, it must do so while considering certain issues. Tiwana (2000:94) argues that a knowledge strategy must be closely linked to the organisation's business strategy, and that to effectively leverage their knowledge assets, organisation must view knowledge management with a focus on their core competencies, and tie them in with their business vision and strategy. On the other hand, Hendricks (1999:160) argues that a main cause of the failure of organisations to leverage their knowledge is that their knowledge remains almost entirely at the level of the individuals or departments. This illustrates a lack of vision and strategy from organisations in their knowledge management initiative.

Wiig devotes an article in Duffy, *et al*, (1999) entitled "Knowledge Management Must Address Business Direction" which underlines the importance of any KM initiative to be aligned with the organisation's strategy. He (Wiig, in Duffy, *et al*, 1999:1) argues that the need for improved performance in the organisation means a knowledge management initiative should be "integrated into the basket of effective management tools and hence disappear as a separate effort." This argument points out the tendency for new management methodologies to be seen as a completely separate initiative which does not contribute to the achievement of the organisation's goals. However, he (Wiig, in Duffy, *et al*, 1999:2) warns that aligning the KM initiative with the intended business strategy of the organisation may mean more work, depending on how well the business strategy has been defined and formulated. Furthermore, he (Wiig, in Duffy, *et al*, 1999:28) argues that some organisations start

a KM initiative because of the hype surrounding KM, often without any proper planning, or considerations to business benefits.

Duffy, in Duffy, *et al*, (1999,16) states that the most important issues in developing knowledge management are strategic "focus, alignment and integration." He defines the following steps in implementing a KM initiative: review the strategic vision, business strategy and business plan of the organisation and identify how knowledge can facilitate the strategic management of the organisation. Duffy, in Duffy, *et al*, (1999:16) also argues that the best way of deciding how important knowledge is, is by evaluating the potential contribution of knowledge to the strategy of the organisation, and the result of this process is that the knowledge strategy will align with the business strategy and help the business achieve its goals.

Hansen, *et al*, (1999:106) argue that because knowledge management as a management practice is so new, managers do not have models to use as guides. However, according to them, a company's choice of knowledge management strategy should not be random, but must be driven by the company's competitive strategy. Furthermore, they warn about the danger of isolating a knowledge management initiative to a specific department like IT or Human Resources.

In the same line of thought, Jooste, in Duffy, *et al*, (1999:29) states that there are a number of crucial actions to be taken to guarantee the success of a KM initiative. Among these recommendations, he recommends that there should be a compelling business reason for undertaking a KM initiative, and that the initiative should address the priority areas where knowledge can best be leveraged. However, he (Jooste, in Duffy, *et al*, 1999:30) warns that it takes time to establish the link between the business benefit and the KM initiative, and that sometimes KM initiatives may not be quantifiable in terms of business benefits.

uit Beijerse (1999) states that views and ideas about KM in an organisation should start with an analysis of the market and the competition. Furthermore, he proposes some questions of strategic importance that management should ask when dealing with KM, among which:

- Does management know what the core competencies of the organisation are in terms of knowledge assets?
- Does management have a long-term vision of the knowledge which will be needed in the future?

These questions demonstrate the importance of the organisation having a clear and well-defined vision and strategy about the KM initiative, as well as how the initiative will help the organisation attain its goals and vision.

Seeley (2000:20) states that a knowledge management strategy must be targeted at that which gives the organisation its competitive advantage in the market. He (Seeley, 2000:21) also argues that knowledge management plays the strategic role of putting into place the capabilities to unlock the organisational asset that is key to strategy realisation. Furthermore, those involved in creating the knowledge management strategy must understand and build upon the corporate strategy to ensure that knowledge management is used to help realise the strategic intent of the organisation (Seeley, 2000:21). Similarly, Seeley and Dietrick (2000:18) argue that the areas that are important to the organisation's strategic objectives become the areas that are important to the knowledge management strategy.

Herschel (2000:37) argues that the responsibility of developing a knowledge management strategy is often shouldered by the Chief Knowledge Officer of the organisation, and that this KM strategy should be validated across the organisation. Furthermore, this KM strategy should evolve to complement and integrate with the business strategy (Herschel, 2000:38). In practice, for example, Adam Brand (1998:18), from 3M, states that at 3M top managers actively engage in knowledge management initiatives.

Zack (1999a:125-145) also writes about the lack of alignment between KM initiatives and business strategy. He (Zack, 1999a:125) states that although organisations have come to view knowledge as the most important strategic resource, many initiatives are being developed and implemented that are not explicitly linked to the organisation's strategy. However, during his research with more than 25 firms, Zack (1999a: 126) has found that the most important factor in conducting

knowledge management is the organisation's strategy. Furthermore, he discovered that many executives struggle to clearly define the relationship between the organisation's intellectual capital and its competitive strategy. This is because managers do not have well-developed strategic models to help them link knowledge-oriented processes and technologies to business strategy, and they are uncertain of how to align their knowledge management goal with the strategic goal of the organisation (Zack, 1999a:126).

Furthermore, Zack (1999a:132, & 1999c:85) proposes the idea of a "strategic knowledge gap". He adapts the concept of SWOT analysis to find the gap between what an organisation should know to support a competitive position and what it actually knows. He terms this gap the "knowledge gap" of the organisation. This is then linked to the strategic gap of the organisation, that is, what the organisation must do to compete, and what it actually does. This linkage between the knowledge gap and the strategic gap of the organisation is then termed the strategic knowledge gap (Zack, 1999a & 1999c).

Tiwana (2000:153) supports Zack, and states that to formulate the strategy-knowledge link, an organisation must clarify its strategy, identify the knowledge required to execute that strategy, and by comparing the knowledge required with its actual knowledge assets, it will reveal its strategic knowledge gaps. This concept is illustrated below (Tiwana, 2000:153):

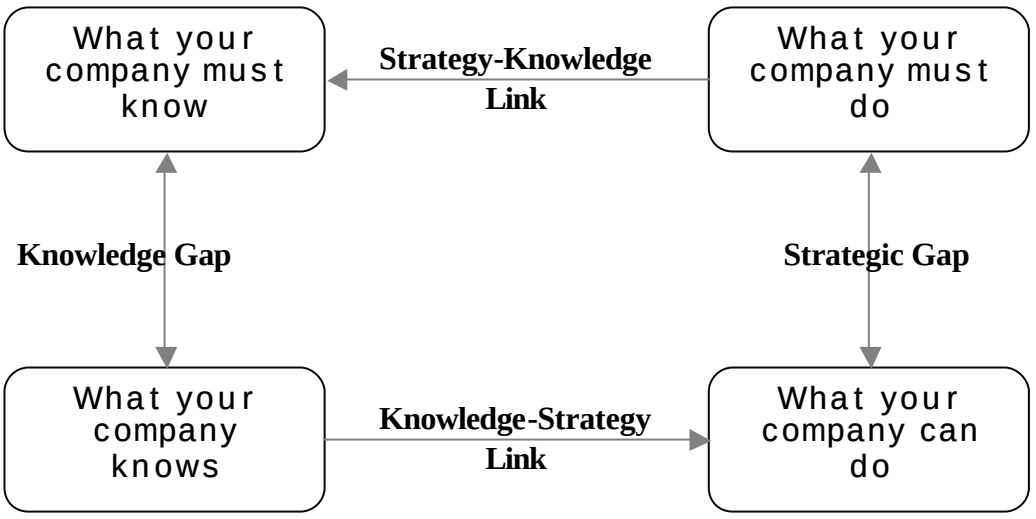

Figure 3.4.1: Strategic Knowledge Gap Analysis

Hence, it can be seen that aligning the KM strategy to serve the needs of the organisational strategy is crucial to the success of the KM initiative. In the words of Zack (1999a:143), "if knowledge management is to take hold rather than become merely a passing fad, it will have to be solidly linked to the creation of economic value and competitive advantage."

3.4.2 Technology is not the solution

Wiig (1999b:2) states that the pursue of knowledge is not new and has been going on for thousands of years, and that the major part of this pursuit was to gain theoretical and abstract understanding of what knowledge is about. Likewise, Moore (2000:12) states that the concept that knowledge assets are crucial and must be managed is not new, and has been a necessity since the dawn of civilisation. Owens (1999:24) agrees, and argues that KM is not a new idea, and only appears to be one. However, there is a tendency for organisations to over-emphasise technology when they start a KM initiative.

Moore (2000:13) argues that advantages provided by technological abilities are minor and temporary, since there is an increasingly short period before competitors embrace the same technology. Tiwana (2000:53) agrees, arguing that technology is too easy to copy, and that technology as a source of competitive advantage is dead. What is important, according to Moore (2000:13), is how the organisation is re-organised for knowledge management, and whether the organisational culture facilitates knowledge sharing and leveraging or not. Holland (1998:11) agrees, and states that when an organisation initiates a KM project, there is the danger that the IT solution will dominate the initiative. Zack (1999a:49) agrees, and states that knowledge management initiatives often place too much emphasis on IT at the expense of well-defined knowledge management roles and responsibilities. Tiwana (2000:49) concurs, and says that organisations that compete on the basis of their information technology assets are wrong. and argues that IT is a means, not an end.

Although information technology will undeniably give important enabling capabilities to the organisation, effective KM will only come out of the workforce

(Holland, 1998:11). For example, Nonaka, in Malhotra (1998), states that only human beings can have a central role in knowledge creation and that computers are merely tools, no matter how great their information-processing capabilities may be. Davenport (1999) agrees, although he argues that the technical capability to transform data into knowledge exists. He also argues that what is missing from knowledge management is people. Similarly, Jooste, in Duffy, *et al*, (1999:27) argues that out the classic failure scenarios, the "Technology Flame-Out" scenario stands out, since buying KM software does not yield the expected results.

Malhotra (2000:10) outlines 3 myths about the role of information technology in knowledge management. The first myth is that KM technologies can deliver the right information to the right person at the right time. This idea is flawed argues Malhotra (2000:10), because it applied to an outdated business model which relied on incremental changes in a stable market. He argues that the new business model is characterised by fundamental changes, and hence it is impossible to build a system that predicts who the right person at the right time is, much less what represents the right information. The second myth is that information technology can store human intelligence and experience. Malhotra (2000:10) argues that although databases and groupware applications can store bits of data, they cannot store the complex schemas that human beings possess for turning information into knowledge. Furthermore, the same information will provoke different responses from different individuals due to their different experiences and the different contexts they find themselves in. Hence, a person's experience cannot be replicated in technology (Malhotra, 2000:10). Thirdly, people assume that IT can distribute human intelligence. Malhotra (2000:10) argues that again, there is the mistaken assumption that organisations can predict the right information for the right people. A central repository of information does not solve the problem, since most people will not see or use the information stored there. Furthermore, he argues that such information is static, rational and without context, and this does not encourage renewal of knowledge or creation of new knowledge.

In summary, Malhotra (2000:5) argues that confusion between information and knowledge has caused managers to invest billions of dollars in information technology initiatives that have resulted in marginal results. This is because

managers do not realise that knowledge resides in people, not in technology. Furthermore, this problem is compounded by the fact that software vendors have been quick to label products as being "Knowledge Management" software, which in most cases are simply old products which have been relabelled (Owens, 1999:25). Malhotra (1998) agrees, and states that the industry is witnessing increasing hype from software vendors about the wonders that the latest technology can deliver for knowledge management. He also points out that trade press coverage has also suggested that increasing investments in new information technologies will result in improved business performance. However, technology experts and academics have observed the opposite, stating that there is no direct correlation between IT investments and business performance or knowledge management (Malhotra, 1998).

3.4.3 People are Key

Drawing from the previous point, it can be seen that most authors and practitioners consider people in the organisation to be of prime importance. For example, according to Andrews (2000:62), "the heart of knowledge management lies with the individual and the relationship that he or she wants to develop within and outside the organisation." Holland (1998:10) agrees, and states that knowledge management starts by targeting the knowledge that is most important to the business and identifying the people that develop and store that knowledge. Wiig (1999a:1) also argues in favour of a people-centred approach, and states that the extent to which an organisation can act intelligently depends on the competencies of its people. van der Westhuizen and Andrews (1999:36) adopt the view of Sveiby that an organisation consists of two things, individual knowledge and internal structures, and that the physical assets are secondary to the knowledge that flows between elements of the organisation.

Wiig (1999a:13) also states that an important requirement for effective knowledge management is that the organisation must deal with the complexity of how people use their minds, and there must be a focus on how people think consciously and how they make decisions. This is undoubtedly because tacit knowledge only resides inside people's brains, and cannot be extracted or replicated easily. Because of this,

Duffy, in Duffy, *et al*, (1999:14) states that the organisation needs to ensure that it hires and keeps the right kind of employees.

Similarly, Tiwana (2000:39) states that as the world moves more deeply into the Information Age, there is mounting evidence that organisations are becoming more and more reliable on people rather than technology. He also argues that the organisations that will succeed are the ones that can use their information technology to leverage people's knowledge in ways that are rapidly applicable.

However, this new people-centric philosophy requires of managers that they abandon the traditional approach which does not recognise the abilities of employees as being a significant contribution to the organisation's economic successes, and embrace the fact that employees are the greatest and most valuable assets of the organisation (Andrews, 2000:62). Wiig (1999a:2) agrees, and says that despite the importance of employees' personal knowledge, the management of knowledge has not been of general concern until recently. Zack (1999:49) concurs, and argues that traditional organisational roles do not address the cross-functional, cross-organisational process that an organisation uses to create, share and apply knowledge.

Nonaka (1998:23) argues that this is a typical Western management philosophy, which views the organisation as a machine for "information processing". He argues that the reason some Japanese organisations are so successful is that they have recognised that knowledge is not objective, but is tacit, and often highly subjective, depending on the intuition, insights and hunches of the individual employee. Takeuchi (1998) also shares this opinion, and states that Western managers have tended to focus on explicit knowledge, which reinforces the view that the organisation is an information-processing machine. He also states that Western organisations must unlearn their current view of knowledge and focus on tacit knowledge, knowledge creation and the whole organisation participating in the KM initiative.

3.4.4 Comparison of Knowledge Management Strategies

The following table shows a classification of the knowledge management strategies analysed in **Section 3.2** and also shows their strengths in terms of the key factors discussed above:

STRATEGY	CLASSIFICATION	ALIGNMENT WITH BUSINESS	FOCUS ON TECHNOLOGY	PEOPLE ARE KEY
3.2.1 van der Spek et al	Prescriptive	Weak	Weak	Strong
3.2.2 Mentzas & Apostolou	Descriptive	Strong	Strong	Weak
3.2.3 KRI	Prescriptive	N/A	N/A	N/A
3.2.4 Carson	Hybrid	Strong	Strong	Strong
3.2.5 Macintosh	Prescriptive	N/A	Strong	Weak
3.2.6 uit Beijerse	Descriptive	Strong	Weak	Strong
3.2.7 Skyrme	Descriptive	Strong	Strong	Strong
3.2.8 Liebowitz	Prescriptive	N/A	Weak	Weak
3.2.9 Weidner	Descriptive	Strong	Weak	Strong
3.2.10 Bhatt	Descriptive	N/A	Weak	Strong

Table 3.4.4: Comparison of KM Strategies

3.5 Knowledge Management Case Studies

The following are case studies that report on the experiences of various organisations when implementing knowledge management. Although there are numerous instances of such reports, these specific ones have been included because they are deemed to be the most significant with regards to knowledge management implementation, and because of the innovative ideas which they express for managing knowledge.

3.5.1 Ernst & Young

At Ernst & Young, the emphasis is on the effective capturing and sharing of knowledge in the organisation, and later transferring it to customers which in turn results in improved value in the company's services. Ernst & Young achieved this by setting up a Center for Business Knowledge (CBK) in 1990, which rapidly became critical to the organisation's knowledge strategy (Davenport, 1996:3). The CBK employed more than a hundred professionals, and included a library, a call-centre and a database of consultant skills. A large part of the CBK's time and effort was directed into identifying and following experts on numerous subjects and making sure that they were present in industry and client teams (Davenport, 1996:3).

The CBK was also responsible for setting up knowledge networks within the consulting practice. These networks had meetings and exchanged valuable information and knowledge about each other's consulting practices. The CBK also developed a knowledge architecture and taxonomy (Davenport, 1996:4). This allowed Ernst & Young to focus their knowledge management initiative in specific domains. He reports that E&Y had to use technology to extract and store the knowledge of the consultants, due to the size and geographical distribution of the knowledge in the organisation.

Davenport (1996:7) reports that some of the challenges that E&Y faced were: embedding knowledge in technology, and an organisational culture that resisted the

knowledge-sharing paradigm. However, Davenport (1996:9) states that despites these problems, E&Y is successful in its knowledge management program, and states that the revenues for the US consulting practice in 1995 increased by forty-four percent. Ernst &Young's success seems to be continuing, since it was ranked first in the 1999 Most Admired Knowledge Enterprise survey (Mclean, 1999b:18)

3.5.2 British Petroleum

At British Petroleum (BP), on the other hand, the KM practices differ considerably. Instead of distributing knowledge across the organisation, BP designed a "Peer Assist" programme, where teams who are in the process of making difficult decisions are assisted by their colleagues. This way, the tacit knowledge of the employees at BP is disseminated throughout the rest of the organisation (Dixon, 1999:214).

British Petroleum also initiated a pilot project called Virtual Teamwork in 1995 (Cohen and Prusak, 1996:1). This initiative consists of teams from across the organisation, equipped with state of the art telecommunications technologies. These technologies allow teams all over the world to videoconference in real-time via ISDN lines or satellite links. This in turn allows the teams to consult each other when faced with new problems in their work area. For example, when equipment fails aboard a drilling platform, the cost of getting a helicopter to fly out to the platform, get the faulty part and take it to be fixed on land, and fly it back to the platform is enormous. This typically means that the drilling platform is out of service for a few days at least. With a Virtual Team present on the platform, they can consult an expert or a team of experts, display the faulty equipment to them in real time and have the problem fixed in less time than conventional means.

This knowledge management project was started as a pilot project with the clear objective of connecting people across the organisation, rather than build a repository of knowledge (Cohen and Prusak, 1996:2). The projects themselves had clear operational goals, for example, to complete a new drilling platform in a specified amount of time. The teams also underwent coaching from a team of change management, people picked form the core teams to find ways to train their team

mates. Throughout the project, the focus of the teams and participants was not on knowledge management, but on using the virtual teamworks to achieve their project goals (Cohen and Prusak, 1996:4).

They report that the participants were very enthusiastic about the project, and resulted in reduced costs and increases in productivity for the project. They also report that at the end of the pilot project, BP approved plans to expand the project by a substantial number of new Virtual Teamwork units.

Some of the success factors which Cohen and Prusak, (1996:7-8) argue were critical to the success of BP's Virtual Teamwork project are:

- Support from Upper Management
- Full-time, Quality Project Staff
- Coaching
- Starting with a Pilot Project
- Measuring and Evaluating Results

3.5.3 Hewlett-Packard

Sieloff (1999) reports that the organisational culture at HP was already a form of knowledge management. HP's traditional approach to the workplace included a number of practices that were already conducive to the sharing of knowledge in the workplace (Sieloff, 1999):

1. Small, independent business units
2. Managers worked among their employees, thus being easily accessible and open.
3. Open office environment
4. Sharing of knowledge and a high-trust culture
5. Loyal and empowered employees
6. An experiment and fail approach
7. Creation of university towns

These business practices allowed employees to be innovative with their work, to be trustful of managers they could access at all times, and to be able to trust them. He reports that these practices were never considered to be knowledge management practices but 'good people management'.

However, these practices could also prove a hindrance to a more centralised and more organised knowledge management strategy. For example, while employees were used to sharing knowledge, they resisted documenting that knowledge and also conforming to formal methodologies and procedures (Sieloff, 1999). Furthermore, employees were used to sharing knowledge on a more localised basis, and could not see the rationale of doing so on a more global level. The rapid expansion of HP in the 1970's and 1980's and its globalisation meant that the traditional management practices had to change (Sieloff, 1999).

Hence, HP invested in the infrastructure to facilitate the global sharing of knowledge, namely email and voice mail (Sieloff, 1999). HP also adopted the use of internet protocols for its wide area networks, and local area networks were seamlessly connected. This infrastructure allowed HP employees to share document repositories, on-line reference databases, and automated software distribution and installation procedures (Sieloff, 1999). This infrastructure eased the process of building and maintaining the formal knowledge repositories, and manuals were replaced with on-line documents which were up-to-date. He cites the explosive growth of the World Wide Web as a facilitator to sharing knowledge through the use of web browsers. HP distributed web browsers, and novice PC users were suddenly capable of sharing and looking for documents that they needed.

He also reports that since then, HP has discovered that although geographically-dispersed teamwork is rapidly becoming fashionable, the technology needs to do even more in order to restore the 'casual proximity' feeling in groups. For example, Sieloff (1999) recommends passive monitoring of workspaces by network cameras, buddy lists, chat capabilities, and a telephone system that provide intercom-like features.

Davenport (1995:3) also reports that one of the knowledge projects initiated by HP was building a network of experts. This system uses a web browser interface that is linked to a relational database, where HP stores a set of expert profiles. This directory of HP experts, Connex, allows users to find an HP employee that has a particular set of experience and qualifications. Another initiative at HP was the effort to capture and use HP product knowledge in order to reduce the rate of dealer support calls. HP implemented a system where frequently-asked questions were stored on a dial-up database, called HP Network News (Davenport, 1995:4). The system now runs on Lotus Notes, and is highly successful in solving dealer problems.

3.5.4 Hoffman-LaRoche

The former Director of Knowledge Systems at Hoffman-Laroche, Patricia Seemann, (1996:2) reports that Hoffman-Laroche wanted to further its success and maintain its lead on the competition. In 1992, the organisation started a knowledge management initiative to achieve its goals. When she joined Hoffman-laroche in 1993, the company's past performance on new drug applications (NDAs) with the United States Food And Drug Administration (FDA) was varied. Some drugs received FDA approval within months and others took years or were approved for more limited usage (Seemann, 1997:27). When she joined the company, Seemann's overall responsibility was to establish where knowledge management could make a change at Hoffman-Laroche, and while analysing the company's operations, she came across the NDAs (Seemann, 1997:27).

Seemann (1996:2) conducted a further analysis of the NDA process and concluded that it was indeed a test for knowledge management. Firstly, the drugs that Hoffman-Laroche produces are simply knowledge products, and secondly, the NDA process involved assembling the knowledge of hundreds of people who had worked on the development of these drugs. This analysis led her (Seeman, 1997:28) to design a knowledge management program with two thrusts: helping the development teams to prototype their knowledge required for the NDA process, and to create a knowledge map to store the existing knowledge sources that would contribute to the NDA process. Seemann (1996:2) reports that Hoffman-Laroche created a knowledge

management team of 25 employees and external consultants from across the company and this team was tasked with using these tools to accelerate the drug development and approval process. She (Seemann, 1996:2) also mentions that the team was comprised of the best, most intelligent and hard-working people to increase the chances of success.

The first step in the KM initiative was to define the company's business objective (Seemann, 1996:2). At Hoffman-Laroche, the goal was to produce more drugs and to get them through the NDA process and to the market as quickly as possible. Next, Seemann involved external consultants to examine approximately 60,000 pages chosen from four NDAs in order to evaluate the explicit knowledge contained in these documents. These consultants used carefully developed criteria to analyse these documents, and concluded that the NDAs did not always convey the key information that the FDA required, and sometimes even contained conflicting, unclear and unsuitable information (Seemann, 1996:3).

Hence, the knowledge management effort went ahead with the development of the company's knowledge map, which helps to capture and access knowledge (Seeman, 1996:4). The components of the knowledge map include (Seeman, 1997:29-30):

- Rewritten guidelines summarising key regulator/customer requirements
- Question tree mapping questions that customers want answered
- Contents outlining how the company should answer customer queries
- Knowledge links recording who should share what knowledge with whom
- Yellow pages cataloguing the people who have knowledge and expertise

This knowledge map allowed people to access both the explicit knowledge as well as the tacit knowledge of the organisation, and Seemann (1997:30) notes that this map became a powerful tool, since it was partly a directory, but also included process descriptions and best-practices.

Next, Seemann (1996:5) proceeded to initiate the prototyping process at Hoffman-Laroche. Seemann (1997:28) gathered a group of former regulators who helped the knowledge management team by discerning that FDA regulators were only trying to answer three basic questions, which were: is the drug safe; does it work; is it of

appropriate quality? The rest of the information demanded by the FDA were simply additions to these basic facts (Seemann, 1997:28). Hence, the goal of the knowledge management team was to create a prototype of an perfect NDA which would achieve the best results through the FDA, and other regulators from Hoffman-Laroche's highest 20 global markets (Seemann, 1997:28). The knowledge management team achieved its goal, and even managed to create a prototype that met the requirements for the NDA of a drug worldwide, something which was formerly thought to be unachievable (Seemann, 1997:29)

Seemann (1996:6) argues that for a knowledge management program to be considered successful, the organisation must be able to measure its impact, both qualitatively and quantitatively. In particular, the organisation should establish if its knowledge management goals were reached, the quality of its document improved, its benchmarks such as time to market and product development time progressed, and finally if team members can observe qualitative benefits (Seemann, 1996:6). For Hoffman-Laroche, the test came quickly, when it submitted an NDA for a new drug, whose filing time was expected to take up to eighteen months, and the approval after three years. Instead, the filing time was only ninety days, and the drug was approved after only nine months, clearly indicating a successful knowledge management program (Seemann, 1997:31).

Other longer-term successes were also noted at Hoffman-Laroche. For example, a majority of the 3000 people who used the knowledge map expressed their gratitude, since it was the first time that they could see where their work fitted in the company's structure, and many were also pleased that they had been included in the yellow pages as experts (Seemann, 1997:31).

3.5.5 3M

Brand, manager of business information systems at 3M (UK), reports that 3M views knowledge management as more of a cultural and organisational issue than a technological one (Brand, 1998:17). He argues that the tacit to tacit transfer of knowledge needs an environment where employees are stimulated to share

knowledge, and are willing to share that knowledge for the greater good of the company. 3M then devised a number of goals that needed to be met in order for the company to be successful in its knowledge management endeavour: vision, foresight, an understanding of its core competencies, stretch goals, freedom for its employees to achieve these goals, and an atmosphere which enables people and encourages people to share knowledge with others (Brand, 1998:18). Furthermore, he argues that in order to achieve these goals, 3M had to secure long-term commitment from top management, recruit the right people, and implement a sound support and recognition plan. Brand (1998:18) emphasises the role that top managers play in the company to support knowledge management. He reports that one of the main responsibilities of top managers is to encourage knowledge sharing in the company.

Brand (1998:18) also emphasises the importance of tradition at 3M. Employees are encouraged to stay in the company for life, and promotion within the organisation is also a key factor in 3M's employment policy (Brand, 1998:18). This is illustrated by the low employee turnover and the average employment time being over ten years. He argues that this allows 3M to build organisational memory, and that the experience acquired through the employees cannot be duplicated by its competitors. Furthermore, this wealth of expertise and knowledge does not get lost when staff leave the organisation or during a downsizing, leaving the innovative capabilities of 3M intact (Brand, 1998:18). This sense of tradition also feeds into the continuity of employment, and loyalty to 3M by employees. He argues that while other organisations employ people on short-term contracts, hoping that they will create innovative ideas, it is often a long-term approach that allows people to be truly innovative.

3M's long-term commitment to its employees also means that it allows its employees to make mistakes (Brand, 1998:19). Over the years, this has resulted in some very successful products being developed as a result of mistakes, for example, the Post-it® Notes were developed as a results of a mistake made during the development of an adhesive. Similarly, 3M's venture into ceramics started as a result of mistakes made during the development of a new abrasive grit (Brand, 1998:19). This also forms part of 3M's flat organisational structure, which allows people at all levels to make decisions. He also mentions the culture of story-telling as an integral part of

knowledge management at 3M. This allows employees to look to past success of the company and to follow their own creative thoughts even when told to abandon their projects.

3M also have a strong culture of innovation, and use two different approaches to innovate: knowledge by design, and knowledge by emergence. The knowledge by design approach entails top managers defining who their customers are and what products they want, and then encouraging their technical employees to join in the process. This allows the technical employees to directly come into contact with their customers, and this leads to the tacit needs of customers being met by the development of innovative products. In the second approach, 3M relies on accidental discoveries to provide new and innovative products. There is also a strong culture of encouraging cross-division cooperation in the organisation, which in turn leads to people from different working environments to share ideas and develop innovative products. Brand (1998:20) also mentions the fact that top management at 3M does not place tight controls over its employees, because they feel that innovation often happens in a chaotic environment.

He also argues that recruiting the right people to work at 3M is vital to the organisation's innovative spirit. The kind of employees that 3M looks for are those who want to be free to pursue their own projects, are action-oriented, and also prepared to take some risk with their jobs. Future employees of 3M also have to be creative, possess a strong work ethic, self-motivated, resourceful, problem solvers, and broad interests (Brand, 1998:21).

In order to maintain the momentum of their knowledge management effort, 3M have a number of organisational structures in place to encourage people to share knowledge and innovate. Employees can display their new products at fairs, employees carry out technical audits of other employees' labs, and chapter meetings are held where people of similar interests can meet through face to face or video conference (Brand, 1998:21). There is also a "15%" rule at 3M that encourages employees to devote about 15% of their time to work on their own innovative ideas. This rule has generated numerous new products for 3M. 3M also recognises that people need money to pursue their ideas, and has instituted a variety of grant

schemes that employees can use to find their equipment needs or to get extra manpower.

3M has also put in place recognition programmes which encourage learning and knowledge transfer (Brand, 1998:21). These structures make it possible for someone to become a vice-president without having any managerial roles, or for inventors to become known throughout the company. This has the effect of motivating others to also start their own innovative projects. Furthermore, a number of awards have been instituted to reward innovation, and these are not restricted to technical employees, but to everyone.

Brand (1998:22) reports that the key to knowledge management at 3M is motivating people to share ideas and to innovate, and concludes that in the right environment, people will use a Knowledge Management system, whereas a powerful Knowledge Management system in the wrong environment will achieve little.

3.5.6 Discussion of Case Studies

The knowledge management practices in the five organisations detailed in the case studies above demonstrate that knowledge management is particular to each organisation. For example, at Ernst & Young, the emphasis is on the capturing and sharing of knowledge in an electronic format. Employees who were knowledgeable in an area were marked as experts, and the Center for Business Knowledge became responsible for creating knowledge networks within the consulting practice. The focus of the E&Y knowledge management effort was to use technology to capture and store knowledge.

At British Petroleum, on the other hand, the emphasis was on the human contact. BP create a system where teams who have a difficult decision to make are assisted by their peers, hence enabling tacit-to-tacit knowledge transfer among its employees. BP also made use of technology by creating a virtual teamwork project.

Hewlett-Packard's organisational culture was already conducive to the development of knowledge management, and some of the business practices were encouraging knowledge sharing. HP focused on developing technology that allowed its employees to share knowledge even when geographically dispersed. It also focused on developing a network of experts so that anyone could locate a person with a specific set of skills or knowledge.

At Hoffman-LaRoche, the knowledge management effort was aligned to the business goals from the beginning, and was aimed at reducing the time spent on their new drugs application process with the US Food and Drugs Administration. The success of the knowledge management implementation resulted in the application process being drastically improved. Furthermore, the knowledge road map produced during the process allowed employees to see exactly how and where their work fitted in the overall organisational picture.

3M's philosophy is to view knowledge management as more of a cultural and organisational issue. The emphasis is to promote a culture of knowledge sharing, and a tradition of innovation. There is little use of technology to achieve this, instead 3M relies on human contact. There is also a strong emphasis on the rewards and recognition awarded to achieving individuals.

As can be seen from these case studies, the knowledge management in each organisation is specific to that organisation, reinforcing the idea that knowledge management must be tailored to an individual organisation.

3.6 Conclusion

This chapter detailed a framework for analysing knowledge management strategies. Existing knowledge management strategies were then analysed according to this framework. The most important factors than can affect knowledge management strategies were then discussed, followed by an analysis of knowledge management case studies. The next chapter will investigate the state and level of knowledge management at present in the South African motor vehicle manufacturing industry.

Chapter 4

Knowledge Management in the South African Motor Vehicle Manufacturing Industry

4.1 Introduction

The previous chapter investigated existing knowledge management strategies, which were analysed according to a specific framework. The most important factors that can affect knowledge management strategies were also discussed, followed by an analysis of knowledge management case studies. This chapter describes a study of the South African Motor Vehicle Manufacturing Industry with regards to its state and level of Knowledge Management. This study is intended to provide the author with a snapshot of the state of knowledge management in selected motor vehicle manufacturing companies. The objective of this study is to determine the importance of, and performance in, knowledge management practices in motor vehicle manufacturing companies. This information will then be used in conjunction with the findings of the literature survey to construct a knowledge management strategy which is tailored to the needs of the motor vehicle manufacturing industry.

4.2 Design

The author consulted Fink (1995) extensively, and decided to use a questionnaire as the data collection tool. The objective was to evaluate the importance and performance of knowledge management practices within the organisations. Duffy's Knowledge Management Benchmarking Questionnaire was used for the purposes of this study (Duffy, 1999).

The questionnaire was targeted at the IT Directors of the motor vehicle manufacturing companies. This targeting of a specific type of person meant that the sample was chosen by means of a convenience, non-probability method. Although a sample should be as large as possible, the targeting of such a small industry meant that only six (6) respondents were available to survey. The author acknowledges the limitations of this approach.

4.2.1 Materials and Equipment

The questionnaire was built in a spreadsheet using Microsoft Excel, and sent electronically and/or in paper format to respondents. The results of this survey were also sent back to Duffy to add to his own results database and for further research purposes. The data was analysed using Microsoft Excel on a Microsoft Windows 2000 Professional platform. The questionnaire can be found in **Appendix A**.

4.2.2 Preparation

Respondents were contacted ahead of time and asked to participate in the study. They were briefed on the purpose and objectives of the study, and were asked to indicate whether they were willing to participate. Respondents were then sent the questionnaire, and were given instructions on how to fill out the questionnaire. All the respondents agreed to participate.

4.2.3 Data Collection Activities

The author collected data from the completed questionnaire, which was designed for quantitative data only. The wording of the questionnaire was kept as simple as possible. However, due to the nature of the subject, the use of IT-specific terms was unavoidable.

4.2.4 Pilot study

Since the questionnaire had already been tested and used, no pilot study was carried out.

4.2.5 Construction of the Questionnaire

The questionnaire was divided into seven (7) sections, the first section dealt with background information, and the remaining sections dealt with specific aspects of Knowledge Management. Respondents were asked to rate the importance of certain aspects of knowledge management on a scale of one (1) to ten (10), and then to rate their performance on that specific aspect on a scale of one (1) to ten (10). The aim of this was to firstly assess the importance that these organisations assign to various aspects of knowledge management, and secondly to evaluate their performance in these aspects. Thus, any major discrepancies between an importance and a performance rating would suggest a shortcoming or problem in that specific area of knowledge management in the company.

4.2.6 Explanation of the Questionnaire

4.2.6.1 Section 1 Background Details

The first section of the questionnaire asked the respondents to supply some background information on their organisation, such as their name, job title, number of employees, and contact details. The questionnaire can be found in **Appendix A**.

4.2.6.2 Section 2 Knowledge Assets

In the second section, respondents were asked to rate the importance of various Knowledge Assets in their organisation, and then to rate the performance of their organisation with regards to these assets. From this section onwards, the following instructions were issued to respondents with regards to the questions:

> In the questions that follow please enter a number from 1 - 10 in each box. The importance is for your organisation and the performance indicates how well your organisation is doing for that item.
>
> 10 = very high importance 1 = very low importance
> 10 = very high performance 1 = very low performance

4.2.6.3 Section 3 Learning People

The aim of this section was to evaluate how the employees in these organisations were sharing and using knowledge in the workplace, in order to create learning.

4.2.6.4 Section 4 A Learning Organisation

This section aimed at judging how well the organisation provided an environment which fostered and rewarded knowledge creation and sharing in the workplace.

4.2.6.5 Section 5 Information technology

Respondents were asked to rate the importance and performance of their organisations with regards to specific aspects of IT, and how their information technology infrastructure helped knowledge management.

4.2.6.6 Section 6 Knowledge Management

Section 6 dealt with the high-level management issues surrounding knowledge management and the issue of commitment of top management and employees to the knowledge management effort.

4.2.6.7 Section 7 Knowledge Intensity

Finally, the respondents were asked to rate the importance only of the 'knowledge intensity' of their organisation, that is, the use of knowledge as a resource in the products/services offered by, and in the value chain of, the organisation.

4.3 Data Analysis

The data analysis performed on the data collected followed the process taken by Professor Duffy, that is, a measure of central tendencies (means) and standard deviations. The means of the responses indicate the level of the importance and the standard deviations indicate how much agreement there is within the industry with regards to specific aspects of knowledge management. Again, due to the small sample size, the figures should be viewed with some care.

4.4 Results

4.4.1 Demographics

A sample of six (6) respondents was selected from South Africa. The small sample size was dictated by the need to assess only South African motor vehicle

manufacturing companies, that is, companies that actually build cars in South Africa. The respondents were asked to respond to questions with regards to their knowledge management practices in their organisations. This provided a sound basis for evaluating the level of knowledge management in these organisations.

All the respondents came from the South African motor vehicle manufacturing industry. Three (3) of the respondents were IT/IS Directors, and the designations of the rest of the respondents were varied: Manager of Server Systems, CRM Program Manager, and Systems Development Manager. The size of the organisations ranged from 3500 to 8000 employees. Three (3) of the respondents were based in Pretoria, two (2) in the Nelson Mandela Metropolitan Area, and one (1) in Durban.

4.4.2 Section 2 Knowledge Assets

2. Knowledge Assets

		Importance		Performance	
		Mean	SD	Mean	SD
2.1	The quality of data, information and knowledge is managed	**9.5**	**0.5**	**6.2**	**1.2**
2.2	Knowledge assets are formally identified	**8.2**	**2.2**	**4.7**	**1.6**
2.3	The locations of knowledge assets are known	**8.0**	**1.7**	**5.5**	**2.1**
2.4	Knowledge requirements are related to business needs	**8.8**	**1.2**	**7.7**	**1.4**
2.5	Specific plans and policies exist for growing knowledge	**8.5**	**2.3**	**6.0**	**2.4**
2.6	Knowledge assets are measured	**8.5**	**1.5**	**4.5**	**1.4**
2.7	**Formal systems exist to**:				
2.7.1	Identify required knowledge	**8.0**	**2.1**	**4.5**	**1.6**
2.7.2	Acquire knowledge	**8.3**	**2.3**	**5.0**	**2.4**
2.7.3	Store knowledge	**8.8**	**1.3**	**5.5**	**2.2**
2.7.4	Facilitate access to knowledge	**9.0**	**1.1**	**5.5**	**1.6**
2.7.5	Distribute knowledge	**9.3**	**0.8**	**6.0**	**1.8**
2.7.6	Protect knowledge	**9.5**	**0.8**	**7.3**	**1.8**
2.7.7	Purge knowledge	**7.8**	**2.3**	**5.3**	**1.4**

Table 4.4.2: Knowledge Assets of the SAMVMI

As can be seen in **Table 4.4.2** above, the respondents assigned high values to the importance of knowledge assets in their organisations, the lowest score being 7.8 and the highest 9.5. This indicates that the industry as a whole recognises the importance

of these assets for the competitiveness of their organisations. The figures of the standard deviations were relatively low, ranging from 0.5 to 2.8, indicating agreement in some cases, and some disagreement in others.

However, it can be seen that the figures for the performance on these particular issues are quite low, except for questions 2.4 and 2.7.6. The standard deviations in the performance section are also higher in some cases, suggesting that the respondents are not performing well, and that the performance levels vary to quite large extent in some cases. In summary, it can be said that the organisations surveyed have identified what areas of knowledge management are important to them, but are failing to perform well in these areas. A more detailed analysis of this section of the questionnaire can be found in **Appendix B**.

4.4.3 Learning People

3	Learning People				
		Importance		**Performance**	
		Mean	**SD**	**Mean**	**SD**
3.1	Never stop learning	**9.0**	**1.3**	**6.0**	**1.8**
3.2	Are constantly alert for new information	**8.5**	**1.2**	**5.8**	**1.5**
3.3	Create and accumulate knowledge	**9.2**	**0.8**	**6.3**	**1.0**
3.4	Accept change	**9.2**	**0.8**	**5.5**	**1.5**
3.5	Are willing to communicate and share knowledge	**9.3**	**0.8**	**6.0**	**1.7**
3.6	See knowledge as fuelling personal growth	**9.2**	**1.0**	**7.5**	**0.5**
3.7	Have a high tolerance for complexity	**8.7**	**1.0**	**6.2**	**1.9**
3.8	Think systematically (e.g. about the underlying causes)	**8.3**	**1.4**	**7.0**	**1.4**
3.9	Continually search for ways to do things cheaper, better, faster	**9.2**	**1.3**	**8.0**	**1.5**
3.10	Are willing to experiment	**8.0**	**1.1**	**6.3**	**2.0**
3.11	Are not afraid to question the status quo	**8.5**	**1.2**	**5.5**	**2.1**
3.12	Can interact with people as well as technology	**8.5**	**1.8**	**6.3**	**2.0**
3.13	Are not complacent	**8.8**	**1.8**	**6.0**	**1.8**
3.14	Are keen to solve problems and help colleagues to do so too	**9.3**	**1.0**	**6.8**	**1.3**
3.15	Can work in teams	**9.3**	**1.2**	**7.3**	**1.4**
3.16	Welcome empowerment by their organisations	**8.8**	**1.3**	**6.8**	**2.0**
3.17	Use information technology effectively in pursuing knowledge	**9.2**	**1.2**	**6.2**	**1.7**

Table 4.4.3: Characteristics of Learning People in the SAMVMI

As can be seen in **Table 4.4.3** above, respondents assigned high values to the importance of learning people in their organisations, the lowest score being only 8.0 and the highest 9.3. This indicates that the industry as a whole recognises the importance of smart people, and the importance of people in a knowledge environment. The figures of the standard deviations were relatively low, ranging from 0.8 to 1.8, indicating agreement in most cases, and disagreement only in a few cases. This suggests that the industry as a whole knows what type of people to employ in order to make knowledge management work in their organisation.

However, in the *Performance* section, again it can be seen that the mean scores are middle-range, although for question 3.9, the mean performance is actually 8.0. This is perhaps not surprising, since organisations have traditionally encouraged their employees to find ways to cut costs, increase profits and reduce time to market. The standard deviations, however, are quite varied, and range from 0.5 to 2.1, indicating that there is quite a marked difference in performance scores for the respondents. In summary, the industry seems to agree on what type of people are necessary to make knowledge management successful, but again their performance in this area can still be improved. A more detailed analysis of this section of the questionnaire can be found in **Appendix B**.

4.4.4 A Learning Organisation

4	A Learning Organisation	Importance		Performance	
		Mean	SD	Mean	SD
4.1	Rewards employee knowledge	**8.5**	**1.2**	**6.3**	**1.9**
4.2	Rewards knowledge sharing and dissemination	**8.7**	**1.5**	**4.8**	**1.8**
4.3	Encourages acceptance of personal responsibility for learning	**9.0**	**1.3**	**6.8**	**1.6**
4.4	Has a high computer literacy level	**8.5**	**1.0**	**6.0**	**2.7**
4.5	Devotes time and resources to training and education	**8.8**	**1.3**	**7.2**	**2.0**
4.6	Rewards team performance	**8.5**	**1.4**	**5.8**	**2.9**
4.7	Rewards knowledge outputs (eg patents, papers)	**8.2**	**1.2**	**5.0**	**2.4**
4.8	Measures knowledge sharing	**7.5**	**2.0**	**3.3**	**2.8**
4.9	Teaches its staff to learn	**7.7**	**2.1**	**5.7**	**2.6**
4.10	Has someone responsible for knowledge management	**7.7**	**2.3**	**5.3**	**2.4**
4.11	Has a flat organisational structure	**8.3**	**1.0**	**6.2**	**1.5**
4.12	Grows its research capability	**7.3**	**2.0**	**5.5**	**2.1**

Table 4.4.4: A Learning Organisation according to the SAMVMI

Respondents were less sure and disagreed more about this section of the questionnaire when compared to the previous section. This can be inferred from the lower importance mean scores and the higher standard deviations. For example, the highest mean score in the Importance section is only 9.0, and the highest standard deviation is 2.3. Respondents seemed to be unsure of what a learning organisation was supposed to be, although they knew what the characteristics of a learning person was in the previous section. It is interesting to note that they did not think that an organisation should develop a research capacity, as implied by the low mean of 7.3 and the high standard deviation of 2.0 in question 4.12. However, they thought that people should be responsible for their own learning and development, and that the organisation should not be held responsible for teaching people to learn, as suggested by the high mean score of 9.0 and relatively low standard deviation of 1.3 in question 4.3, and from the low mean score of 7.7 and the high standard deviation of question 4.9. However, the importance of rewarding people for sharing and using knowledge was evident, from their answers to questions 4.1, 4.2, 4.6, 4.7. It was also suggested that a flat organisational structure would be conducive to knowledge management.

Very interestingly, respondents also thought that it was quite important that organisations rewarded people for sharing knowledge, as suggested by the relatively high mean score of 7.5, although the relatively high standard deviation of 2.0 indicated difference of opinion among respondents. However, it was clear that they also felt that organisations were falling short in this area, with a *Performance* mean of only 3.3, although the high standard deviation of 2.8 also meant that some organisations were better at it than others.

When it came to performance on these aspects of organisational learning, respondents indicated that their organisations were not performing very well, and there were marked difference in the performance among organisations. This is implied by the low performance mean scores, as low as 3.3, and the high standard deviations, 2.9 for question 4.6. This suggests that organisations are not doing very well in establishing their organisational structures in a way that fosters a knowledge-creating and -sharing environment. A more detailed analysis of this section of the questionnaire can be found in **Appendix B**.

4.4.5 Information Technology

5	**Information Technology**	**Importance**		**Performance**	
		Mean	**SD**	**Mean**	**SD**
5.1	A high level of systems integration exists	**9.5**	**0.8**	**7.7**	**1.4**
5.2	There is extensive access to external databases	**7.5**	**1.6**	**6.0**	**2.1**
5.3	The Internet (intranet and/or extranet) is used extensively	**8.5**	**1.0**	**7.2**	**1.9**
5.4	Data base management systems are used extensively	**9.5**	**0.8**	**7.3**	**2.4**
5.5	Electronic mail is used extensively	**9.0**	**1.3**	**8.7**	**1.2**
5.6	The IT architecture is network-centric	**9.3**	**0.8**	**8.2**	**1.2**
5.7	Knowledge-based systems (expert systems, neural nets) are used extensively	**8.8**	**1.3**	**5.3**	**2.5**
5.8	Simulation (including what if models) is used extensively	**8.5**	**1.2**	**6.0**	**3.0**
5.9	Management support systems are used extensively	**9.3**	**0.8**	**7.3**	**2.0**
5.10	Data mining is used extensively	**8.8**	**1.2**	**4.8**	**2.7**
5.11	Groupware (eg Lotus Notes) is used extensively	**8.8**	**1.9**	**6.8**	**2.5**
5.12.	People databases are used extensively	**9.2**	**1.2**	**6.3**	**2.3**

Table 4.4.5: Information Technology in the SAMVMI

This section of the questionnaire dealt with specific information technologies in place in organisations that aid knowledge management and the results are shown in **Table 4.4.5** above. The high mean scores and the relatively low standard deviations in the *Importance* section once again outline that respondents think that knowledge management needs a technological grounding in order to work. Respondents felt that it was very important that the organisational systems should be integrated, and it seemed most respondents were in agreement on this point. The same thing can be seen on the matter of database management systems, from question 5.4. According to respondents, the least important technology needed by the organisation was access to external databases, which is somewhat surprising. The overall picture that emerges from this section is that organisations need to provide for easy access to data and information, and make use of electronic means for easier communication.

The mean scores in the *Performance* section are also fairly high when compared to the previous sections of this questionnaire, since most of these information technologies have been in use in most organisations for a number of years, e.g., database management systems. The relatively high standard deviations in this section also suggest that the performances of organisations differ to a fairly large extent. Not surprisingly, the highest mean scores were from questions 5.5 and 5.6, which indicate that respondents felt that their organisations were performing well in the area of using technology to facilitate communication among employees. However, the use of groupware was an issue on which respondents felt their organisations could improve on. Furthermore, although data mining was marked as being very important, the performance of organisations in this area was extremely poor. This was indicated by the low mean score of only 4.8, and a high standard deviation of 2.7 suggested there were differences in performance among organisations. A more detailed analysis of this section of the questionnaire can be found in **Appendix B**.

4.4.6 Knowledge Management

6	Knowledge Management	Importance		Performance	
		Mean	SD	Mean	SD
6.1	Top management is committed to knowledge management	**8.8**	**1.3**	**6.3**	**2.3**
6.2	Knowledge intensive products or services play a key role	**8.8**	**1.2**	**6.0**	**2.0**
6.3	A formal knowledge strategy is in place	**8.8**	**1.5**	**5.3**	**2.2**
6.4	Users are committed to knowledge management	**8.8**	**1.5**	**4.8**	**2.0**
6.5	A formal knowledge plan exists	**8.5**	**1.5**	**4.7**	**2.1**

Table 4.4.6: Knowledge Management in the SAMVMI

Table 4.4.6 above shows the results for Section 6 of the questionnaire, which dealt with the management part of knowledge management. The overall picture that comes out of this section is that commitment from top management and employees, knowledge intensive products, the existence of a formal knowledge strategy and a formal knowledge plan are all very important, as suggested by the high mean scores of 8.5 and 8.8, and the relatively low standard deviations ranging from 1.2 to 1.5. This indicates that respondents have a fairly good idea of the requirements of the entire organisation if knowledge management is to succeed.

However, it can also be seen from the table above that respondents felt that their organisations were not very successful in these key areas. This is indicated by the fairly low mean scores in the *Performance* section, ranging from 4.7 to 6.3. Furthermore, high standard deviations ranging from 2.0 to 2.3 indicate marked differences in performance among these organisations. A more detailed analysis of this section of the questionnaire can be found in **Appendix B**.

4.4.7 Knowledge Intensity

7	**Knowledge Intensity**	**Importance**	
		Mean	**SD**
	The knowledge intensity of your organisation	**8.0**	**1.4**

10 = very high importance of knowledge as a resource, in the products/services offered and in the value chain

1 = very low importance of knowledge as a resource, in the products/services offered and in the value chain

Table 4.4.7: Knowledge Intensity of the SAMVMI

In the last section of the questionnaire, only a rating of the importance of the knowledge intensity of the organisation was required, as shown in **Table 4.4.7** above. A high mean score of 8.0 indicated that respondents thought that it was very important that their organisations use knowledge as a resource in their products and services, and throughout the entire value chain of the organisation. A relatively low standard deviation of 1.4 suggested that there was some difference in opinion on this subject.

4.5 Discussion of Results

The state and level of knowledge management in the South African Motor Vehicle Manufacturing Industry is revealing. It is quite apparent that the industry knows to a large extent what areas of business, people and technology it needs to focus on in order to achieve successful knowledge management. However, the results also indicate that respondents did not think that their organisations were very successful in these areas.

The results from Section 2 indicate that it is very important that these organisations should have formal systems in place to deal with knowledge identification, acquisition, storage, distribution and protection. The image of a learning person that emerged was surprising. Respondents emphasized the need for people who never stop learning, create and accumulate knowledge, are willing to change, and who are

not only techno-centric, but can also interact with people. However, the results also indicate that respondents did not think that their organisations were very successful in these areas.

The characteristics of a learning organisation that were revealed were quite surprising, the most surprising one being that respondents thought that organisations should encourage people to be responsible for their own learning. The importance of a flat organisational structure was also emphasized, as well as the need for a measuring system for knowledge sharing, and reward systems for knowledge sharing and distribution. However, respondents were of the opinion that it was not overly important for organisations to grow their research capabilities, which is quite surprising. Again in this case, the results indicate that respondents did not think that their organisations were very successful in these areas.

When it came to the use of information technologies in the organisations, respondents emphasized the importance of collaborative technologies such as email, and a network-biased infrastructure. The need for a high level of system integration was also stressed. Not surprisingly, results indicate that these organisations were quite successful in most IT areas, which can be explained by the fact that IT has been integrated in the motor vehicle manufacturing industry for quite some time now. However, on the issue of data mining and knowledge-based systems, organisations were not particularly successful, which can be explained by the fact that these technologies are relatively new.

Perhaps the most surprising aspect of this study is the revelation that organisations are aware that commitment from top management and employees is vital to the success of knowledge management, but are still struggling to perform well in these areas, and they seemed to be having particular difficulties with commitment from users, although top management also did not seem very committed. The need for a formal knowledge strategy and knowledge plan as well as knowledge intensive products was also pointed out. However, the results also indicate that respondents did not think that their organisations were very successful in these areas.

Finally, all respondents agreed to some extent that their organisations are very knowledge intensive, as supported by findings of the literature.

4.6 Use of Findings

The picture that emerges from this study is that the motor vehicle manufacturing industry knows what it needs for knowledge management to be successful, but is still unable to be successful in their knowledge management efforts. In support of the literature survey, the organisations are focusing on the technological aspect of knowledge management to the detriment of the people aspect, which is more important.

These findings will be used to construct a knowledge management strategy for these organisations which overcomes their current shortcomings in the knowledge management area. For example, one of the areas that needs focus is the management of people, and the rewards for knowledge sharing in the organisation. Another aspect is the commitment and involvement from employees, as well as top management for knowledge management, which these organisations are not able to create.

4.7 Conclusion

This chapter described a study of the South African Motor Vehicle Manufacturing industry with regards to their state and level of Knowledge Management. The aim of this study was to obtain a snapshot at the state and level of knowledge management in the South African motor vehicle manufacturing industry. This was done in order to better understand the needs of the local organisations which needed a knowledge management strategy suited to their needs. Respondents were asked to rate the important of, and performance in, various aspects of knowledge management of their organisations. Thus, the results obtained from this study will help the author to construct a knowledge management strategy that will rectify the apparent shortcomings in the industry. The next chapter will describe the proposed model.

Chapter 5

A Model of Knowledge Management Implementation Strategy

5.1 Introduction

The previous chapter described a study of the South African Motor Vehicle Manufacturing industry with regards to their state and level of Knowledge Management. This was done in order to better understand the needs of the local organisations which needed a knowledge management strategy suited to their needs. This chapter will use these and the findings of the literature survey to construct a knowledge management implementation strategy tailored to the needs of the target industry. A general overview of the model is presented, followed by in-depth explanations of each section of the model. A list of the Critical Success Factors are derived from the model, followed by a discussion of the model. The applicability of the model organisations in other industries is also considered.

5.2 The Model

5.2.1 Underlying Principles of the Proposed Model

According to Rubenstein-Montano, *et al*, (2000) a knowledge management framework should adhere to the following:

1. Be both prescriptive and descriptive,
2. Be consistent with systems thinking,
3. The organisational goals and strategies must be linked to knowledge management,
4. Planning should take place before any knowledge management activities,
5. The cultural aspects of the organisation must be acknowledged and the, knowledge management practices must be compatible with that culture,
6. Knowledge management must be directed by learning and feedback loops, both single and double.

The author agrees with the recommendations proposed by Rubenstein-Montano, *et al*, (2000), and will propose a model that will adhere to these.

5.2.2 The Proposed Model

The proposed model consists of three main interlinked components: Knowledge Management of the Organisation, Knowledge Management of the People, and Knowledge Management of the Infrastructure and Processes. The organisation needs to balance its focus on these three subsystems in order to achieve a successful knowledge management effort.

The emphasis in this model is on the importance of aligning the knowledge management strategy of the organisation to the overall business strategy of the organisation. The culture and managing the culture change when implementing knowledge management are also of utmost importance. The author proposes a holistic approach to managing knowledge by including in the process customers,

suppliers, stakeholders, and environmental factors. The concept of organisational learning is also catered for in this model.

The author then focuses on the importance of the employees of the organisation, and their contribution towards a successful knowledge management effort. There should also be a concerted effort to make people feel part of the change when implementing knowledge management. The organisation should also encourage individual learning, and innovative thinking with employees, and reward those that do produce such results.

Finally, the infrastructure and business processes of the organisation cannot be neglected when implementing knowledge management. The author highlights the importance of hardware and software that will facilitate employees to share and disseminate knowledge throughout the organisation. The business processes are also mentioned as they need to allow for formal as well as informal sharing and use of knowledge within the workplace.

The proposed knowledge management model is illustrated below:

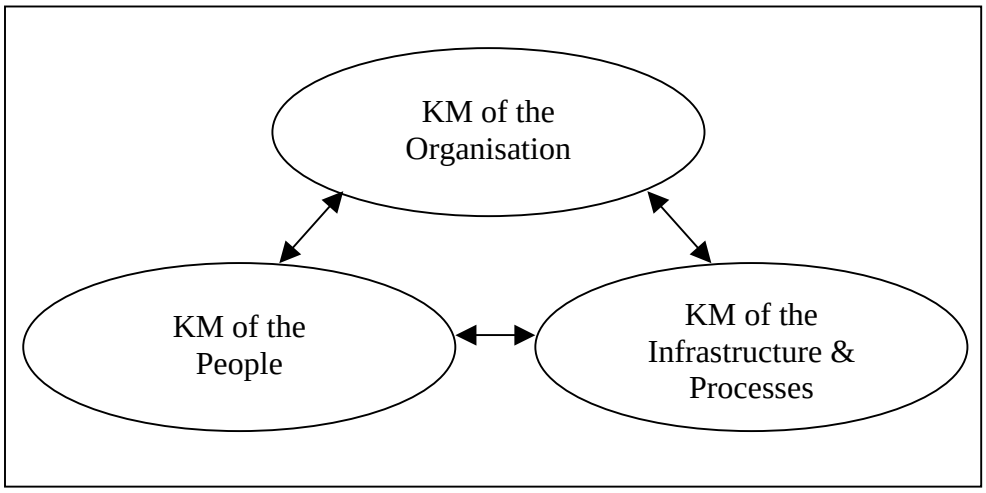

Figure 5.2.2: The proposed model

5.2.2.1 Knowledge Management of the Organisation

The Knowledge Management of the Organisation component deals with the overall activities that need to be performed in the organisation during the knowledge management effort. At this level, the organisation needs to carry out the high-level activities such as creating a knowledge management strategy, aligning that strategy with the business strategy, etc.

Firstly, at the organisational level, knowledge management must focus on the following key activities:

1. Perform a knowledge-based SWOT analysis;
2. Create a vision for the KM initiative & providing a Leader;
3. Align the KM effort with the business strategy;
4. Plan & Design the KM project (set goals & objectives);
5. Manage the organisational culture and manage change(s);
6. Manage with a holistic approach, including:
    a. Customers
    b. Suppliers
    c. Shareholders
    d. Other Stakeholders
    e. Business Environment
    f. Competitors
    g. Overall Environment; and
7. Create & Manage organisational learning.

5.2.2.1.1 Perform a Knowledge-based SWOT analysis

Zack (1999a:126) argues that the strengths, weaknesses, opportunities and threats (SWOT) framework is arguably the most well-known approach to defining strategy in business. He (Zack, 1999a:128) therefore recommends using the SWOT framework to identify the organisation's knowledge gap and help it define its knowledge strategy.

This process is illustrated in the figure below (Tiwana, 2000:153):

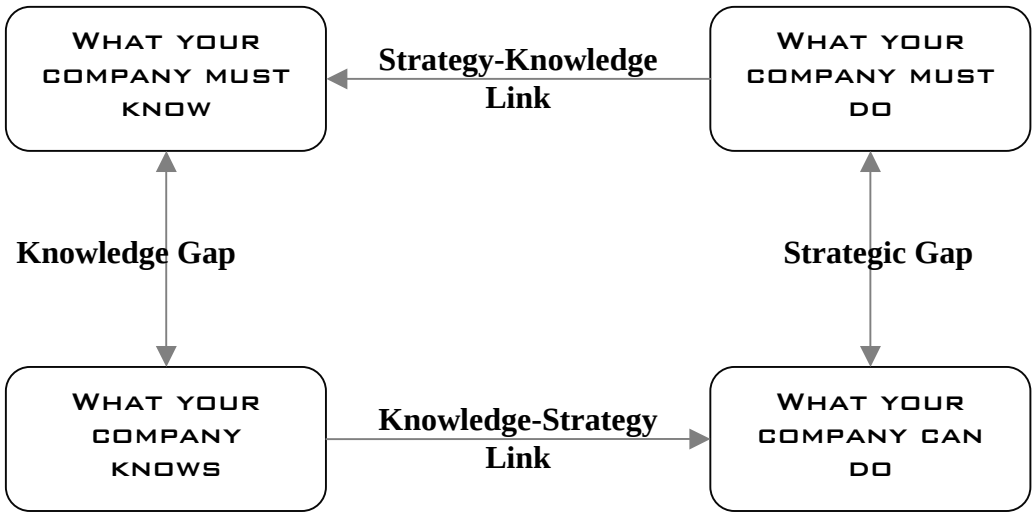

Figure 5.2.2.1.1: Strategic Knowledge Gap Analysis

It is also important to identify the knowledge gaps in terms of the two forms of knowledge, tacit and explicit knowledge. The author argues that it is tacit knowledge that really gives an organisation its competitive edge. Hence, by filling these knowledge gaps, the organisation will be in a better position to compete in an innovative way.

In identifying these knowledge gaps, the employees of the organisation should also be consulted. It is extremely important to involve employees as much as possible in knowledge management, because by allowing them to participate in creating something new, they will support it more readily than if they are told to do so. The input of employees at this level will also reveal some knowledge gaps that management might not have thought of.

It is very important that the knowledge-based SWOT analysis is consistent with systems thinking. This means that the organisation should be considered to be a system, with sub-systems and interactions between these sub-systems. Therefore, any knowledge gap in the organisation should be analysed on the overall picture, and also on the sub-system and interaction level. This will ensure that the KM initiative is consistent with systems thinking.

5.2.2.1.2 Creating a Vision for Knowledge Management & Providing a Leader

Top management needs to create and share a vision for the knowledge management initiative. Senior levels of management, together with the employees need to articulate how they expect the organisation to benefit from the knowledge management effort, and how this will benefit the employees and their work. The vision is the long term strategy that will drive the knowledge management initiative and provide the scope within which the knowledge management effort and the organisation will grow. The vision should also encompass the core beliefs and values of the organisation.

A very important aspect of the vision is a working definition of knowledge and knowledge management for the organisation. Top management should clearly define what they mean by knowledge and knowledge management in the context of their organisation and their line of work. In particular, one of the most important points is the distinction between data, information and knowledge. By not having a clear definition of knowledge, this can lead to confusion in the minds of employees and hamper the knowledge management effort. This will also help employees better understand what they are being asked to contribute to the knowledge management effort, and help bring about knowledge-sharing in the organisation.

The creation of the vision can be done in two ways. Top management can either appoint a chief knowledge officer (CKO), who will create the vision, or they can create a vision and entrust the CKO to carry it out. This process depends on where the CKO ranks on the corporate structure, and the needs and preferences of management. The author argues that it would be preferable if the CKO is a member of the board of directors, and reports directly to the Chief Executive Officer instead of reporting to the IT director as is the case still in many organisations. This way, the board of directors conveys a clear message to the rest of the organisation that knowledge management is a serious issue for the organisation.

It is extremely important at this point, that the employees of the organisation are allowed to share in the making of vision of the organisation. The author suggests that management consider assembling working groups of employees from different

sectors of the organisation, and allow them to brainstorm about their vision statement for the organisation. This will create a sense of belonging for the employees, and allow them to participate in the change process. It will also make them accept the change process more readily than if they were not allowed to participate in it. This process will ideally result in a vision statement where top management's aspirations as well as the workers' aspirations are met.

The leader of the knowledge management effort should ideally be the chief executive officer (CEO). This will send a clear message to the employees that the organisation is serious about KM, and will provide the commitment from top management for the knowledge management initiative. In particular, the knowledge leader should act as a role model for sharing and disseminating knowledge in the organisation and should be seen doing so. They should champion knowledge management frequently and emphasise the sharing of knowledge in everyday work, projects and research, between business units, departments and across the entire organisation.

In many instances, the CEO is taken up by other responsibilities, and the task of being the knowledge management leader can be left to the CKO. The CKO should be the person in the organisation who champions the knowledge management effort, and who acts as an intermediary between the various parties in the organisation. The main responsibilities of the CKO should be to help integrate the three levels of knowledge management, namely the organisation, the people and the processes and infrastructure. The CKO should help bring down barriers to knowledge sharing and distributing, and the hierarchy that exists in the organisation.

Ideally, the CKO would bring people of different business units, departments and across geographical locations together in a bid to encourage them to share and distribute knowledge among themselves and others. However, the CKO should avoid getting involved in the day-to-day running of projects or details that should be best delegated to front-line managers. It is important that the CKO act as a visionary and champion, and channel the efforts of others in order to further the knowledge management effort instead of dealing with technology or human resources problems.

The CKO should also be responsible for the following:

- Building KM awareness
- Developing KM processes
- Coordinate KM activities among business units
- Assessing KM effectiveness

These activities are crucial to the success of the KM effort in the organisation, and the CKO should take into consideration the organisational culture while carrying out these activities.

5.2.2.1.3 Aligning KM with Business Strategy

It is crucial that the KM effort is not a project that is undertaken on its own without any link to the overall business strategy. The literature consistently emphasises the importance of the link between the business strategy and knowledge management, and the author agrees on this point. The organisation's overall strategy can be defined as the high-level plan that directs the business while balancing its resources, internal forces and external influences. A knowledge management strategy can be defined as the high-level plan that defines how and where the knowledge resources of the organisation are used to further the competitive edge of the organisation.

The author again refers to Tiwana (2000:153) to illustrate how the organisation can derive this linkage:

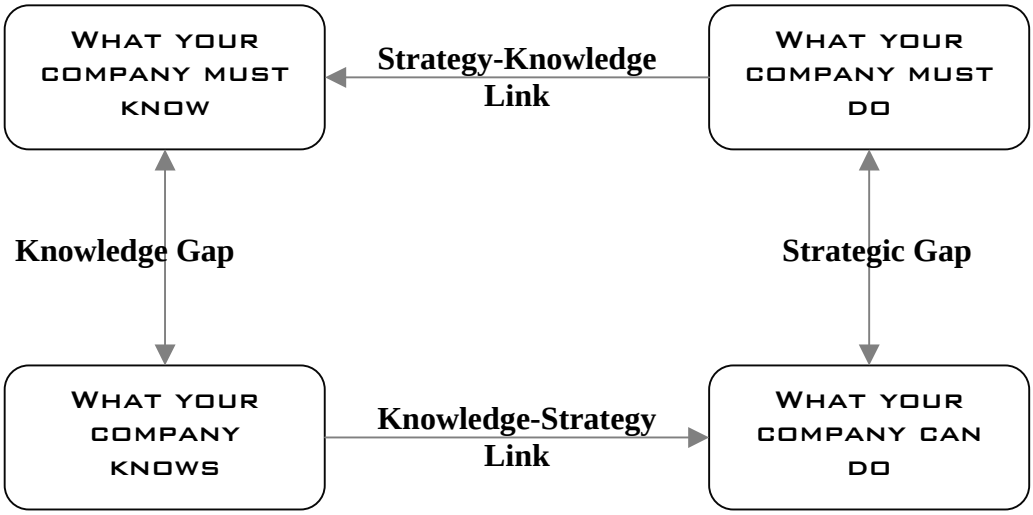

Figure 5.2.2.1.3: Strategic Knowledge Gap Analysis

The organisation should look at its knowledge gap and its strategic gap, according to figure 5.2.2.1.4 above. By looking at the strategic gap, the organisation will discover the difference in what it wants to do and what it can do, and by looking at its knowledge gap, it will determine the difference between what it knows and what it needs to know in order to carry out its strategy. Explicating this link between what it must know and what it can do is extremely important, since it will determine how the organisation aligns the knowledge management strategy to the business strategy.

The most basic component of the knowledge strategy of any organisation is to determine the tacit and explicit knowledge gaps that will provide it with a competitive edge. Furthermore, as part of aligning knowledge management strategy to the business strategy, the organisation must also look at its tangible and knowledge resources and clearly define how these resources will be put to use in order to achieve the goals of the KM effort.

The KM strategy of the organisation should take into consideration its organisational culture. The literature contains numerous examples where knowledge management initiatives have failed in organisations because their approach was incompatible with their culture. Therefore the organisation needs to look at the way its business is carried out, and the culture in the workplace and design a knowledge management strategy that does not conflict with that culture.

In keeping the knowledge management effort consistent with systems thinking, the organisation must extend the knowledge strategy to the sub-systems of the organisation. This might entail explicating knowledge strategies for each sub-system, and in this case, it should be ensured that the strategies in the sub-systems are compatible with the overall knowledge strategy.

Management should also involve employees in this process. One way of doing this would be to have groups of employees brainstorm about their views on the knowledge strategy of the organisation and how it links to the overall business strategy. Again, by allowing employees to participate in the change process, they will support it.

It is also crucial that the knowledge strategy of the organisation is not defined without regard to what its competitors are doing. The organisation needs to look at the knowledge trends in the industry and its markets and define its knowledge strategy accordingly.

5.2.2.1.4 Plan & Design the KM project (set goals & objectives)

The knowledge effort of the organisation should start with a pilot project. Once the pilot project is complete, the CKO can review its effectiveness, and then decide how the knowledge initiative should be implemented in the rest of the organisation. The CKO must make sure that the pilot project(s) is started in an area(s) where there is already an inclination towards or an understanding of knowledge management. This will ensure that the people are enthusiastic about trying something new and achieving results in the project. By achieving visible results in the pilot project(s), the CKO will encourage other people in the organisation to learn how they can use KM to perform better and that sharing and distributing knowledge does benefit everyone. The pilot project itself can take three different approaches: organisational-wide, departmental- or unit-wide, or a mixture of both.

With the first approach, the knowledge management project is rolled out throughout the entire organisation, with all divisions, departments and business units participating. This approach obviously carries the most risk, because of the logistics problems and cultural factors associated with rolling out a new project. The author does not recommend implementing knowledge management in this way, because it will not be perceived to be a real project by the employees. This is because unlike normal projects, people are used to deadlines and concrete results, and a knowledge management initiative seldom yields such results in the short to medium term on an organisational-wide scale. Furthermore, all employees will not be willing to change the way they are used to working or communicating, because they do not see the benefit in doing so. The concept of knowledge sharing will take some time to get used to, and will require several workshops and seminars and continuous education to convince employees to do so.

The second approach is a safer one, requires the organisation to initiate the knowledge management project to be rolled out within a business unit or a division or a department. The CKO should choose a unit where the people will be more willing to accept new ideas and new ways of working and communicating than the rest of the organisation. This kind of test project is more easily controlled, and involves the least risk, since it only involves a few people, and the CKO should ensure that they have been briefed on the concept and practices of knowledge management and knowledge sharing. The author proposes that the project should last between six to twelve months, in order for results to be apparent. Once this test project proves successful, then knowledge management can be gradually implemented in other business units. This will make sure that after the test project, the results and benefits can be advertised to the rest of the organisation, and this will make implementing knowledge management to other business units much more easier. This method will also acclimatise employees to the concepts and practices of knowledge management, and help change the organisational culture. This will ensure that there is the least resistance from employees when knowledge management is being rolled out in their units.

A combination of the first two approaches results in a mixed approach, involving rolling out the knowledge management project in a number of business units that are totally separate from one another over a period of six to twelve months. This method involves more risks that the single approach, but less risks than the organisational-wide approach, since monitoring a few projects for the CKO will prove more difficult that monitoring a single project. However, the author thinks that this method might actually be more beneficial to the organisation in the sense that the CKO will be able to observe how different types of employees react to the same project. By choosing business units which are as different and separate to one another as possible, the CKO will be able to experiment on a wide variety of people, and work processes. This will enable the CKO to observe how people doing different work will react to the concepts and practices of knowledge management, and this will be useful when knowledge management is rolled out to the rest of the organisation.

Once a method of implementation is chosen, the CKO needs to plan and design the roll out of the project. The author proposes that the initial pilot project should be implemented as any other project, with deadlines, budget considerations and reward incentives. This will ensure that the employees take this project seriously, and participate fully towards the goals of the project. It is very important that the CKO sets reasonable and attainable goals and objectives for the test project, otherwise the employees participating in the project will become disillusioned with knowledge management and the advertised benefits of sharing knowledge. The objectives and goals of the test project should be attainable in a period of six to twelve months, in order for people to be able to see the benefits of knowledge management, and become convinced of its usefulness.

The CKO should also involve employees on the planning and design of the pilot project. This will ensure that they will support the pilot project, and also help the CKO in setting reasonable objectives and benchmarks. The CKO should then initiate the project.

After the test project has been completed, the CKO should then re-evaluate the effectiveness of the goals and objectives of the project, and if need be, modify the goals and objectives for the full implementation of KM in the organisation, after consultation with the employees who participated in the pilot project(s).

5.2.2.1.5 Manage the organisational culture and manage organisational change

The CKO has the very important task of managing the change in organisational culture that implementing knowledge management demands. In most cases, the CKO will have to help move the organisational culture from a closed structure to an open, flowing one, institute new working methods, encourage people to share their experiences and knowledge, provide inspirational leadership, and involve everyone in the organisation to participate in and contribute to the change. It should be taken into consideration that the change in culture will take a long time to happen. Other norms that will probably need to be altered are: shared responsibility between management and workers; a continuous learning environment; promote accountability; and a values-based environment. A very important aspect of the

knowledge management culture is that is should be an environment where people are encouraged to share ideas, problems, successes and failures. This will lead the way to the organisation learning from its people.

It would be inappropriate for the CKO to plan and initiate a knowledge management project and expect it to be carried out. What actually takes place in the organisation depends on a large extent on the people and their behaviour in the work place, and on the organisational culture. The literature abounds with case studies of organisations where knowledge management initiatives have failed because of improper management of culture. Therefore, the author recommends that the objective of the change is not to change the organisational culture drastically, but to modify the behaviour of people in a way that suits the demands of knowledge management in the context of the organisation, in the same way that the KM strategy needs to be compatible with the organisational culture. It should also be noted that the literature supports the view that there is no right way of doing knowledge management, and that whatever means that suit the organisation should be used.

According to the author, the most important factors in managing the change in culture are: a shared vision by employees and management, support and commitment from top management, trust between employees and management, communication and acceptable reward incentives. Hence, it is important that top management initiate the process, and provide support for the rest of the organisation. Top management can then delegate day-to-day training and support to middle management, who will be responsible for communicating top management's intentions to the workforce. Therefore, the CKO should ensure that all these factors are present before initiating a full project for the organisation.

The author recommends that one way to bring about a change in culture effectively is to educate people continually about knowledge management, and inform them of what is required of them. The employees should also be involved in determining what needs to change, and how to change it. This will ensure their support in the knowledge management initiative.

The author also contends that no amount or extent of existing technology can replace human interaction in the organisation. This is especially evident when it comes to transferring tacit knowledge, where human contact is essential. Hence, top management need to communicate this properly to middle management, who will be responsible for providing an environment conducive to tacit knowledge transfers in the workplace.

The implementation of suitable reward schemes is also of utmost importance. Top management need to realise that this does not only mean monetary rewards, but also includes recognition of the individual's or the team's achievements. In some instances, monetary rewards may even be detrimental to the knowledge management initiative. Hence, a combination of cash rewards and recognition rewards would be better suited. One example of such a reward structure would be to institute an award based on an innovative idea or invention in a particular field, or a performance-based award. These awards could be presented at annual general meetings, staff meetings or the organisation could organise a special annual event for the purpose of rewarding staff. The author argues that it would be the responsibility of middle managers to ensure that rewards and recognitions are awarded to the right people.

Finally, the CKO should put into place formal structures and processes that will deal with the various organisational changes that will take place during the implementation of the knowledge management initiative. This will ensure that problems and issues which manage to filter through the newly-implemented channels will be dealt with swiftly. This is important because the employees should not be made to feel left out of the knowledge transformation process. It is important to remember that knowledge management is not a once-off project, but an incremental process, whereby change is constantly challenging the organisation and its people.

5.2.2.1.6 Manage with a holistic approach

The author argues that a knowledge management effort should not take place with the organisation focusing only on itself. Based on Skyrme's (1998) Knowledge Layers in his Knowledge Strategy, the author proposes four environmental factors

which also need to be managed by the CKO and the organisation within its context of managing knowledge. These factors are :

a. Stakeholders
b. Competitors
c. Business Environment
d. Overall Environment

It is very important that the organisation should also pay attention to its various stakeholders, namely the customer, suppliers, shareholders, employees, and its immediate community. By developing and analysing knowledge about these factors, the organisation will be in a position to identify and forecast trends in its environment.

Firstly, the organisation must take into consideration its customers and their needs and knowledge needs. It is crucial that the organisation develops an understanding of what the customers want, and what knowledge they want, since this will affect the way the organisation acquires knowledge about its customers. Furthermore, by acquiring knowledge about the customers and sharing knowledge with the customers, the organisation will be in a position to analyse trends with customers as well as with the market. Furthermore, the organisation might even be able to forecast trends in the market based on the knowledge it has acquired. This will provide the organisation with the opportunity to become proactive in meeting customer needs, generating new opportunities for business.

It is also important that the organisation carry out the same process with its suppliers. This will enable the organisation to share with its suppliers the knowledge that they need to provide the best service to the organisation. By creating a flow of knowledge between the organisation and its suppliers, the organisation should be in a position to forecast its supply needs in terms of the trends it has identified in the market. This will allow the business to take a proactive stance when it comes to securing its supplies.

Thirdly, the organisation needs to pay attention to its shareholders, and their views on the operations of the organisation. Shareholders can provide valuable insights

into the strategic running of the organisation if they are given the opportunity to participate and share knowledge with the organisation. This will ensure that shareholders know what the organisation is doing, and will feel a sense of belonging with the organisation.

The author argues that the contribution of the employees in a knowledge management effort is invaluable to any organisation. In this respect, the organisation should create and improve the knowledge flows between its employees and management. This will provide the opportunities for employees to share their valuable knowledge with management, and participate fully in the knowledge management effort. The employees of the organisation are its most valuable assets, and the author holds the view that any knowledge management effort is doomed to fail if the employees are not fully participative in that process. This point will be discussed further during the Knowledge Management of the People section.

It is also important for the organisation to look at what its competitors are doing, and to collect and analyse knowledge about them. The author argues that this is especially important in the early stages of knowledge management, when the organisation might learn valuable lessons from what the competition has already done in this field. For example, by adopting a practice of a competitor, the organisation might discover useful knowledge about the market. Imitating the competition in the early days of knowledge management might also save the organisation a lot of time and money in developing their own practices and systems while bringing them up to the same level of knowledge management. If this strategy works, the organisation can then start developing its own practices and systems, and gain a lead on the competition.

The organisation does not operate in a vacuum. It is therefore very important that it performs an assessment of its business environment in terms of the knowledge that it needs in order to remain competitive and innovative. By acquiring and analysing knowledge in of the business environment, the organisation can identify and predict trends thus preparing itself to meet future needs of the market.

Furthermore, the organisation should also not lose sight of the overall environment in which it operates. It is important that the organisation analyses knowledge about governmental regulations, global market trends, social and political trends, technological trends, and finally community demands. This will allow the organisation to market itself in a way that takes into consideration the needs of the immediate environment in which it operates, while remaining at the forefront of innovative products and services.

5.2.2.1.7 Create and Manage Organisational Learning

The author proposes a 'knowledge life-cycle' in order to create and maintain individual and organisational learning in the organisation. According to Rubenstein-Montano, *et al*, (2000) the literature abounds with such frameworks which are mostly prescriptive. Rubenstein-Montano, *et al*, (2000) argue that the ideal knowledge management framework should have both descriptive and prescriptive characteristics. Therefore the author has devised this cycle with a prescriptive approach, the rest of the model being descriptive in nature. The author has also included double-loop feedback in this cycle, following Rubenstein-Montano, *et al*, (2000) recommendations. The knowledge life-cycle is shown below:

1. Create New Knowledge ◄
    a. Identify new knowledge
    b. Identify old & existing knowledge
2. Identify Knowledge relevant to organisation
3. Verify selected Knowledge
4. Capture & Organise Knowledge
5. Disseminate & Use Knowledge
6. Combine new knowledge and re-evaluate assumptions to Create Knowledge

Firstly, knowledge needs to be created for the organisation, based on a selection of the internal and external knowledge needed by the organisation. The internal knowledge can be found within the organisation, particularly with the employees, and to a certain extant, in documents or previous knowledge repositories. The

external knowledge should be identified from external sources, such as customers, competitors, stakeholders, business environment, etc. Furthermore, the organisation also needs to identify old and existing knowledge as well as any new knowledge which it might need during the course of the knowledge management effort, and for the business in general. It is important at this stage to identify which knowledge is explicit and which knowledge is tacit in nature, since this will affect the storage medium of the knowledge

The next step in the cycle is to identify which knowledge is relevant to the organisation in terms of its knowledge management strategy and its business strategy. It is important at this point, that useless knowledge is not accumulated, in order to avoid clutter in the knowledge repositories. Furthermore, if the repositories are easy to search and employees do not have to sift through useless knowledge, this will increase the likelihood of employees using the repositories to look for knowledge.

It is also important that the knowledge which has been selected to be included in the repository is verified, in terms of its relevancy and importance to the organisation. This will avoid any decisions being made on the basis of erroneous or outdated knowledge later on. Again, by avoiding useless knowledge in the repository, employees will be encourage to use the repositories to look for relevant knowledge.

The next step is to capture that knowledge, and organise it in relevant sections. For example, knowledge repositories could be created which include the explicit knowledge that has been identified and verified. Such repositories could be in the form of databases, data warehouses, intranet or internet web pages, text documents, and the likes. For storing tacit knowledge, the author recommends using a ‘human’ medium, such as cross-functional ‘knowledge teams’, which would be responsible for the sharing and disseminating knowledge throughout the organisation. This is due to the difficulties of translating tacit knowledge into explicit knowledge. However, by encouraging employees to use the knowledge repositories to retrieve and store knowledge, more and more tacit knowledge will be transferred to those knowledge repositories.

This knowledge also needs to be organised in a meaningful way so that when employees are looking for something specific, they can find it easily and quickly. A meaningful data storage structure can be worked out by the CKO taking into consideration how it will best suit the organisation and the employees. However, the author warns of classifying knowledge only according to traditional ways, such as content. P Novins & R Armstrong (1997:45) argue that knowledge could also be classified in terms of its users, applicability, transferability, richness, age and reliability. They (Novins & Armstrong, 1997:47) state that their work has revealed that knowledge is useful when classified in terms of applicability and transferability, and the author agrees.

The CKO should also encourage people to disseminate that knowledge, and to use it. Using cross-functional knowledge teams is a very good way of disseminating knowledge throughout the organisation, since it ensures that knowledge from different parts of the organisation will be shared with other parts of the organisation. The knowledge can also be disseminated through the use of intranet web pages, newsletters, knowledge forums, etc. There is also a need for the CKO to encourage the employees to use that knowledge. This is important because it might cut down on time and monetary resources when it comes to product development or project management. By looking at what has been done before, and how it has been done, time and money can be saved on delivery times.

The last step of the cycle is a double-loop learning feedback. The author proposes this loop to conform to the systems thinking advocated by Rubenstein-Montano, *et al* (2000). This step involves re-evaluating assumptions held by the organisation and using these new assumptions with the knowledge created by the organisation to create new knowledge. The author argues that this process will generate innovative knowledge and allow the organisation to produce innovative products and business processes. The author also argues that for this process to be successful, cross-functional knowledge teams are needed, because of their varied knowledge and assumptions. By using different or even conflicting assumption, cross-functional teams will be in a position to produce new assumptions which can be innovative when combined with the new knowledge of the organisation.

5.2.2.2 Knowledge Management of the People

At the Knowledge Management of the People level, the focus is on managing people, their behaviour, their expectations, and their potential to contribute to the success of the knowledge management effort. There should also be a concerted effort to encourage employees to share and use knowledge in the workplace, and to reward people who do so.

The most important asset of any organisation is its employees, since most of the knowledge resides in their minds. Hence the author proposes that the CKO puts in place specific processes in order to manage the employees, since learning and knowledge creation can only occur through them. The model proposes the following activities to achieve this:

1. Manage people as individuals
2. Encourage Sharing and Use of Knowledge
3. Encourage Individual Learning and Innovative Thinking
4. Implement reward plans and incentives to promote above

5.2.2.2.1 Manage People as Individuals

It is important that management recognise that organisational learning can only take place through individual learning. It is only through a person's willingness and ability to learn and use new knowledge that the organisation can in turn learn and use that knowledge. Hence it is important that the employees in the organisation are treated as individuals and that management considers each person's opinion and input. This will ensure that employees feel that they are important and will reinforce the fact that they are more willing to accept change if they are part of that change.

This does not mean that management should hold face-to-face meetings with every employee. Management can easily make people feel important by creating teams of four to five employees, who get together and discuss business practices, their role in the organisation, their contribution, and their suggestions about how to improve their work conditions. Each team then submits their best idea or suggestion to their

manager, who then submits these to the CKO. The best idea or suggestion should be put into practice, and if it results in a noticeable improvement in the business the team should be rewarded for it. However, the author warns about putting too much emphasis on rewarding the team which produced the best idea, since this might make the other teams feel like their ideas were not good enough.

This process might make employees feel that management is more willing to listen to their suggestions and contributions to the organisation. Furthermore, this might produce some innovative thinking from employees in terms of business processes and product development.

5.2.2.2.2 Encourage Sharing and Use of Knowledge

The CKO should be responsible for putting into place the appropriate structures and processes so that people are motivated to share and use knowledge in the workplace. This might prove to be a difficult task, since the traditional workplace attitude is that of 'knowledge hoarding', whereby the individual makes an effort to acquire and retain as much knowledge about the organisation as possible in order to keep his job.

It is the responsibility of the CKO to change this attitude, and to provide the necessary reward and motivation to encourage people to share more knowledge with their colleagues and with management, as well as with subordinates in a concerted effort to transfer useful knowledge throughout the organisation. The CKO will have to use his leadership skills to demonstrate convincingly that people who divulge what they know will not be dismissed, as traditional organisational values would predict.

The author recommends that the CKO start by sharing with employees something which would never be divulged to the rest of the organisation previously. A decision reached by top management at a board meeting which can affect the entire organisation is a good example of this. By revealing what was discussed and decided upon at the highest level, the CKO will establish trust with the employees, who will feel that they can be trusted with this knowledge without any risks. In turn, they will feel that they can trust the CKO with their personal knowledge. It is imperative that

this process be successful, otherwise the entire knowledge management effort will be a failure.

At the same time, the CKO needs to establish a 'push' factor to force employees to share knowledge even if they do not want to. A good example, would be to force employees to search through the knowledge repository before starting a project or a business venture. By explaining to employees that this practice could cut the time they spend learning how to solve the problems of their project, the CKO can motivate people to share knowledge about their projects.

McDermott and O'Dell (2001:79) propose three ways by which to make sharing knowledge an important factor in their business:

1. Make sharing knowledge a direct part of the business strategy
2. 'Piggyback' sharing knowledge onto other business initiatives
3. Share knowledge commonly as part of normal work

These practices have proved their worth in companies which have adopted them (McDermott & O'Dell, 2001:79-80), and the author recommends using these methods to encourage people to share and use knowledge in the workplace.

At this point, a very important distinction should be made between the two forms of knowledge, tacit and explicit knowledge. These two forms of knowledge need to be managed differently, since tacit knowledge is embedded inside the minds of people, and need to be shared with the rest of the organisation. The following diagram illustrates the process by which this can be achieved (Nonaka, 1998:28):

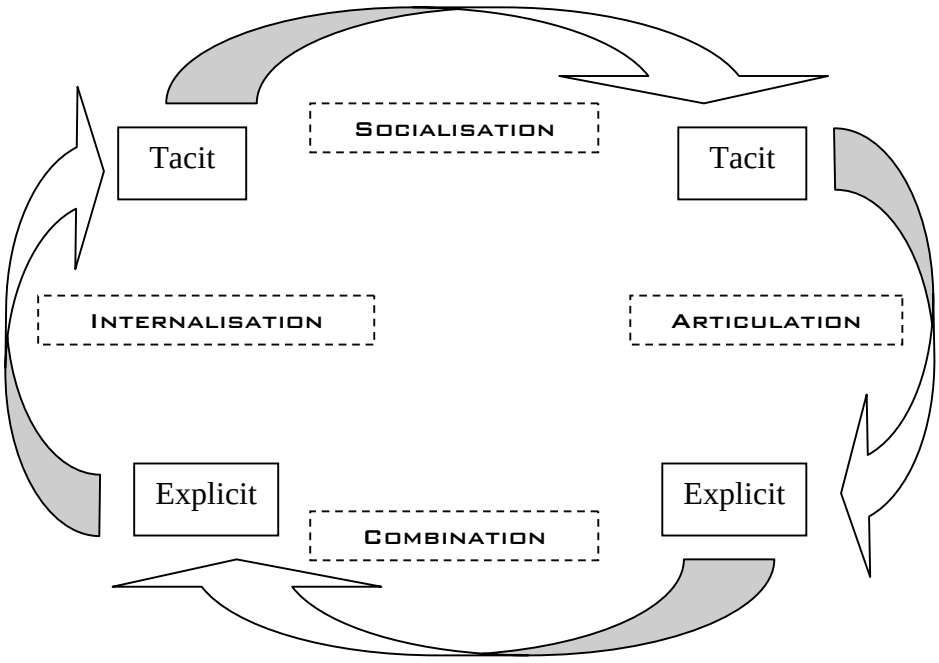

Figure 5.2.2.2.2: Nonaka's Spiral of Knowledge

By allowing formal and informal tacit to tacit transfer of knowledge, and the subsequent tacit to explicit and explicit to explicit and ultimately explicit to tacit transfers of knowledge, the organisation is creating an extremely important cycle of individual learning, whereby the individuals of the organisation are learning from other individuals. In time, this process will provide the necessary knowledge base for organisational learning, where the organisation itself can be said to be 'learning'.

5.2.2.2.3 Encourage Individual Learning and Innovative Thinking

Drawing from **Section 5.2.2.2.2** above, the CKO should encourage individual learning in the organisation. This can be done in a variety of ways, the easiest of which would be to demonstrate how sharing knowledge with other employees and learning from them can result in improved products and services and time and cost reduction. The CKO can also organise a number of formal activities, such as knowledge fairs, workshops, and seminars aimed at creating the environment necessary to share and learn. The employees might resist this process at first, but if the CKO advertises that these will be forums where ideas and opinions taken from employees will be rewarded and maybe even used in the business, then people might be encouraged to participate.

The use of cross-functional knowledge teams is also recommended, since they create knowledge flows between different departments and help to transfer tacit knowledge throughout the organisation. The CKO should choose people who are talented at what they do, and who are willing to learn and share knowledge with others freely, and give them a free mandate to create. This is very important, because different departments harbour different kinds of knowledge about the organisation and its products and services. If these different knowledge items are shared, they might instigate a different line of thinking about a product or process and therefore create a line of innovative thinking. The creation of innovative products and services is extremely important in making the organisation competitive in its market.

The CKO should also implement the notion of double-loop feedback in the form of challenging assumptions in conjunction with new knowledge. This is where cross-functional knowledge teams can make the most impact. While granting them a free license to create knowledge, the CKO should also ensure that they are willing to challenge existing assumptions and look at situations from an unconventional perspective. This will allow them to create innovative products and business processes.

Furthermore, by allowing individuals and teams to learn and to contribute to the overall effectiveness of the organisation, the CKO will ensure that employees will be more willing to be a part of the change process of knowledge management. This commitment from the employees is important for the success of the effort.

5.2.2.2.4 Implement Reward Plans and Incentives

Another very important part of managing employees in a knowledge management paradigm is the rewards and the incentives that the CKO awards them for their contribution towards the effort.

Unlike traditional reward schemes, where the emphasis is on monetary value, the literature recommends a departure from this norm. As mentioned in 5.2.2.1.6, the author recommends that the CKO implement a scheme where awards and monetary

rewards are both awarded to employees who contribute. By recognising an individual's abilities and/or performance, or a team's performance and rewarding them with a coveted award, the CKO can encourage other employees and teams to try and match the same knowledge-based performance and abilities.

It is the responsibility of the CKO to implement a reward scheme which suits the organisational culture that prevails in the workplace. If the reward scheme does not suit the employees, then the knowledge management effort will fail due to lack of support from employees.

5.2.2.3 Knowledge Management of the Infrastructure and Processes

The third component consists of managing the infrastructure and the processes of the organisation which will support the overall knowledge management effort. The organisation should be concerned with factors such as the corporate intranet, the software and hardware that will assist people in sharing knowledge. The organisation should also re-evaluate its business processes in order to align them with the paradigm of knowledge sharing and people-oriented processes.

There are two distinct parts to this process:

1. Managing the Technology
2. Managing the Processes

The CKO has to manage the technology which will enable the storing, sharing and disseminating of knowledge. The CKO will also have to re-evaluate and/or devise the business process to allow the employees to share and use knowledge.

5.2.2.3.1 Managing the Technology

Managing the technology which will support the knowledge management effort is as important as managing the people and managing the organisation in a knowledge management effort. The literature abounds of examples of knowledge management efforts where all the emphasis is on the technology and not on the people.

The CKO has to plan what type of technology the knowledge management effort needs in order to be successful, and implement these technologies. In most cases the organisation already will have quite an extensive Information Technology (IT) infrastructure, and the CKO will only need to built upon this to achieve his goals. There are too many IT solutions for the author to be able to recommend any particular one, therefore only brief guidelines will be mentioned.

Firstly, the author argues that a basic networked PC is needed for every knowledge worker who has been identified. This PC needs to be loaded with the following basic software: word processor, spreadsheet, database, presentation tool and a website creation tool. The author recommends using Microsoft's Office suite as a standard office productivity tool, including Microsoft Frontpage.

The author recommends implementing IT infrastructures which will allow easy communication between employees, in other words collaborative technologies. For example, a corporate intranet linked to the knowledge repositories of the organisation could allow employees to access and retrieve information about past projects, and hence save time and money when starting a new project. This intranet in turn could be connected to the Internet, and provide access to a world of information.

It is also important that the IT infrastructure of the organisation be able to link easily with that of customers and suppliers, in order to allow flow of information between the business and its partners. This will allow the organisation to collect knowledge about its business partners and vice-versa.

Other technologies that the author recommends are electronic meeting rooms and/or videoconferencing capabilities. These will allow communication with employees who are geographically far apart, and allow sharing of knowledge even across national boundaries. The use of such groupware will greatly enhance the ability of employees to communicate over long distances.

The CKO should also choose the medium of the knowledge repository with care. If the access and retrieval time from the repository is long, employees will not use it to look at previous works. The knowledge workers should be able to access and

retrieve knowledge from their desktops easily and quickly. If there is a need to build a customised software to communicate to the knowledge repository, the CKO should ensure that the users are involved in the systems development process from the beginning. The author recommends using the organisation's intranet and web facilities to achieve this, since most novice PC users find the Web easy to use and manipulate.

Davenport, et al, (1997:14) argue that the organisation needs to achieve a comfortable balance in its knowledge structure. The author concurs, and argues that on the one hand, the knowledge repository should have an easily understandable structure and categories so that users can find what they are looking for easily. However, the knowledge stored should not be over-categorised and over-structured, otherwise it will lose its essence.

However, every technology has a downfall in that the emphasis shifts from using the technology to enhance or facilitate work to using the technology for the sake of using it, and the CKO must ensure that this does not happen.

Where the workers involved are not computer literate or simply not literate, the CKO should devise ways to ensure that their contributions are not overlooked simply because they cannot read or use a computer. In a South African context, this is a reality which needs to be taken into consideration, especially when it comes to line workers. There are a variety of ways of bypassing this problem, one of which is to train a number of these line workers to be computer literate, and these empowered workers are then responsible to extract the tacit knowledge from their colleagues and document it on the knowledge repository. This will ensure that the tacit knowledge of production workers is not lost, and will further reinforce the feeling that management wants to involve everyone in the knowledge management initiative.

5.2.2.3.2 Managing the Processes

It is the CKO's responsibility to put processes in place in order to facilitate the creation of organisational learning. The business process should be re-evaluated and modified if need be so that the employees can create, identify, verify, capture,

organise, disseminate and use knowledge easily throughout the organisation. In essence, the CKO should devise methodical processes to ensure that the organisation does not lose knowledge, but retains it.

McDermott & O'Dell (2001:82) argue that the organisation should make use of its existing informal networks and the author agrees. The CKO should use these informal networks to the best of their potential, perhaps by making them official, giving them more resources and rewarding them (McDermott & O'Dell, 2001:82).

However, sometimes the workplace processes will need to be modified to suit the knowledge paradigm. The modification of existing processes will imply changing the way people do things in the organisation, and the CKO will undoubtedly encounter resistance to change from the employees. This is why it is important to involve the employees in the process from the beginning. The CKO might find it more useful if the employees are asked to change their own business processes to meet the needs of a knowledge environment. The author argues that employees will be more willing to change the way they do their work if they are asked to devise new and more efficient ways to do so.

It is important to remember that knowledge management is not a once-off project, but an incremental one, and that the business processes should be regularly re-evaluated to gauge whether they are creating an environment where knowledge can flow freely.

Another very important aspect of managing the knowledge management processes is the measurement of the impact of knowledge management on the business. The CKO is responsible for devising suitable metrics that measure how effective the knowledge management effort is to the organisation, and other impacts as well.

However, the author cautions against using only financial indicators as a measure of the success of knowledge management effort. For example, it would be impossible to assign financial value on the know-how and experience of the employees of an organisation. However, one cannot deny the value of such know-how and experience. Hence, knowledge management achievements cannot always be

quantified in monetary terms, and the CKO should ensure that top management is made aware of this, and devise other metrics to represent progress accurately. Davenport, De Long, and Beers (1997:9) use the following success indicators, and the author agrees with them:

1. Growth in the resources linked to the project
2. Growth in the volume of knowledge content and usage.
3. Survival of project without support of only one or two individual
4. Some evidence of financial return

5.3 Critical Success Factors

This section identifies a number of critical success factors (CSF's) which will determine whether a knowledge management effort will be successful or not. These CSF's should be dealt with by the CKO as the most important factors of the knowledge management model. The author is using these critical success factors to summarise the model itself, and to convey the importance of these attributes in a knowledge management effort.

5.3.1 Alignment of Knowledge Management strategy with Business Strategy

The author argues that this is the most important factor in creating a knowledge management effort which will succeed. Knowledge management cannot exist in a vacuum, and needs to be closely aligned to the rest of the organisational goals in order to achieve a tangible result.

5.3.2 Top Management Support

A knowledge management effort that does not enjoy the support of the most senior managers in the organisation is doomed to failure. The CKO is the person who should convince top management that this is a worthwhile effort, and secure their trust and support for this endeavour.

5.3.3 Create and Manage Knowledge Culture

The CKO also needs to create a knowledge culture, which will provide the support from employees for the effort. The author argues that this is should be done by choosing a middle ground between the organisational culture and the knowledge culture needed by the organisation. Furthermore, the CKO also needs to manage the knowledge culture on a continual basis, by ensuring that people are contributing freely and willingly.

It is very important that the CKO manage this culture change with caution, otherwise lack of support from employees will bring down the knowledge management effort. The culture change will be a challenging process for the employees, and they need to be made an integral part of this process so that they participate in the process fully.

5.3.4 Use of a Pilot Project

The author argues that the use of a pilot project is essential to the success of the knowledge management effort. The pilot project will demonstrate to the rest of the organisation the benefits of knowledge management, and warn the CKO of the possible pitfalls for the main project. The results of the pilot project will also secure the commitment from top management, and provide the CKO with the means to advertise this new paradigm to the rest of the organisation.

5.3.5 Create and Manage Organisational Learning

The CKO needs to be aware that organisational learning is crucial to the long-term effectiveness of the organisation's knowledge management effort. If the individuals of the organisation do not change their attitude towards knowledge sharing and learning, the organisation itself will not become a learning organisation. In the long term, the knowledge management programme will not be successful, since valuable knowledge will be lost when people leave the organisation. Hence, the CKO needs to put into place the necessary structures and processes to encourage people to share and use knowledge in the workplace.

5.3.6 Manage People

The author argues that the support and contribution of the employees of the organisation are crucial to the success of the knowledge management effort. The employees hold the knowledge that is most valuable to the business, and only they can share that knowledge with others. The key to encouraging them to share this knowledge and to use others' knowledge is to make them an integral part of the knowledge management effort, and to provide incentives and rewards for their participation.

The CKO should provide the employees with the right environment in which they will feel secure enough to share their most valuable knowledge, and to use it to promote the knowledge culture. The CKO should also provide the right means by which employees can be made to transfer their tacit knowledge to others, and to try and articulate it into an explicit form.

5.3.7 Choosing the Right Technology

It is also very important that the CKO chooses the right technology to implement any knowledge management system. The CKO should make use of the organisation's existing IT infrastructure, if the latter can provide the necessary tools for a knowledge workplace.

If new technology has to be implemented in the organisation, the CKO should involve the employees throughout the process, and obtain their views about the technology. It is also imperative that if a customised system is being built, the employees should be closely involved in the systems development process.

5.3.8 Include double-loop Learning

The author argues that to be truly successful, a knowledge management initiative should create an environment where innovative and creative learning take place. The

author also contends that one way of achieving this is to include double-loop learning in the organisation.

The CKO is responsible for creating the right environment where employees can achieve this. The author proposes that initially the CKO set up cross-functional teams that will be tasked to re-evaluate existing organisational assumptions and knowledge and create new knowledge in the process. When this practice has been established, the CKO can then encourage individuals to do the same, either on their own or in informal teams.

This process will ensure that the organisation constantly re-evaluates itself in terms of the knowledge that it needs to survive, and also creates new and innovative knowledge.

5.4 Discussion of the Model

This model is aimed at providing the target industry with a knowledge management implementation strategy which it can use to develop its knowledge management effort. While this work is based on Skyrme's (1998), Nonaka's (1998), Zack's (1999a), and Tiwana's (2000) work, the author has attempted to address the concerns of Rubenstein-Montano, *et al*, (2000) with regard to the shortcomings of knowledge management frameworks in the literature. For example, the proposed model is both descriptive and prescriptive, and places much emphasis on the cultural and people aspects of knowledge management. The author has also taken into consideration the linkage between the business and the knowledge management effort, and the importance of systems thinking in a knowledge management model. Finally, the author has devised a double-loop learning cycle in the model so that the organisation can try to produce innovative and creative knowledge.

The author has also extracted a number of critical success factors from the model. A knowledge management implementation strategy should be successful if these critical success factors are managed effectively. However, these are not the only factors which can affect a knowledge management initiative, and the author

recommends using this model in a holistic way in order to ensure a successful knowledge management project.

The proposed model should not be considered to be a step-by-step recipe to carry out a successful knowledge management effort. Rather, the author has attempted to provide valuable guidelines based on previous works by experts in the field, and some innovative insights into how knowledge management should be carried out. It is important to note that knowledge management is a highly distinctive field, and a knowledge management implementation strategy which proves to be successful in one organisation will probably not be successful in another. Therefore the author recommends tailoring any knowledge management model to the specific organisation to ensure a fit with the organisational culture and the organisation's existing infrastructure and processes.

5.5 Applicability of the Model to other Industries

This model was developed primarily for the target industry. However, it is useful to consider whether or not the model is applicable to other industries or organisations, what aspects of the model might have to be modified, and the extent of the modifications.

The concept of balancing the knowledge management of the organisation, the people and the infrastructure and processes can be applied to any organisation, regardless of its nature. The model also makes use of a high-level approach, and hence can be tailored at the lower levels to target other organisations.

The emphasis of the proposed model is on the importance of aligning the knowledge management strategy of the organisation to the overall business strategy of the organisation, which is also applicable to any organisation.

The model also emphasises the importance of culture and managing the culture change when implementing knowledge management. In a knowledge management implementation, these factors would be important in any organisation regardless of

its nature. However, the extent and degree of the recommendations of the proposed model would have to be tailored to the needs of the specific organisation before implementation.

The model also focuses on the importance of the employees of the organisation, and their contribution towards a successful knowledge management effort. There should be a concerted effort to make people feel part of the change when implementing knowledge management, and management should also encourage individual learning and innovative thinking, and reward those that do produce such results. Again, these recommendations can be applied to any organisation, with some degree of modification required to suit the needs and organisational culture of that particular organisation. For example, where one organisation would favour monetary rewards due to its culture, an organisation with a different culture could prefer rewarding employees by giving them extra holidays.

The infrastructure and business processes of the organisation cannot be neglected when implementing knowledge management. The model highlights the importance of hardware and software that will facilitate employees to share and disseminate knowledge throughout the organisation.

The business processes are also mentioned as they need to allow for formal as well as informal sharing and use of knowledge within the workplace. Again, these factors are not specific to the target industry, and can be applied to any organisation with some modification. For example, in an organisation where employees already share knowledge in an informal way, introducing formal, controlled ways of sharing knowledge would be counter-productive, and vice-versa.

Furthermore, the holistic approach taken in the construction of the model, for example, by including customers, suppliers, stakeholders, and environmental factors in the knowledge management process makes the model applicable to any organisation, albeit with some tailoring required.

Finally, the model's adherence to the systems approach also supports its applicability to other organisations. By containing both prescriptive and descriptive elements, the

model can be adapted to suit an organisation's specific knowledge management needs.

Hence, it is argued that although the model has been targeted at the South African Motor Vehicle Manufacturing Industry, the universal aspects of the model also make it suitable for use by other industries and organisations.

5.6 Conclusion

This chapter described the development of a knowledge management implementation strategy tailored to the needs of the South African motor vehicle manufacturing industry, but which is also applicable in other organisations. A general overview of the model was presented, followed by in-depth explanations of each section of the model. The Critical Success Factors of the model were then presented, followed by a discussion of the model. It was also noted that although the model was aimed at the target industry, it is also applicable to other organisations. The next chapter will investigate the validity of this model through an empirical study.

Chapter 6

Empirical Study of the Model

6.1 Introduction

The previous chapter described the proposed model of a knowledge management implementation strategy tailored to the needs of the South African Motor Vehicle Manufacturing Industry, and presented the Critical Success Factors of the model. This chapter describes an empirical study designed to test the validity of the model developed in this research by canvassing the opinion of industry practitioners. The objective of this empirical study is also to test the critical success factors of the knowledge management model proposed by the author. The results of the study are used to provide the basis for further refinement and modification of the model.

6.2 Design

A number of respondents were surveyed about their views on certain aspects of knowledge management pertinent to the proposed model. The author consulted Fink (1995) extensively, and decided to use a questionnaire as the data collection tool. The main objective was to explore the validity of the critical success factors of the Knowledge Management model. The questions were constructed to reflect the Critical Success Factors of the proposed model, and hypotheses were constructed to validate these critical success factors. The secondary objective was to test whether the level of knowledge management in respondent's organisations would affect their responses to the rest of the questionnaire. A third objective was to test for correlations between specific questions, in order to cross check respondent's responses to certain questions.

6.2.1 Hypotheses

6.2.1.1 Critical Success Factors

The Critical Success Factors introduced in the previous chapter reflect the core activities and tasks that need to be performed by an organisation in order to ensure a successful knowledge management effort. The main objective of this study is to verify the importance of carrying out these tasks and activities. Hence, they must first be converted into hypotheses. If the majority of the respondents regard these CSF's to be of particular importance, then it would confirm their validity. The hypotheses are categorised in terms of hypothesis sets, each of which relates to a CSF. There was only one hypothesis per CSF. The null hypotheses are represented by H_0, and the alternative hypotheses by H_1. The following are the sets of hypotheses:

Hypothesis Set 1: Alignment of Knowledge Management strategy with Business Strategy

H_0: It is not important to align the KM strategy with the Business Strategy

H_1: It is important to align the KM strategy with the Business Strategy

Hypothesis Set 2: Top Management Support

H_0: It is not important for Top Management to support the KM effort

H_1: It is important for Top Management to support the KM effort

Hypothesis Set 3: Create and Manage Knowledge Culture

H_0: It is not important to create and manage a Knowledge Culture in the organisation

H_1: It is important to create and manage a Knowledge Culture in the organisation

Hypothesis Set 4: Use of a Pilot Project

H_0: It is not important to conduct a pilot project to demonstrate the effectiveness of KM

H_1: It is important to conduct a pilot project to demonstrate the effectiveness of KM

Hypothesis Set 5: Create and Manage Organisational Learning

H_0: It is not important to create and manage Organisational Learning in the organisation

H_1: It is important to create and manage Organisational Learning in the organisation

Hypothesis Set 6: Manage People

H_0: It is not important to manage people and their knowledge

H_1: It is important to manage people and their knowledge

Hypothesis Set 7: Choosing the Right Technology

H_0: It is not important to choose and implement the right technology for KM

H_1: It is important to choose and implement the right technology for KM

Hypothesis Set 8: Include double-loop Learning

H_0: It is not important to include double-loop learning in the organisation

H_1: It is important to include double-loop learning in the organisation

6.2.1.2 Correlation between the Level of Knowledge Management in the organisation and responses to the remaining questions

The author also assumed that there was no correlation between the level of knowledge management in the respondents' organisations and their responses to the rest of the questionnaire, that is, the responses did not depend on the level of knowledge management in the respondent's organisation. The objective of investigating the existence of a correlation between the level of KM and the rest of the questionnaire was to ascertain whether the level of knowledge management in the respondents' organisation would determine their responses to the rest of the questionnaire.

Evidence of a correlation between the level of KM in respondents' organisations and their responses to another question would indicate that the organisations which are doing well in knowledge management have also done well in certain aspects of the model. However, if there were no evidence of a correlation, it would mean that respondents agree on what is

needed in a knowledge management strategy, regardless of whether they practice knowledge management or not.

Section 1 Level of Knowledge Management in the Organisation

Question 1 Please indicate which of these descriptions best fits your organisation in terms of Knowledge Management (KM):

A. No formal Knowledge Management initiative exists within the organisation

B. There is an awareness of Knowledge Management, management has recently initiated a programme, but there are no visible results yet.

C A KM programme exists and has been running for over 6-12 months. Some preliminary results have been achieved.

The hypothesis can be formulated as follows:

Hypothesis Set 9

H_0: there is no relationship between the Level of KM in the respondents' organisations and their responses to the remaining Questions

H_1: there is a relationship between the Level of KM in the respondents' organisations and their responses to the remaining Questions

6.2.1.3 Correlation between other aspects of the Model

Other related questions were also investigated for evidence of a correlation, and to crosscheck the responses of respondents on certain aspects of the model.

6.2.1.3.1 Correlation between the importance of appointing a Chief Knowledge Officer and the importance of the CKO to not operate under a division/department

This hypothesis investigates the existence of a correlation between the importance of appointing a CKO and the importance of the CKO operating independently in the organisation. It would be expected that if respondents think it is important to have a Chief Knowledge Officer appointed to lead the knowledge management effort, they would also think it is important for the CKO to operate independently.

Hypothesis Set 10.1

H_0: There is no correlation between the need to appoint a CKO and the need for the CKO to operate independently

H_1: There is a correlation between the need to appoint a CKO and the need for the CKO to operate independently

6.2.1.3.2 Correlation between Top Management promoting KM and the organisation providing a work environment where knowledge sharing is encouraged

This hypothesis investigates the existence of a correlation between the importance of Top Management in the organisation promoting and supporting the knowledge management effort, and the importance of the organisation providing a work environment where knowledge sharing is encouraged. It would be expected that if respondents think it is important for top managers to promote and support, they would also think it is important for the organisation to provide a work environment conducive to knowledge sharing.

Hypothesis Set 10.2

H_0: There is no correlation between Top Management promoting KM and the organisation providing a work environment where knowledge sharing is encouraged

H_1: There is a correlation between Top Management promoting KM and the organisation providing a work environment where knowledge sharing is encouraged

6.2.1.3.3 Correlation between the views of employees being taken into consideration when initiating KM, and management treating employees on an individual basis and sharing knowledge with them

This hypothesis investigates the existence of a correlation between the importance of the organisation taking the views of employees into consideration when initiating the knowledge management effort, and the importance of managers treating employees on an individual basis and sharing knowledge with them. It would be expected that if respondents think it is important for management to take the views of employees into consideration, they would also think it is important for managers to treat employees as individuals and share knowledge with them.

Hypothesis Set 10.3

H_0: There is no correlation between the views of employees being taken into consideration when initiating KM, and management treating employees on an individual basis and sharing knowledge with them

H_1: There is a correlation between the views of employees being taken into consideration when initiating KM, and management treating employees on an individual basis and sharing knowledge with them

6.2.1.3.4 Correlation between the organisation encouraging a knowledge-sharing work environment and management rewarding employees for sharing and using knowledge

This hypothesis investigates the existence of a correlation between the importance of the organisation encouraging a knowledge-sharing work environment, and the importance of management rewarding employees for sharing and using knowledge in their work. It would be expected that if respondents think it is important for the organisation to promote a knowledge-sharing work environment, they would also think it is important for management to reward employees for sharing and using knowledge.

Hypothesis Set 10.4

H_0: There is no correlation between the organisation encouraging a knowledge-sharing work environment and management rewarding employees for sharing and using knowledge

H_1: There is a correlation between the organisation encouraging a knowledge-sharing work environment and management rewarding employees for sharing and using knowledge

6.2.2 Materials and Equipment

The author made use of a web-based questionnaire package to conduct the survey. The package used is the Question Mark Perception version 2.2.0, running on a Microsoft Windows NT 4.0 Server. The questionnaire was accessible to anyone with a web browser and an Internet connection.

6.2.3 Preparation

Respondents were contacted ahead of time and asked to participate in the study. They were briefed on the purpose and objectives of the study, and were asked to indicate whether or not they were willing to participate. Respondents were then given the URL pointing to the online survey, and were given instructions on how to fill out the questionnaire. An initial low response rate meant that the author had to contact respondents a number of times over a period of over two months, in order to reach the achieved response rate.

6.2.4 Pilot Study

Prior to the questionnaire being submitted to the respondents, the author conducted a pilot study in the Department of Information Systems and the Department of Computer Science

at Rhodes University. Sixteen (16) people responded, and provided constructive feedback on the wording of some questions which could have been ambiguous. The author then made some changes to the language of the questionnaire based on this feedback.

6.3 Data Collection Method

The author collected data from the completed questionnaire (see **Appendix C**), which was designed to collect qualitative, ordinal data only. The wording of the questionnaire was kept simple, so as to avoid confusion in respondents. However, due to the nature of the subject, the use of IT-specific terms was unavoidable.

The questionnaire provided a way of testing the expert opinion of people who are familiar with, if not professionals in, Knowledge Management in the industry. This targeting of a specific type of person meant that the sample was chosen by means of a convenience, non-probability method. Although a sample should be as large as possible, the targeting of IT Directors and other such highly placed professionals meant that the population and sample sizes were limited.

6.3.1 Construction of the Questionnaire

The questionnaire was divided into nine (9) sections, each dealing with a specific aspect of Knowledge Management. Prior to responding to the questions, a short introduction was provided to assist the respondents in understanding the nature and objectives of the questionnaire:

Welcome to the Knowledge Management Survey!

This survey has been designed to identify which factors are important to a Knowledge Management Implementation Strategy.

Knowledge Management can be defined as "the identification, growth and effective application of an organisation's critical knowledge" (Duffy, 1999). Knowledge itself can be defined to be the expertise residing inside a person's brain.

The author has designed a model aimed at facilitating the implementation of a Knowledge Management strategy, and needs to test its validity, hence the importance of this survey.

Your assistance is appreciated. Thank you for spending time to fill out this survey!

The first section required the respondents to rate the level of Knowledge Management in their organisation according to three choices. The other sections of the questionnaire all used a five-point Likert scale, requiring the respondents to indicate the importance of a particular aspect of the model, as illustrated in the table below:

Not Important	Somewhat Important	Important	Very Important	Extremely Important

Table 6.3.1: 5 point Likert Scale

6.3.2 Explanation of the Questionnaire

The questionnaire consisted of nine (9) sections:

- Section 1 Level of Knowledge Management in your organisation
- Section 2 Initiating a Knowledge Management effort
- Section 3 Alignment of KM Strategy with Business Strategy
- Section 4 Top Management Support
- Section 5 Create and Manage a Knowledge Culture in the Organisation
- Section 6 Use of a Pilot Project
- Section 7 Create and Manage Organisational Learning in the Organisation
- Section 8 Managing People in the Organisation
- Section 9 Choosing the right technology

Each section required the respondents to rate the importance of specific aspects of Knowledge Management tasks, activities or processes within their organisation. Each of the sections is described below.

6.3.2.1 Section 1 Level of Knowledge Management in your organisation

In this section, the respondents were required to rate the level of Knowledge Management in their organisation. The objectives of this question were firstly to determine the level of knowledge management in each respondent's organisation, and secondly to ascertain whether the subsequent responses to the questionnaire depended on the level of knowledge management practiced in the respondents' organisations.

6.3.2.2 Section 2 Initiating a Knowledge Management effort

In this section, the respondents were required to rate the importance of carrying out various tasks, activities and processes which would ensure a good start to the knowledge management effort in their organisation.

6.3.2.3 Section 3 Alignment of Knowledge Management Strategy with Business Strategy

The aim of this section was to obtain the view of respondents on the importance of aligning the knowledge management strategy of their organisation with the overall business strategy of their organisation.

6.3.2.4 Section 4 Top Management Support

In this section, respondents were required to evaluate the importance of top management being committed to knowledge management, and publicly demonstrating that support in the organisation in order to motivate employees to buy into the knowledge management effort.

6.3.2.5 Section 5 Create and Manage a Knowledge Culture in the Organisation

The aim of this section was to obtain the view of respondents on the importance of firstly creating a culture of knowledge sharing in the organisation, and secondly, managing that knowledge culture, as well as the role of the CKO in managing change and problems arising from the implementation of a knowledge culture.

6.3.2.6 Section 6 Use of a Pilot Project

Respondents were required to rate the importance of starting and carrying out a pilot project on knowledge management within their organisation. The importance of treating this project as any other organisational project was also evaluated.

6.3.2.7 Section 7 Create and Manage Organisational Learning in the Organisation

In this section, the respondents were required to indicate how important the process of creating and managing organisational learning is to their organisation. The two aspects evaluated were identification and storing of knowledge relevant to the organisation, and the encouragement that employees receive to share knowledge and create innovative ideas in the organisation.

6.3.2.8 Section 8 Managing People in the Organisation

The aim of this section was to evaluate the responses of respondents in terms of the management of people in their organisations, particularly with regards to whether or not management share knowledge with employees, and whether or not employees are rewarded for sharing and using knowledge in the workplace.

6.3.2.9 Section 9 Choosing the right technology

Finally, this section required respondents to judge the importance of various aspects of the technologies used to enable employees to share and use knowledge in the organisation.

6.4 Results

Firstly, all the questions are summarised and frequency tables and histograms produced to evaluate the responses of respondents. It should be noted again, that due to the small sample size of thirty-three, comparing the categories using the frequencies alone should be avoided. The author argues that the number of responses should be compared in order to provide an accurate view of the results

Secondly, the hypotheses postulated in **section 6.2.1.1** are tested using the Chi-Square test. The Chi-Square test is the preferred method in this case because of the small sample size, and measures whether an observed frequency differs significantly from an expected frequency.

Thirdly, the author investigated whether or not a correlation existed between the responses to the first question concerning the level of knowledge management in the organisation and the responses to the remaining questions.

It is important to note that since the value of the Pearson & M-L Chi-square and its significance level depends on the overall number of observations and the number of cells in the table, and the size of the sample in this study is relatively small, the categories of responses were joined to provide the necessary numbers. Hence, instead of five (5) categories being analysed, these were reduced to three (3) categories for the data analysis process. The first two categories and the last two categories of the 5-point Lickert Scale used were combined, as illustrated below in **table 6.4**:

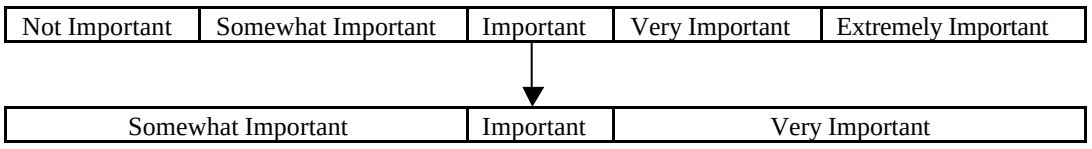

Table 6.4: Combined Lickert Scale

6.4.1 Demographics

A sample of thirty-three (33) respondents was selected from various companies in South Africa. The respondents were either Information Technology (IT) directors, or IT professionals, or Knowledge Management professionals. This ensured that respondents were familiar with the concepts of knowledge management and information technology. The respondents either work presently in the IT industry in South Africa, or have worked previously for a number of years in the IT industry in South Africa. The respondents were asked to respond to the questions with regards to their organisations. This provided a sound basis for evaluating the opinion of the respondents with regards to the applicability of the model in South African organisations.

It should be noted that the sample size was largely dictated by the specific nature of the subject, and the targeting of companies which are leaders in their respective fields. Furthermore, a response rate of 78.8% (26 out of 33) to the questionnaire meant that the results should be interpreted with care.

The respondents came from a number of industries, and were varied, as shown in **Figure 6.4.1** below:

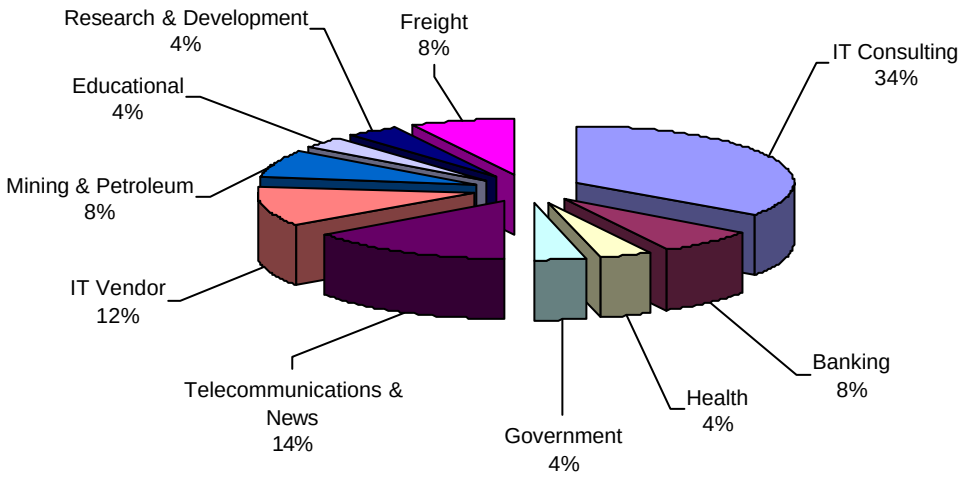

Figure 6.4.1: Demographics

The chart above shows that the majority of respondents were from the IT Consulting industry, with 34% (9 respondents). This was followed by the Telecommunications and News industry, with 14% (4 respondents). The third largest sector of respondents were the IT Vendors, with 12% (3 respondents). Next came the Banking sector, the Freight sector, and the Mining and Petroleum sector, each with 8% (2 respondents). Lastly, the Educational, Research and Development, Health, and Government sectors each had 4% of the total respondent number (1 respondent).

6.4.2 Distribution of Responses

6.4.2.1 Distribution of Responses for Section 1

The distribution of responses for question 1 are shown below, and the detailed histogram and frequency table can be found in **Appendix D**:

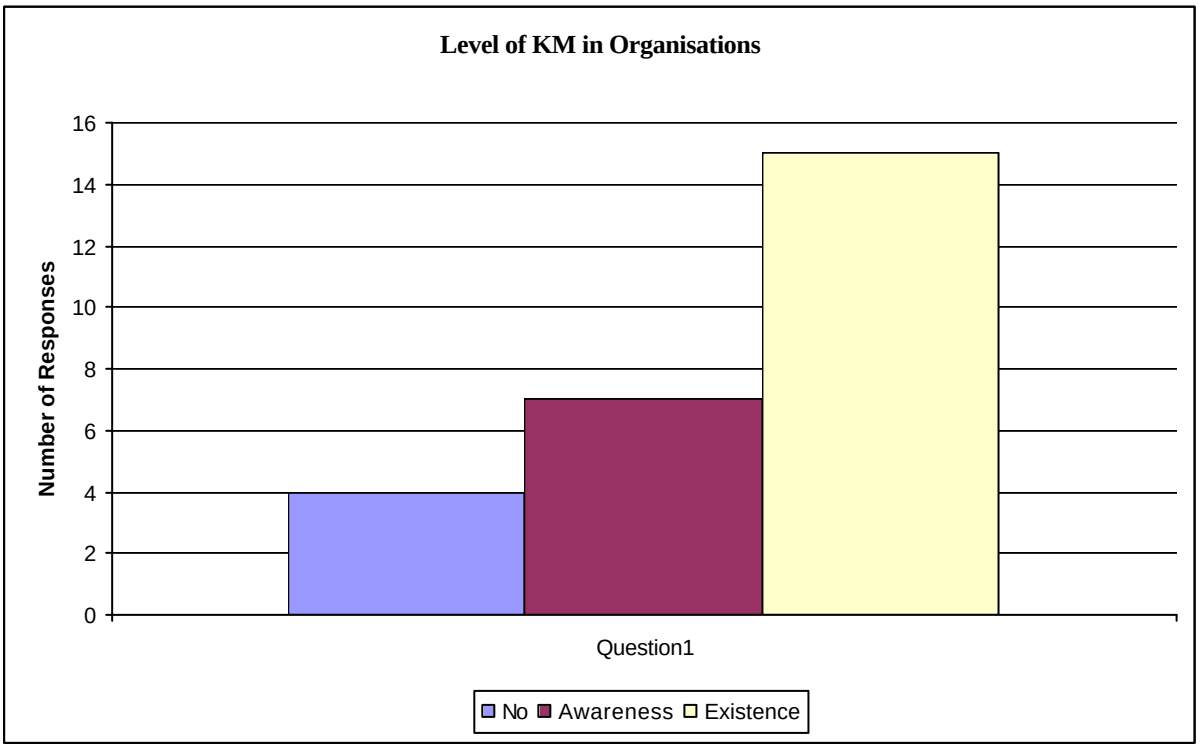

Figure 6.4.2.1: Summary of Section 1

Question 1: Level of Knowledge Management in respondents' organisations

The majority of respondents said that their organisations were carrying out a formal knowledge management strategy: 57.69% (15 respondents). 26.92% (7 respondents) of the organisations had some awareness of knowledge management, and 15.38% (4 respondents) did not have any knowledge management programme in place.

6.4.2.2 Distribution of Responses for Section 2

The distribution of responses for each question from section 2 are shown below, and the detailed histograms and frequency tables can be found in **Appendix D**:

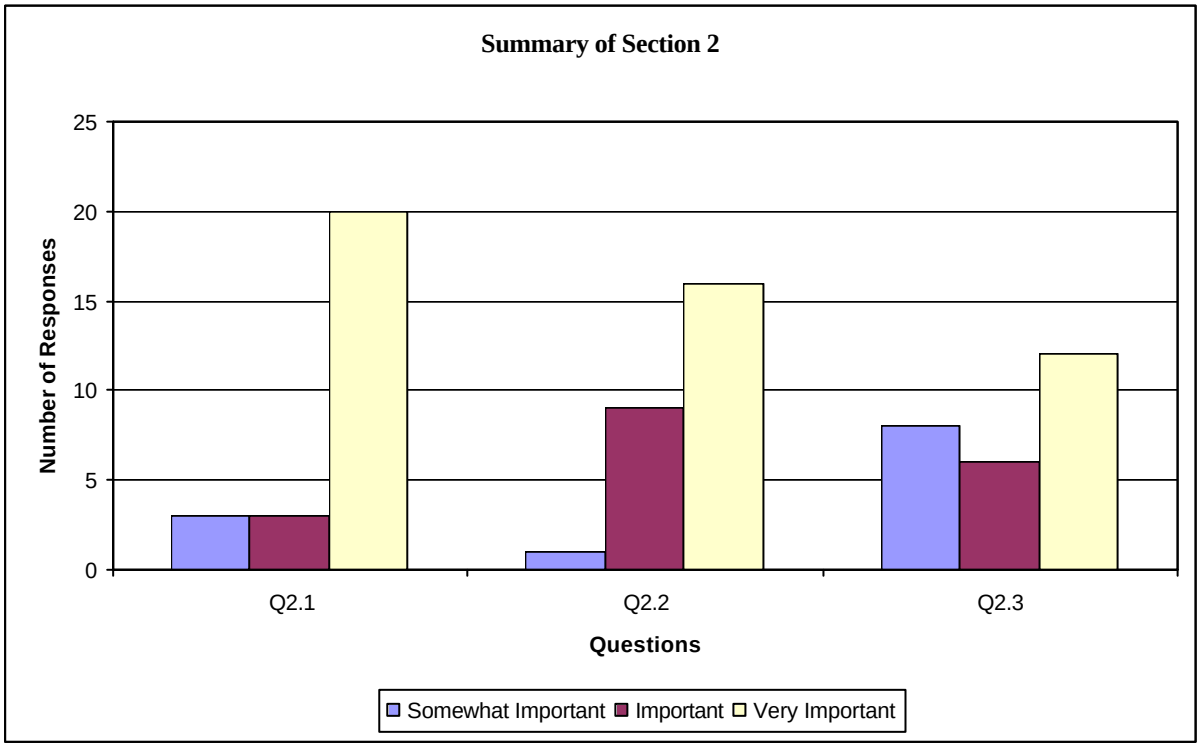

Figure 6.4.2.2: Summary of Section 2

Question 2.1: Analyse the Strengths, Weaknesses, Opportunities, and Threats of the organisation in terms of knowledge resources

The majority of respondents, 76.92% (20 respondents) also indicated that it was very important to perform a knowledge-based SWOT analysis, whereas only 11.54 % (3 respondents) thought it was important and the remaining 11.54% thought it was somewhat important.

Question 2.2: Create a long-term strategy, including core beliefs & values of the organisation, for knowledge management

In response to Question 2.2, 61.54% of the respondents (16) indicated that it was very important for their organisations to create a knowledge strategy. 34.52% (9 respondents) indicated that it was important, and only one (3.85%) said it was somewhat important.

Question 2.3: Appoint a leader (Chief Knowledge Officer) to lead the knowledge management effort

The majority of respondents, 46.15% (12) thought that it was "Very Important" to appoint a Chief Knowledge Officer to lead the knowledge management effort. This was followed by 30.77% of respondents (8) who thought it was somewhat important, and the remaining 23.08% (6 respondents) thought it was important.

6.4.2.3 Distribution of Responses for Section 3

The distribution of responses for each question from section 3 are shown below, and the detailed histograms and frequency tables can be found in **Appendix D**:

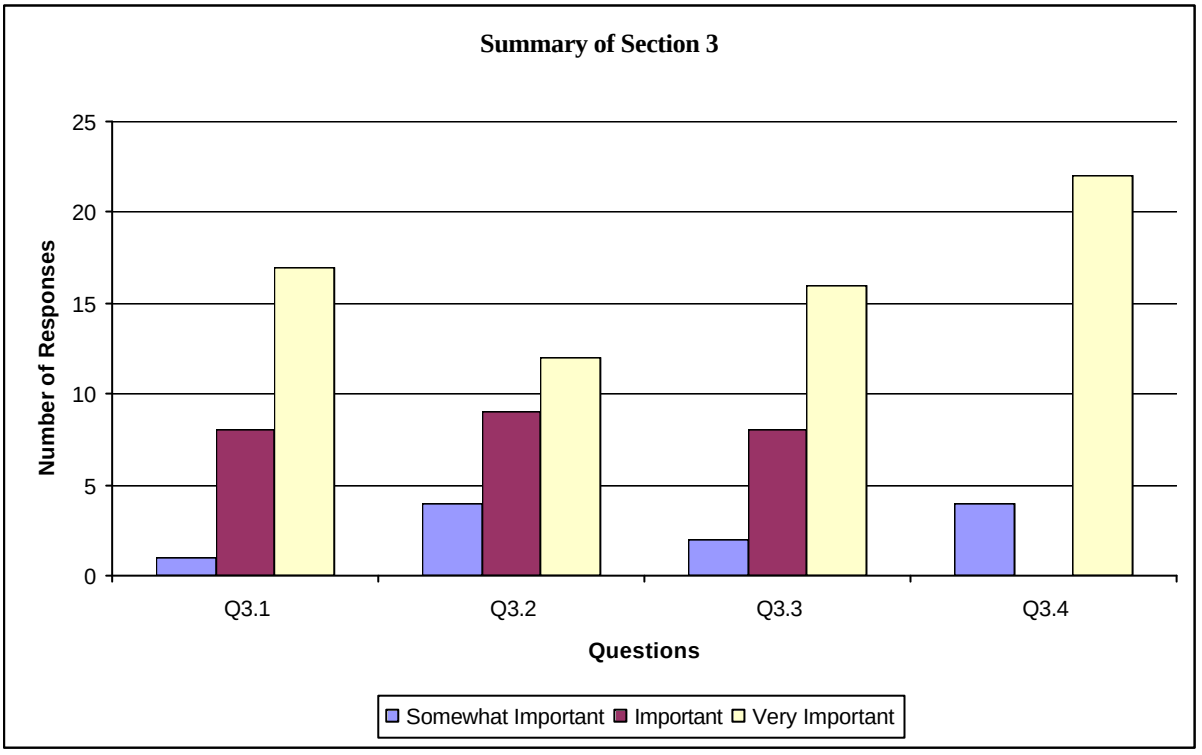

Figure 6.4.2.3: Summary of Section 3

Question 3.1 Derive the difference between what the organisation can do and what it wants to do, that is, its strategic gap

The majority of respondents, 65.38% (17) thought it was very important to define the strategic gap of their organisation. 30.77% (8 respondents) thought it was important, and the one respondent (3.85%) thought it was somewhat important.

Question 3.2: Derive the difference between what the organisation knows and what it must know in order to achieve what it wants to do, that is, its knowledge gap

Again, the majority of respondents, 46.15% (12 respondents) thought it was very important to obtain the knowledge gap of the organisation. 34.62% (9 respondents) thought it was important, and the remaining 15.38% (4 respondents) felt it was somewhat important.

Question 3.3: Create a high-level plan defining how & where knowledge resources will be used in the organisation, based on its strategic gap and its knowledge gap

The majority of respondents, 61.54% (16 respondents) felt that it was very important for their organisations to have a high level plan to define and guide the knowledge management effort. 30.77% of the respondents (8) thought it was important, and only 7.69% (2 respondents) thought it was somewhat important.

Question 3.4: Knowledge Management must make the organisation more competitive and profitable, enabling it to achieve its goals

The majority of respondents, 84.62% (22 respondents) thought it was very important that knowledge management bring more competitiveness to the organisation. The remaining 15.38% (4 respondents) thought it was important, and none of the respondents thought it was somewhat important.

6.4.2.4 Distribution of Responses for Section 4

The distribution of responses for each question from section 4 are shown below, and the detailed histograms and frequency tables can be found in **Appendix D**:

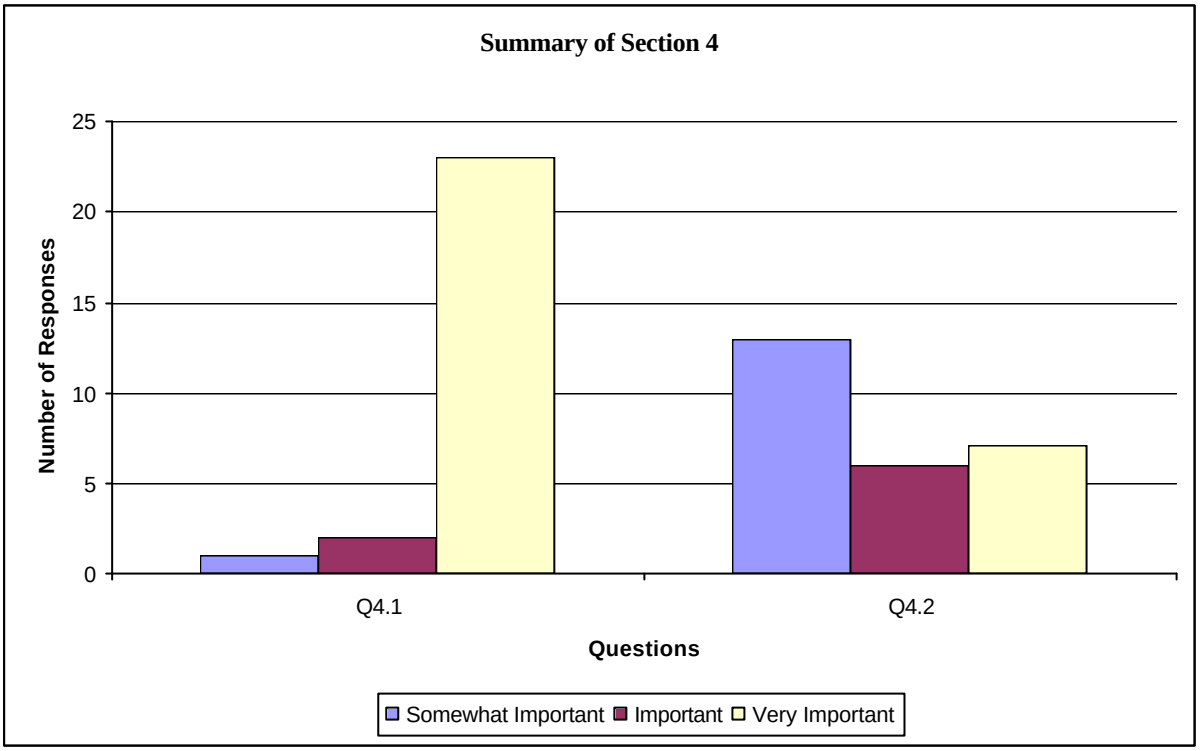

Figure 6.4.2.4: Summary of Section 4

Question 4.1: Top Management is aware of KM, and actively promotes KM in the organisation

The majority of respondents, 88.46% thought it was very important that top management actively support knowledge management in the organisation. This is indicated by twenty-three (23) respondents answering very important to the question, whereas 7.69% (2 respondents) opted for important, and only 3.85% (1 respondents) for somewhat important.

Question 4.2: CKO does not operate under a particular division/department

Surprisingly, the majority of respondents thought this issue was not very important, with 50.00% of respondents (13) answering somewhat important, 23.08% (6 respondents) saying it was important, and 26.92% (7 respondents) saying it was very important.

6.4.2.5 Distribution of Responses for Section 5

The distribution of responses for each question from section 5 are shown below, and the detailed histograms and frequency tables can be found in **Appendix D**:

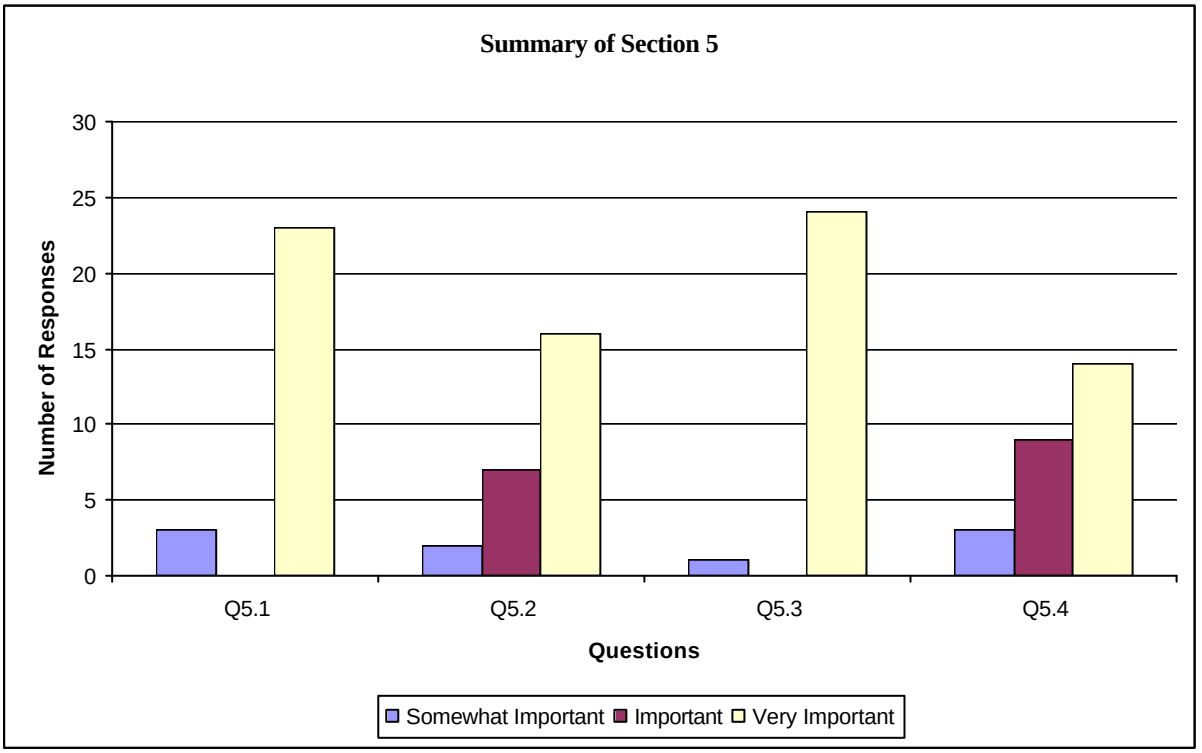

Figure 6.4.2.5: Summary of Section 5

Question 5.1: View of employees are taken into consideration when initiating the KM effort

The majority of respondents, 88.46% (23), thought that it was very important to involve employees in the knowledge management effort. Only 11.54% (3 respondents) thought it was somewhat important, and no respondent gave a middle ground answer.

Question 5.2: Senior, middle and line managers involve employees in decision-making

The majority of respondents, 62.54% (16) indicated that it was very important for senior, middle, and line managers to involve employees in decision making. This was followed by 26.92% of respondents (7) who thought this was important, and only 7.69% (2 respondents) thought it was somewhat important. One respondent (3.85%) abstained from answering this question.

Question 5.3: Organisation provides a work environment where people are encouraged to share ideas, experiences, successes & failures

The majority of respondents, 92.31% (24) felt it was very important for the organisation to encourage employees to share knowledge in the workplace. Only 3.85% (1 respondent) thought it was somewhat important, and one respondent (3.85%) abstained from answering.

Question 5.4: CKO has devised formal ways of dealing with change and problems arising from change

The majority of respondents, 53.85% (14) thought it was very important for the chief knowledge officer of the organisation to have designed formal ways of dealing with change and problems arising from change in the organisation. This was followed by 34.62% of respondents (9) who thought it was important, and the remaining 11.54% (3) thought it was only somewhat important.

6.4.2.6 Distribution of Responses for Section 6

The distribution of responses for each question from section 6 are shown below, and the detailed histograms and frequency tables can be found in **Appendix D**:

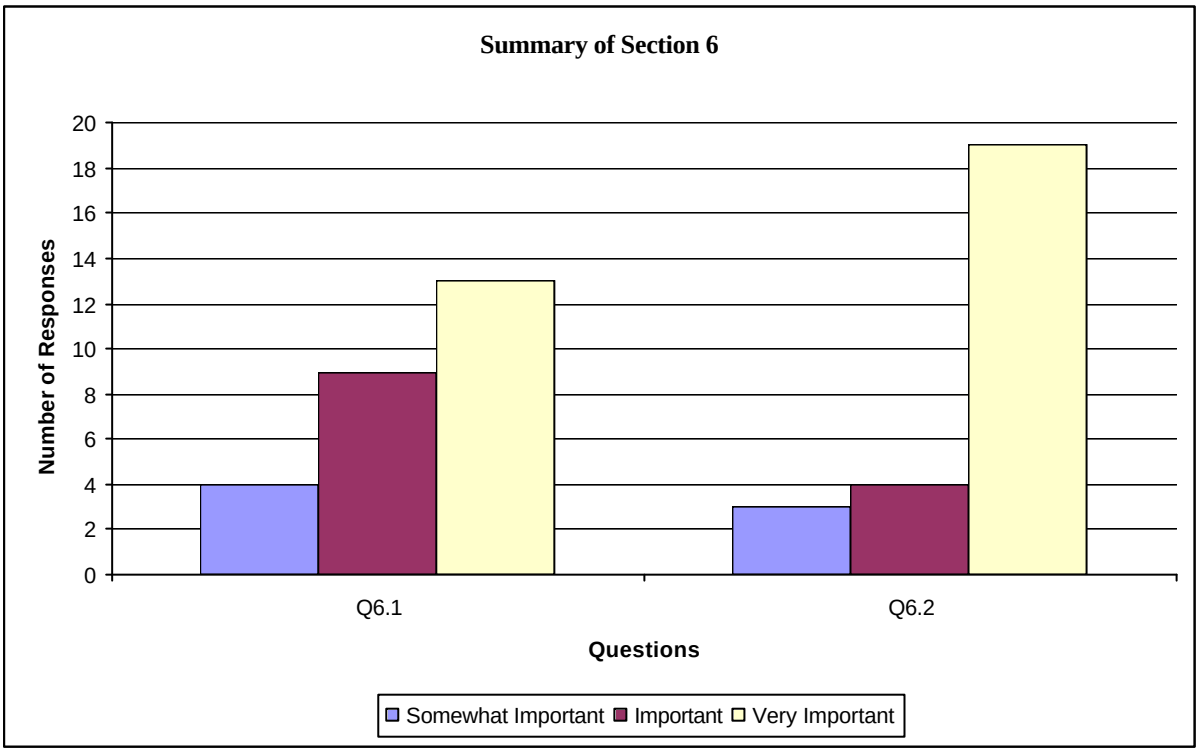

Figure 6.4.2.6: Summary of Section 6

Question 6.1: CKO has initiated a pilot project to demonstrate the effectiveness of KM in the organisation

Half of the respondents (13) thought is was very important that the chief knowledge officer initiate a pilot project to demonstrate the effectiveness of knowledge management to the organisation. 34.62% of respondents (9) thought this was important, and the remaining 15.38% (4 respondents) thought it was only somewhat important.

Question 6.2: The pilot project is implemented like any other project, with deadlines, budgets, etc.

The majority of respondents, 73.08% (19) thought it was very important that the knowledge management pilot project should be treated like any other organisational project. 15.38% (4 respondents) thought this was important, and 11.54% (3 respondents) thought this was only somewhat important.

6.4.2.7 Distribution of Responses for Section 7

The distribution of responses for each question from section 7 are shown below, and the detailed histograms and frequency tables can be found in **Appendix D**:

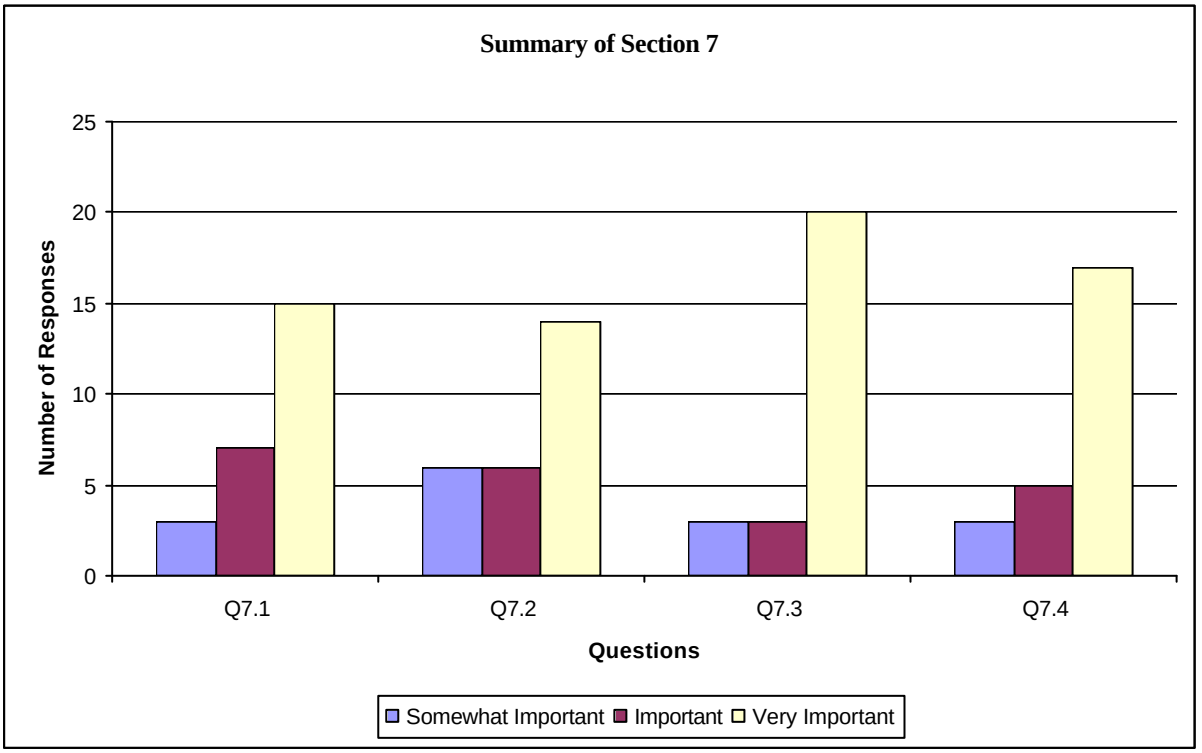

Figure 6.4.2.7: Summary of Section 7

Question 7.1: All knowledge relevant to the organisation is identified

57.69% of respondents (15) thought it was very important that the organisation identified the knowledge that was relevant to its operations. 26.92% (7 respondents) thought this was important, and only 11.54% (3 respondents) thought this was only somewhat important. One respondent (3.85%) abstained from answering this question.

Question 7.2: Relevant knowledge is verified and organised in an electronic knowledge repositories

53.85% of respondents (14) thought it was very important that the organisation verify and store the relevant knowledge it identified in knowledge repositories. 23.08% of the respondents (6) thought this was important, and a similar proportion thought this was only somewhat important.

Question 7.3: Employees are encouraged to use knowledge repositories and disseminate that knowledge

A clear majority of respondents thought that employees should be encouraged to use the knowledge repositories of the organisation. This is indicated by 76.92% of the respondents (20) responding very important to this question. Only 11.54% (3 respondents) thought it was important, and a similar proportion thought it was only somewhat important.

Question 7.4: Employees are encouraged to re-evaluate old knowledge and assumptions to create innovative ideas

The majority of respondents, 65.38% (17) thought that employees should be encouraged to be innovative in their work. 19.23% of respondents (5) thought this was important, and only 11.54% (3 respondents thought this was somewhat important. One respondent (3.85%) abstained from answering this question.

6.4.2.8 Distribution of Responses for Section 8

The distribution of responses for each question from section 8 are shown below, and the detailed histograms and frequency tables can be found in **Appendix D**:

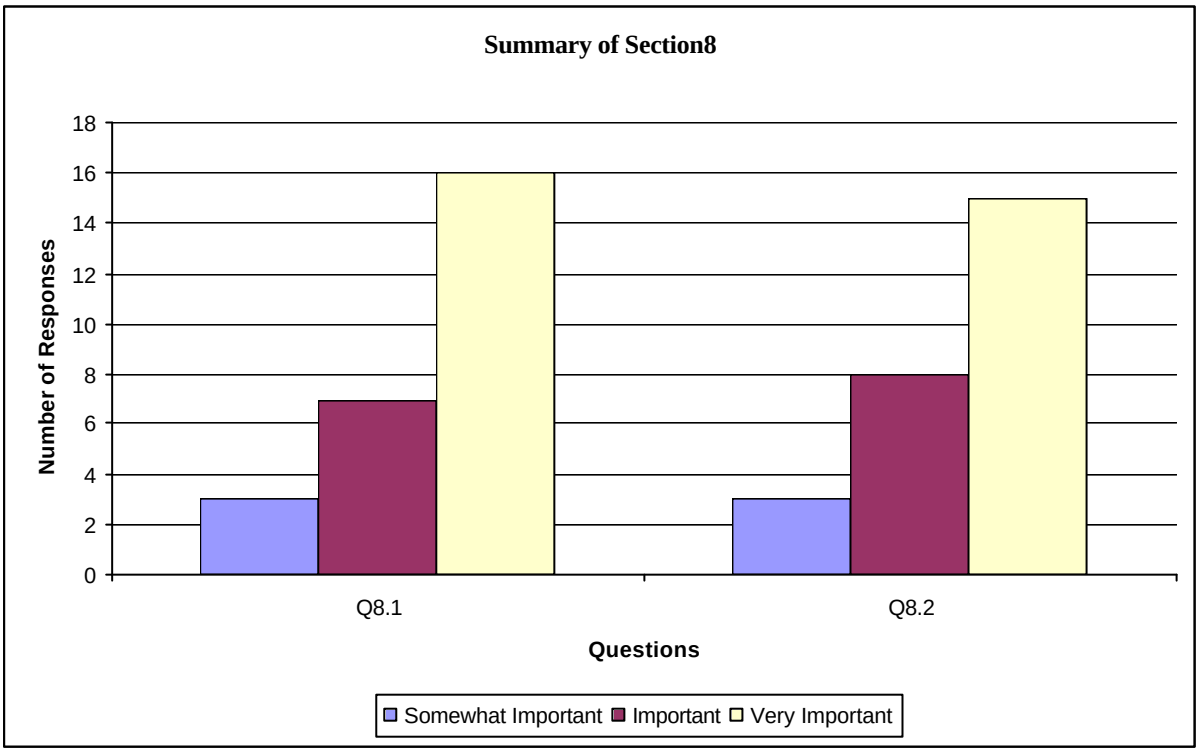

Figure 6.4.2.8: Summary of Section 8

Question 8.1: Management treat employees on an individual basis, and share knowledge with them

The majority of respondents, 61.54% (16 respondents) thought this managerial practice was very important, followed by 26.92% (7 respondents), and only 11.54% (3 respondents) thought it was only somewhat important.

Question 8.2: Management rewards employees for sharing and using knowledge

57.69% of respondents (15) thought this was a very important factor for knowledge management in their organisations. 30.77% (8 respondents) thought it was important, and only 11.54% (3 respondents) thought it was only somewhat important.

6.4.2.9 Distribution of Responses for Section 9

The distribution of responses for each question from section 9 are shown below, and the detailed histograms and frequency tables can be found in **Appendix D**:

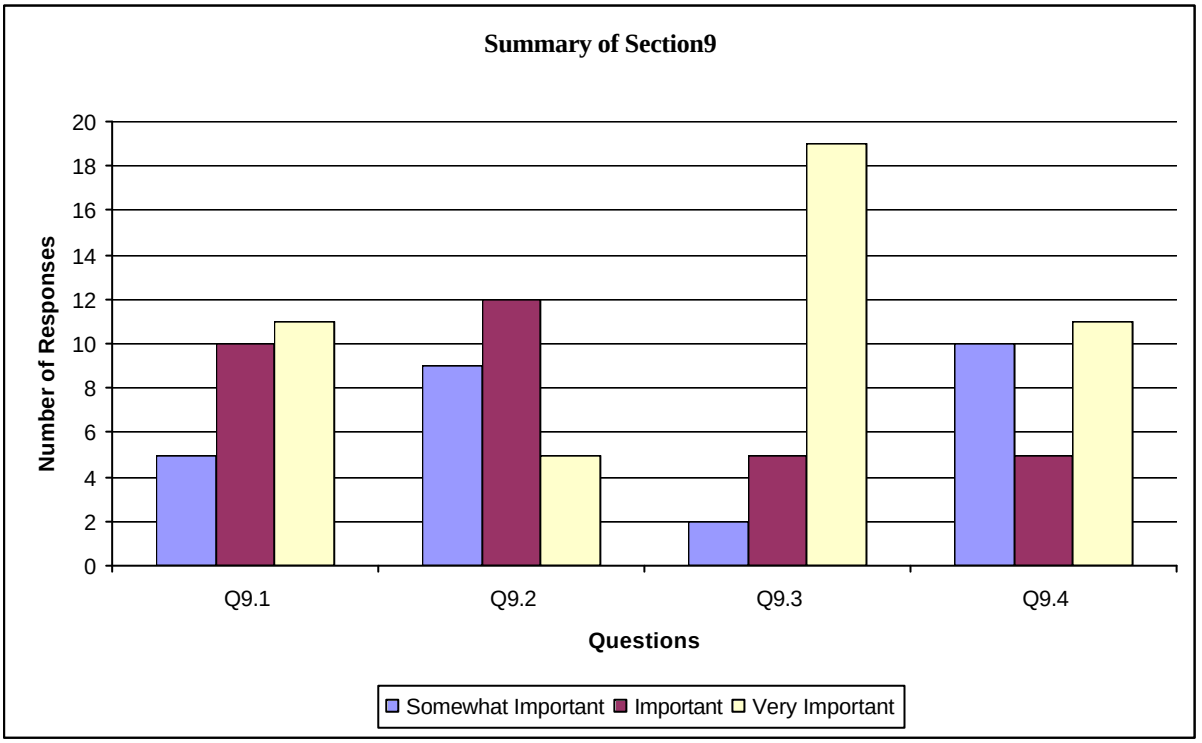

Figure 6.4.2.9: Summary of Section 9

Question 9.1: Organisation uses collaborative technologies to facilitate transfer of knowledge among workers

The opinion of respondents was more divided on this question. Only 42.31% (11 respondents) thought it was very important to use collaborative technologies to help knowledge transfer in the workplace. 38.46% of respondents (10) thought it was important, and 19.23% (5 respondents) thought it was somewhat important.

Question 9.2: Organisation's technologies are easily linked to those of suppliers and customers

In response to this question, the majority of respondents, 46.15% (12 respondents) thought it was merely important that their organisational technologies be easily linked to those of their suppliers and customers. A further 34.62% of respondents (9) thought it was somewhat important, and only 19.23% (5 respondents) thought it was very important.

Question 9.3: Knowledge repositories are easy to access and use, even for novice computer users

The majority of respondents, 73.08% (19 respondents), thought it was very important for their organisations to have knowledge repositories which were easy to access and use, 19.23% (5 respondents) thought it was important, and only 7.69% of respondents (2) thought it was somewhat important.

Question 9.4: There are alternative technologies for non computer-literate workers to use for collaboration

In dealing with the specific South African problem of a low computer literacy in a large proportion of the working force, respondents were queried about the importance of having organisational systems that allow non-computer literate workers to contribute to the knowledge management effort. Surprisingly, their opinion was quite divided, and only 42.31% (11 respondents) said it was very important. 38.46% of respondents (10) thought it was somewhat important, and only 19.23% (5 respondents) thought it was important.

6.4.3 Hypothesis Testing

In this section, the hypotheses formulated in Section 6.2.1 are tested and the results of these tests will reveal the validity of the Critical Success Factors of the proposed model. The statistical test used is the Chi-Square test, which tests whether an observed frequency from a sample differs significantly from the expected frequency from that sample. Hence, for each question that relates to a hypothesis, the Chi-Square is performed to test whether the observed frequencies differ significantly from the expected frequencies. This is done by computing $(E-O)^2/E$ for each interval and summing the results, where E is the expected frequency and O is the observed frequency. The result of this sum is then compared to the critical values of the Chi-Square distribution at the corresponding level of confidence. If the Chi-Square value of the Observed value is greater than the critical value, the null hypothesis is rejected in favour of the alternative hypothesis. Otherwise, there is not enough evidence to reject the null hypothesis.

The null hypothesis can be formulated as follows:

H_0: It is not important to perform the task/activity

H_1: It is important to perform the task/activity

For statistical purposes, this can be translated into:

H_0: $p <= 0.5$

H_1: $p > 0.5$

Also, some of the observations will be combined for the purposes of the Chi-Square test, for example, the observations in the "Important" category will be added to those in the "Very Important" category. Since the "Somewhat Important" category includes the "Not Important" observations, this will be taken to indicate "Not Important".

6.4.3.1 Hypothesis Set 1: Alignment of Knowledge Management strategy with Business Strategy

H_0: It is not important to align the KM strategy with the Business Strategy

H_1: It is important to align the KM strategy with the Business Strategy

This hypothesis set will be investigated with regards to the following questions:

Question 2.1: Analyse the Strengths, Weaknesses, Opportunities, and Threats of the organisation in terms of knowledge resources

Question 2.2: Create a long-term strategy, including core beliefs & values of the organisation, for knowledge management

Question 3.1 Derive the difference between what the organisation can do and what it wants to do, that is, its strategic gap

Question 3.2: Derive the difference between what the organisation knows and what it must know in order to achieve what it wants to do, that is, its knowledge gap

Question 3.3: Create a high-level plan defining how & where knowledge resources will be used in the organisation, based on its strategic gap and its knowledge gap

Question 3.4: Knowledge Management must make the organisation more competitive and profitable, enabling it to achieve its goals

For statistical purposes,

H_0: $p <= 0.5$

H_1: $p > 0.5$

	Q2.1	Q2.2	Q3.1	Q3.2	Q3.3	Q3.4
Somewhat Important	3	1	1	4	2	4
Important	23	25	25	21	24	22
Expected Frequency	13	13	13	12.5	13	13
Degrees of Freedom	1					
Chi-Square value	15.3846	22.1538	22.1538	11.5600	18.6154	12.4615

Table 6.4.3.1: Results of Chi-Square tests for Hypothesis Set 1

As can be seen from the table above, the Chi-Square values are quite high for all the questions. The expected Chi-Square value at a 99% Confidence Interval and with 1 degree of freedom is 6.635. Since all the observed Chi-Square values are greater than 6.635, there is enough evidence to reject H_0 in favour of H_1.

6.4.3.2 Hypothesis Set 2: Top Management Support

H_0: It is not important for Top Management to support the KM effort

H_1: It is important for Top Management to support the KM effort

This hypothesis set will be investigated with regards to the following questions:

Question 2.3: Appoint a leader (Chief Knowledge Officer) to lead the knowledge management effort

Question 4.1: Top Management is aware of KM, and actively promotes KM in the organisation

Question 4.2: CKO does not operate under a particular division/department

For statistical purposes,

H_0: $p <= 0.5$

H_1: $p > 0.5$

	Q2.3	Q4.1	Q4.2
Somewhat Important	8	1	13
Very Important	20	25	13
Expected Frequency	14	13	13
Degrees of Freedom	1		
Chi-Square value	5.1429	22.1538	0.0000

Table 6.4.3.2: Results of Chi-Square tests for Hypothesis Set 2

As can be seen from the table above, the Chi-Square values are high, except for Question 4.2. Comparing the observed Chi-Square values from Question 2.3 and 4.1 to the expected Chi-Square value of 6.635 suggests there is enough evidence to reject H_0 in favour of H_1, even though the observed Chi-Square value for Question 4.2 does not fulfil the criteria.

6.4.3.3 Hypothesis Set 3: Create and Manage Knowledge Culture

H_0: It is not important to create and manage a Knowledge Culture in the organisation

H_1: It is important to create and manage a Knowledge Culture in the organisation

This hypothesis set will be investigated with regards to the following questions:

Question 5.1: View of employees are taken into consideration when initiating the KM effort

Question 5.2: Senior, middle and line managers involve employees in decision-making

Question 5.3: Organisation provides a work environment where people are encouraged to share ideas, experiences, successes & failures

Question 5.4: CKO has devised formal ways of dealing with change and problems arising from change

Question 7.3: Employees are encouraged to use knowledge repositories and disseminate that knowledge

Question 8.2: Management rewards employees for sharing and using knowledge

For statistical purposes,

H_0: $p <= 0.5$

H_1: $p > 0.5$

	Q5.1	Q5.2	Q5.3	Q5.4	Q7.3	Q8.2
Somewhat Important	3	2	1	3	3	3
Very Important	23	23	24	23	23	23
Expected Frequency	13	12.5	12.5	13	13	13
Degrees of Freedom	1					
Chi-Square value	15.3846	17.6400	21.1600	15.3846	15.3846	15.3846

Table 6.4.3.3: Results of Chi-Square tests for Hypothesis Set 3

As can be seen from the table above, the Chi-Square values are quite high for all the questions. The expected Chi-Square value at a 99% Confidence Interval and with 1 degree of freedom is 6.635. Since all the observed Chi-Square values are greater than 6.635, there is enough evidence to reject H_0 in favour of H_1.

6.4.3.4 Hypothesis Set 4: Use of a Pilot Project

H_0: It is not important to conduct a pilot project to demonstrate the effectiveness of KM

H_1: It is important to conduct a pilot project to demonstrate the effectiveness of KM

This hypothesis set will be investigated with regards to the following questions:

Question 6.1: CKO has initiated a pilot project to demonstrate the effectiveness of KM in the organisation

Question 6.2: The pilot project is implemented like any other project, with deadlines, budgets, etc.

For statistical purposes,

H_0: $p <= 0.5$

H_1: $p > 0.5$

	Q6.1	Q6.2
Somewhat Important	4	3
Very Important	22	23
Expected Frequency	13	13
Degrees of Freedom	1	
Chi-Square value	12.4615	15.3846

Table 6.4.3.4: Results of Chi-Square tests for Hypothesis Set 4

As can be seen from the table above, the Chi-Square values are high, and when compared to the expected Chi-Square value at a 99% Confidence Interval of 6.635 and with 1 degree of freedom, there is enough evidence to reject H_0 in favour of H_1.

6.4.3.5 Hypothesis Set 5: Create and Manage Organisational Learning

H_0: It is not important to create and manage Organisational Learning in the organisation

H_1: It is important to create and manage Organisational Learning in the organisation

This hypothesis set will be investigated with regards to the following questions:
Question 7.1: All knowledge relevant to the organisation is identified

Question 7.2: Relevant knowledge is verified and organised in an electronic knowledge repositories

Question 7.3: Employees are encouraged to use knowledge repositories and disseminate that knowledge

Question 7.4: Employees are encouraged to re-evaluate old knowledge and assumptions to create innovative ideas

Question 5.3: Organisation provides a work environment where people are encouraged to share ideas, experiences, successes & failures

For statistical purposes,

H_0: p <= 0.5

H_1: p> 0.5

	Q7.1	Q7.2	Q7.3	Q7.4	Q5.3
Somewhat Important	3	6	3	3	1
Very Important	22	20	23	22	24
Expected Frequency	12.5	13	13	12.5	12.5
Degrees of Freedom	1				
Chi-Square value	14.4400	7.5385	15.3846	14.4400	21.1600

Table 6.4.3.5: Results of Chi-Square tests for Hypothesis Set 5

As can be seen from the table above, the Chi-Square values are quite high for all the questions. Since all the observed Chi-Square values are greater than 6.635, there is enough evidence to reject H_0 in favour of H_1.

6.3.4.6 Hypothesis Set 6: Manage People

H_0: It is not important to manage people and their knowledge

H_1: It is important to manage people and their knowledge

This hypothesis set will be investigated with regards to the following questions:

Question 6.1: CKO has initiated a pilot project to demonstrate the effectiveness of KM in the organisation

Question 6.2: The pilot project is implemented like any other project, with deadlines, budgets, etc.

Question 5.1: View of employees are taken into consideration when initiating the KM effort

For statistical purposes,

H_0: p <= 0.5

H_1: p> 0.5

	Q8.1	Q8.2	Q5.1
Somewhat Important	3	3	3
Very Important	23	23	23
Expected Frequency	13	13	13
Degrees of Freedom	1		
Chi-Square value	15.3846	15.3846	15.3846

Table 6.4.3.6: Results of Chi-Square tests for Hypothesis Set 6

As can be seen from the table above, the Chi-Square values are high. When compared to the expected Chi-Square value at a 99% Confidence Interval of 6.635 and with 1 degree of freedom, there is enough evidence to reject H_0 in favour of H.

6.4.3.7 Hypothesis Set 7: Choosing the Right Technology

H_0: It is not important to choose and implement the right technology for KM

H_1: It is important to choose and implement the right technology for KM

This hypothesis set will be investigated with regards to the following questions:

Question 9.1: Organisation uses collaborative technologies to facilitate transfer of knowledge among workers

Question 9.2: Organisation's technologies are easily linked to those of suppliers and customers

Question 9.3: Knowledge repositories are easy to access and use, even for novice computer users

Question 9.4: There are alternative technologies for non computer-literate workers to use for collaboration

For statistical purposes,

H_0: $p <= 0.5$

H_1: $p > 0.5$

	Q9.1	Q9.2	Q9.3	Q9.4
Somewhat Important	5	9	2	10
Very Important	21	17	24	16
Expected Frequency	13	13	13	13
Degrees of Freedom	1			
Chi-Square value	9.8462	2.4615	18.6154	1.3846

Table 6.4.3.7: Results of Chi-Square tests for Hypothesis Set 7

As can be seen from the table above, the Chi-Square values are high for Questions 9.1 and 9.3. However, for Questions 9.2 and 9.4, the Chi-Square values are both less than 6.635. In spite of this, since two of the four questions have yielded higher observed Chi-Square values than 6.635, there is enough evidence to reject the null hypothesis in favour of the alternative hypothesis.

6.4.3.8 Hypothesis Set 8: Include double-loop Learning

H_0: It is not important to include double-loop learning in the organisation

H_1: It is important to include double-loop learning in the organisation

This hypothesis set will be investigated with regards to the following question:

Question 7.4: Employees are encouraged to re-evaluate old knowledge and assumptions to create innovative ideas

For statistical purposes,

H_0: $p <= 0.5$

H_1: $p > 0.5$

		Q7.4
Somewhat Important		3
Very Important		22
Expected Frequency		12.5
Degrees of Freedom	1	
Chi-Square value		14.4400

Table 6.4.3.8: Results of Chi-Square tests for Hypothesis Set 8

As can be seen from the table above, the Chi-Square value is high, and when compared to the expected Chi-Square value at a 99% Confidence Interval of 6.635 and with 1 degree of freedom, there is enough evidence to reject H_0 in favour of H_1.

6.4.4 Correlation between the Level of Knowledge Management in the organisation and responses to the remaining questions

In this section, the author investigates the correlation between the various responses provided by the respondents. Firstly, the correlation between the level of knowledge management in the respondents' organisations and their responses to the rest of the questions will be investigated, and secondly, related knowledge management aspects from the questionnaire will also be investigated. A detailed analysis of this section can be found in **Appendix E**.

Section 1 Level of Knowledge Management in the Organisation

Question 1 Please indicate which of these descriptions best fits your organisation in terms of Knowledge Management (KM):

A. No formal Knowledge Management initiative exists within the organisation

B. There is an awareness of Knowledge Management, management has recently initiated a programme, but there are no visible results yet.

C A KM programme exists and has been running for over 6-12 months. Some preliminary results have been achieved.

H_0: there is no relationship between the Level of KM in the respondents' organisations and their responses to the remaining Questions
H_1: there is a relationship between the Level of KM in the respondents' organisations and their responses to the remaining Questions

The table below describes the analysis of the results using the Pearson and M-L Chi-Square test at the 95% Confidence Level. This is motivated by the fact that the Pearson Chi-Square test is the most common test for significance of the relationship between categorical variables. The null hypothesis is that there is no correlation between the responses from Question 1 and the rest of the questionnaire, whereas the alternative hypothesis is that there is a correlation. If the Chi-Square value is too large ($p < 0.05$), the null hypothesis is rejected in favour of the alternative hypothesis, and there is sufficient evidence to suggest a correlation. However, if the Chi-Square value is not significantly large ($p > 0.05$), the null hypothesis stands, and there is no evidence to suggest a correlation.

However, due to the small sample size, the expected frequencies are in most cases not greater than five, which should be the case for a Chi-Square test. Hence these results should be viewed with caution.

The table below shows the results of the Chi-Square test between responses from Question 1 and the rest of the questionnaire. A detailed analysis of this section can be found in **Appendix E**.

Questions	Pearson Chi-Square Value	df	p value	Hypothesis
2.1	2.12	4	0.71	Accept H_0
2.2	4.22	4	0.38	**Accept H_0**
2.3	0.81	4	0.94	Accept H_0
3.1	3.65	4	0.46	**Accept H_0**
3.2	5.32	4	0.26	Accept H_0
3.3	2.93	4	0.57	Accept H_0
3.4	4.56	2	0.10	Accept H_0
4.1	**14.61**	**4**	**0.01**	**Reject H_0**
4.2	4.80	4	0.31	Accept H_0
5.1	0.62	2	0.73	Accept H_0
5.2	3.80	4	0.43	Accept H_0
5.3	0.69	2	0.71	Accept H_0
5.4	3.52	4	0.47	Accept H_0
6.1	**9.83**	**4**	**0.04**	**Reject H_0**
6.2	4.80	4	0.31	Accept H_0
7.1	7.33	4	0.12	Accept H_0
7.2	3.36	4	0.50	Accept H_0
7.3	1.58	4	0.81	Accept H_0
7.4	5.07	4	0.28	Accept H_0
8.1	5.71	4	0.22	Accept H_0
8.2	3.81	4	0.43	Accept H_0
9.1	4.67	4	0.32	Accept H_0
9.2	3.81	4	0.43	Accept H_0
9.3	5.86	4	0.21	Accept H_0
9.4	1.50	4	0.83	Accept H_0

Table 6.4.4: Results of Chi-Square tests for Hypothesis Set 9

As can be seen in **Table 6.4.4** above, the results of the Chi-Square tests suggest that, in general, there is no evidence of correlation between the level of knowledge management in respondents' organisation and the other aspects of knowledge management queried by the survey. However, in the case of the responses to Question 4.1, where the p value is less than 0.05, there is enough evidence to reject H_0 in favour of H_1. Question 4.1 asked respondents to rate the importance of Top Management being aware of KM, and actively promoting KM in the organisation.

There is also evidence of a correlation between the level of knowledge management in respondents' organisations and their responses to Question 6.1, which queried respondents about the issue of the CKO starting a pilot project to demonstrate the effectiveness of KM

in the organisation. The p-value of the Chi-Square test is less than 0.05, and therefore there is enough evidence to reject H_0 in favour of H_1.

6.4.5 Correlation between other aspects of the Model

This section investigates the existence of a correlation between related knowledge management aspects from the questionnaire. The hypotheses for these tests are found in **Section 6.2.1.3**. A detailed analysis of this section can be found in **Appendix E**. Again, due to the small sample size, these results should be viewed with caution.

6.4.5.1 Correlation between the importance of appointing a CKO and the importance of the CKO not operating under a particular division/department

Question 2.3: Appoint a leader (Chief Knowledge Officer) for the knowledge management effort

Question 4.2: CKO does not operate under a particular division/department

H_0: There is no correlation between the need to appoint a CKO and the need for the CKO to operate independently

H_1: There is a correlation between the need to appoint a CKO and the need for the CKO to operate independently

Questions	Pearson Chi-Square Value	df	P value	Hypothesis
2.3 and 4.2	5.70	4	0.223	Accept H_0

Table 6.4.5.1: Results of Chi-Square tests for Hypothesis Set 10.1

The results of the Chi-Square test (p-value > 0.05) do not indicate evidence of a correlation between the need to appoint a CKO and the need for the CKO to operate independently. Therefore the null hypothesis is not rejected.

6.4.5.2 Correlation between the importance of Top Management promoting KM and the importance of organisation providing a work environment where knowledge sharing is encouraged

Question 4.1: Top Management is aware of KM, and actively promotes KM in the organisation

Question 5.3: Organisation provides a work environment where people are encouraged to share ideas, experiences, successes & failures

H_0: There is no correlation between Top Management promoting KM and the organisation providing a work environment where knowledge sharing is encouraged

H_1: There is a correlation between Top Management promoting KM and the organisation providing a work environment where knowledge sharing is encouraged

Questions	Pearson Chi-Square Value	df	P value	Hypothesis
4.1 and 5.3	0.14	2	0.931	Accept H_0

Table 6.4.5.2: Results of Chi-Square tests for Hypothesis Set 10.2

The results of the Chi-Square test (p-value > 0.05) do not indicate evidence of a correlation between Top Management promoting knowledge management in the organisation, and the organisation providing a work environment where knowledge-sharing is encouraged. Therefore the null hypothesis is not rejected.

6.4.5.3 Correlation between the views of employees being taken into consideration when initiating KM, and management treating employees on an individual basis and sharing knowledge with them

Question 5.1: View of employees were taken into consideration when initiating the KM effort

Question 8.1: Management treat employees on an individual basis, and share knowledge with them

H_0: There is no correlation between the views of employees being taken into consideration when initiating KM, and management treating employees on an individual basis and sharing knowledge with them

H_1: There is a correlation between the views of employees being taken into consideration when initiating KM, and management treating employees on an individual basis and sharing knowledge with them

Questions	Pearson Chi-Square Value	df	P value	Hypothesis
5.1 and 8.1	11.07	2	0.004	Reject H_0

Table 6.4.5.3: Results of Chi-Square tests for Hypothesis Set 10.3

The results of the Chi-Square test (p-value < 0.05) provide enough evidence to reject the null hypothesis in favour of the alternative hypothesis. Therefore there is enough evidence of a correlation between the need to take into consideration the views of employees when initiating KM, and management treating employees on an individual basis and sharing knowledge with them.

6.4.5.4 Correlation between the organisation encouraging a knowledge-sharing work environment and management rewarding employees for sharing and using knowledge

Question 5.3: Organisation provides a work environment where people are encouraged to share ideas, experiences, successes & failures

Question 8.2: Management rewards employees for sharing and using knowledge

H_0: There is no correlation between the organisation encouraging a knowledge-sharing work environment and management rewarding employees for sharing and using knowledge

H_1: There is a correlation between the organisation encouraging a knowledge-sharing work environment and management rewarding employees for sharing and using knowledge

Questions	Pearson Chi-Square Value	df	P value	Hypothesis
5.3 and 8.2	7.64	2	0.022	Reject H_0

Table 6.4.5.4: Results of Chi-Square tests for Hypothesis Set 10.4

The results of the Chi-Square test (p-value < 0.05) provide enough evidence to reject the null hypothesis in favour of the alternative hypothesis. Therefore there is evidence of a correlation between the organisation encouraging a knowledge-sharing work environment and management rewarding employees for sharing and using knowledge in the workplace.

6.5 Conclusion

This chapter described an empirical study designed to test the validity of the model developed in this research. The results gathered from this study clearly demonstrate that the proposed model is valid, but might require modification in two areas, namely the importance of the chief knowledge officer not operating under a particular division/department, and the availability of alternative technologies for non-computer literate employees. There was also enough evidence to suggest relationships between some of the most important aspects of the model, providing support for their validity. In the majority of the cases, there was also no evidence of correlations between the level of knowledge management in respondents' organisations and their responses to the rest of the questionnaire, implying that most respondents agreed on the importance of the various aspects of knowledge management presented to them, regardless of whether they practice knowledge management or not. However, these results should be viewed with caution because of the small sample size of the study. The next chapter will introduce a discussion

of the results obtained from this study, and where required, modifications to the model will be made.

Chapter 7

Discussion of Findings and Recommendations

7.1 Introduction

The previous chapter described the empirical study carried out to test the validity of the critical success factors of the proposed model. This chapter interprets the results of the empirical study presented in Chapter 6 and makes recommendations in light of these results. The results and their implications are discussed in terms of the hypotheses presented in Chapter 6 and the corresponding critical success factors presented in Chapter 5. The author concludes with recommendations to adapt the critical success factors and the model based on the findings of the empirical study.

7.2 General Discussion of the Results

From the results shown in the previous chapter, it can be seen that the majority of respondents thought that the factors of the proposed model were very important. Of the twenty-five questions respondents had to answer, twenty-two questions yielded high scores in the "Important" and "Very Important" categories. This indicates that the majority of respondents were of the opinion that the facets of knowledge management raised in the questionnaire were important or very important to the

success of a knowledge management effort. In most cases, a high proportion of the respondents thought that these aspects of knowledge management were "very important".

In Section 2, which queried respondents about the importance of initiating the knowledge management effort, respondents thought that it was very important for the organisation to perform a knowledge-based SWOT analysis. They also thought it was very important to create a long-term knowledge strategy, and to appoint a Chief Knowledge Officer.

In response to Section 3, which dealt with the importance of aligning the knowledge management strategy with the business strategy, respondents indicated it was very important for the organisation to derive its strategic and knowledge gaps, create a vision for knowledge management, and that the initiative should make the organisation more competitive.

Section 4 queried respondents about the issue of support from top management, and they indicated that it was very important for top managers to actively promote KM in the organisation. However, they did not think it was important for the chief knowledge officer to operate independently.

Section 5 questioned respondents about the importance of creating and managing a knowledge culture in the organisation. Again, respondents indicated it was important by answering important to all the questions in this section.

In Section 6, which queried the importance of conducting a knowledge management pilot project, respondents indicated that it was important that the organisation implement such a pilot project, and that it was implemented like any other project.

In response to questions from Section 7, which dealt with the issue of creating and managing organisational learning in the organisation, respondents again thought that all the aspects were important.

In Section 8, which queried respondents about the importance of managing people, respondents again indicated that this aspect of knowledge management was important.

Lastly, in Section 9, which dealt with the issue of choosing the right technology for supporting the knowledge effort, respondents indicated that only two of the four aspects on which they were queried were important. Respondents thought it was important for the organisation to use collaborative technologies to support knowledge transfer, and it was also important for their knowledge repositories to be easily accessible and user-friendly. However, they indicated that it was not important for the organisation's technologies to be linked to those of their suppliers and customer, and they also thought it was not important to supply alternative technologies for employees who are not computer literate.

The results of the tests dealing with the importance of the knowledge management practices are reinforced by the Chi-Square tests which were performed on the individual questions supporting the Critical Success Factors. In most cases, the null hypotheses were rejected in favour of the alternative hypotheses. However, for responses to questions 4.2, 9.2 and 9.4, there was not enough evidence to reject the null hypothesis, and this reveals that respondents did not think these tasks and activities to be of great importance to knowledge management. Question 4.2 queried respondents about the importance of the Chief Knowledge Officer operating independently in the organisation. Question 9.2 dealt with the importance of the organisation's technologies being linked to those of its suppliers and customers, and question 9.4 dealt with the importance of providing alternative technologies for employees who were not computer-literate.

The results of the tests dealing with the importance of the knowledge management practices are also reinforced by the results of the Pearson and M-L Chi-Square tests, which showed that the majority of answers to the questionnaire did not depend on the level of knowledge management in the respondent's organisation. This showed that regardless of whether the respondents' organisations were involved in knowledge management, the respondents were aware of the importance of the aspects of knowledge management presented to them.

Other tests indicated no correlation between the need to appoint a Chief Knowledge Officer (CKO) and the need for the CKO to operate independently. This is shown by the absence of a correlation between questions 2.3 and 4.2. Question 2.3 queried respondents about the importance of appointing a CKO for the knowledge management effort, and question 4.2 asked respondents to rate the importance of the CKO operating independently. When the results of this test are viewed in conjunction with the results of the Chi-Square tests, it can be concluded that the part of the model that recommends that the CKO operate independently requires modification.

There was also no evidence of a correlation between Top Management promoting KM and the organisation providing a work environment where knowledge sharing is encouraged. This is illustrated by the absence of a correlation between questions 4.1 and 5.3. Question 4.1 asked respondents to rate the importance of Top Management being aware of knowledge management, and actively promoting knowledge management in the organisation, and question 5.3 queried respondents about the importance of the organisation providing a work environment where people are encouraged to share ideas, experiences, successes & failures.

However, other correlation tests showed a relationship between the views of employees being taken into consideration when initiating KM, and management treating employees on an individual basis and sharing knowledge with them. This is evidenced by the correlation between questions 5.1 and 8.1. Question 5.1 dealt with the importance of involving the employees of the organisation in the knowledge management effort, and question 8.1 dealt with the importance of treating employees as individuals and sharing knowledge with them. Hence the author concludes that this is one of the key aspects of the proposed model which has been validated by the study.

There was also evidence of a correlation between the organisation encouraging a knowledge-sharing work environment and management rewarding employees for sharing and using knowledge. This was shown by the correlation between questions 5.3 and 8.2. Question 5.3 asked respondents about the importance of the organisation providing a work environment where people are encouraged to share

ideas, experiences, successes & failures, and question 8.2 asked respondents about the importance of management rewarding employees for sharing and using knowledge. The author argues that this is also a key factor in the proposed knowledge management model which has been confirmed by the study.

7.3 Confirmation of the validity of the Critical Success Factors

This section discusses the results of the study in terms of the critical success factors derived from the proposed model. Each critical success factor relates to a hypothesis, which was tested in the previous chapter. The author warns that due to the small sample size, the results and their interpretation should be treated with caution. However, they do indicate the state of thinking in the sample with regard to good knowledge management practices. Hence, the author argues that these results provide enough evidence to warrant changes to the critical success factors of the proposed model, and if need be, to the model itself.

7.3.1 CSF1: Alignment of Knowledge Management strategy with Business Strategy

H_0: It is not important to align the KM strategy with the Business Strategy
H_1: It is important to align the KM strategy with the Business Strategy

The results indicated that there was enough evidence to reject the null hypothesis in favour of the alternative hypothesis. The author concludes that the tasks and activities prescribed by Questions 2.1, 2.2, 3.1, 3.2, 3.3 and 3.4 are all validated by respondents. The author also concludes that this provides enough evidence to suggest that the model is correct when dealing with the matter of aligning the knowledge management strategy with the overall business strategy of the organisation. Hence, the first Critical Success Factor of the model has been validated.

7.3.2 CSF2: Top Management Support

H_0: It is not important for Top Management to support the KM effort
H_1: It is important for Top Management to support the KM effort

The results indicated that there was enough evidence to reject the null hypothesis in favour of the alternative hypothesis. Despite the low observed Chi-Square value from Question 4.2, the author concludes that the tasks and activities prescribed by Questions 2.3, and 4.1 have been validated by respondents. Therefore, the author concludes that this CSF has been validated, and that the model is correct when emphasising the importance of top management actively supporting knowledge management in the organisation. The idea of the CKO operating independently, which was tested through Question 4.2, however, will have to be revised.

7.3.3 CSF3: Create and Manage Knowledge Culture

H_0: It is not important to create and manage a Knowledge Culture in the organisation
H_1: It is important to create and manage a Knowledge Culture in the organisation

The results indicated that there was enough evidence to reject the null hypothesis in favour of the alternative hypothesis. Therefore, the author concludes that the tasks and activities prescribed by Questions 5.1, 5.2, 5.3, 5.4, 7.3, and 8.2 are all validated by respondents. The author also concludes that this provides enough evidence to suggest that the model is correct when prescribing the importance of creating and managing a knowledge culture in the organisation. Hence, the third critical success factor has been validated.

7.3.4 CSF4: Use of a Pilot Project

H_0: It is not important to conduct a pilot project to demonstrate the effectiveness of KM

H_1: It is important to conduct a pilot project to demonstrate the effectiveness of KM

The Chi-Square tests performed on the responses to this question indicate that there is enough evidence to reject the null hypothesis in favour of the alternative hypothesis. Therefore, the author concludes that the tasks and activities queried by Questions 6.1 and 6.2 are all validated by respondents. The author also concludes that this provides enough evidence to suggest that the model is correct when recommending the use of a knowledge management pilot project in the organisation to demonstrate the effectiveness of knowledge management. Hence, the fourth critical success factor has been validated.

7.3.5 CSF5: Create and Manage Organisational Learning

H_0: It is not important to create and manage Organisational Learning in the organisation

H_1: It is important to create and manage Organisational Learning in the organisation

The results indicated that there was enough evidence to reject the null hypothesis in favour of the alternative hypothesis. The author concludes that the tasks and activities prescribed by Questions 7.1, 7.3, 7.3, 7.4 and 5.3 are all validated by respondents. Therefore the model's recommendation of creating and maintaining the process of organisational learning is accurate. Hence, the fifth critical success factor has been validated.

7.3.6 CSF 6: Manage People

H_0: It is not important to manage people and their knowledge

H_1: It is important to manage people and their knowledge

The results indicated that there was enough evidence to reject the null hypothesis in favour of the alternative hypothesis. The author concludes that the tasks and

activities queried by Questions 8.1, 8.2 and 5.1 have been validated by respondents. Therefore the model's proposal in ways of managing people in a knowledge environment is proper. Hence, the sixth critical success factor has been validated.

7.3.7 CSF7: Choosing the Right Technology

H_0: It is not important to choose and implement the right technology for KM
H_1: It is important to choose and implement the right technology for KM

The results indicated that there was enough evidence to reject the null hypothesis in favour of the alternative hypothesis, despite two of the questions (questions 9.2 and 9.4) yielding lower observed Chi-Square values than the expect Chi-Square values. Therefore the author concludes that the idea of linking the organisations' technologies with their suppliers and customers and the idea of providing alternative technologies for non-computer literate employees need some modification in light of these results. Therefore the model's recommendations on choosing the right technology to support the knowledge management initiative is partly correct. Hence, the seventh critical success factor has been validated.

However, in light of these results, the proposal about the organisation linking its technologies to those of its suppliers and customers needs to be revised.

7.3.8 CSF 8: Include double-loop Learning

H_0: It is not important to include double-loop learning in the organisation
H_1: It is important to include double-loop learning in the organisation

The result of the Chi-square test for the last set of hypothesis indicates that there is enough evidence to reject the null hypothesis in favour of the alternative hypothesis. Therefore, the author concludes that the model's proposal to include a double-loop learning in the knowledge management strategy is correct. Hence, the eight and final critical success factor has been validated.

7.4 Discussion of Other Results

7.4.1 Relationship between the Level of Knowledge Management in the Organisation and responses to other aspects of Knowledge Management

The results gained from performing the Pearson & M-L Chi-Square test on the responses of the survey confirmed the validity of the model. These results showed that the majority of answers to the questionnaire did not depend on the level of knowledge management in the respondent's organisation. This means that regardless of whether or not the respondents' organisation was involved in knowledge management, the respondents were of similar opinion as to what constituted a good knowledge management strategy.

The only responses which depended on the level of knowledge management were those from questions 4.1 and 6.1. Question 4.1 dealt with the importance of top management supporting and promoting the knowledge management effort, and this depended on the level of knowledge management in the organisation. Question 6.1 dealt with the importance of implementing the knowledge management pilot project like any other organisational project, and again this depended on the level of knowledge management in the respondents' organisations. Hence there was a direct link between the level of knowledge management in the respondent's organisations and their opinions about the importance of top management supporting knowledge management, and the importance of implementing a knowledge management pilot project like any other project.

Therefore the author concludes that the level of knowledge management in the respondents' organisations had an impact on their opinions about the importance of top management supporting the knowledge management effort, and the need for the Chief Knowledge Officer to initiate a pilot project to demonstrate the effectiveness of knowledge management to the organisation.

7.4.2 Relationship between other aspects of the Model

Other correlation tests showed a relationship between the importance of involving the employees of the organisation in the knowledge management effort, and the importance of treating employees as individuals and sharing knowledge with them. Therefore the author concludes that this key aspect of the proposed model that recommends ways of dealing and managing people has been validated by the study.

There was also evidence of a relationship between the importance of the organisation providing a work environment where people are encouraged to share ideas, experiences, successes & failures, and the importance of management rewarding employees for sharing and using knowledge. The author argues that this is also a key factor in the proposed knowledge management model which has been confirmed by the study.

7.5 Recommendations

This section lists the recommendations of the author with regards to the proposed model based on the results gained from the empirical study. These recommendations explain how and where the theoretical model should be modified in order to bring it in line with the findings of the empirical study. As mentioned previously, due to the small sample size, the results of the empirical study should be considered with caution. However, they do indicate the inclinations of the sample with regards to good knowledge management practices. Hence, the author argues that the results of the study provide sufficient grounds on which to adapt the proposed model based on the confirmation or modification of the critical success factors.

7.5.1 CSF 2: Top Management Support

From the results of the study, respondents indicated that the idea of the Chief Knowledge Officer operating independently was not very important. It would seem to indicate that it would not matter to organisations whether the CKO reported

directly to the board of directors or to the IT manager, or to another member of the board. Hence, the author concludes that this part of the model requires modification. The model will be modified to reflect the fact that it does not really matter under which department or division the CKO operates, or to whom the CKO reports.

7.5.2 CSF 7: Choosing The Right Technology

In this CSF, two factors were deemed not important by respondents during the analysis of the results.

The first factor the respondents thought was not important concerned the proposal of linking the organisations' technologies with those of their suppliers and customers. Respondents indicated that this was not important, and the author concludes that this area of the model required modification. Hence, the model will be modified to remove this proposal.

The second factor concerned the idea of providing alternative technologies to enable non-computer literate employees to participate and contribute to the knowledge management effort. Respondents indicated that this was not important. However, the author concludes that this particular proposal of the model does not require modification.

7.6 Modified Model

This section shows the modified areas of the proposed model. A complete model can be found in **Appendix F**. The modified sections are from **Sections 5.2.1.1.2** and **5.2.1.3.1**, and are shown in italics, where they have been modified.

5.2.1.1.2 Creating a Vision for Knowledge Management & Providing a Leader

Extract from the Proposed Model:

The creation of the vision can be done in two ways. Top management can either appoint a chief knowledge officer (CKO), who will create the vision, or they can create a vision and entrust the CKO to carry it out. This process depends on where the CKO ranks on the corporate structure, and the needs and preferences of management. The author argues that it would be preferable if the CKO is a member of the board of directors, and reports directly to the Chief Executive Officer instead of reporting to the IT director as is the case still in many organisations. This way, the board of directors conveys a clear message to the rest of the organisation that knowledge management is a serious issue for the organisation.

Extract from the Modified Model:

The creation of the vision can be done in two ways. Top management can either appoint a chief knowledge officer (CKO), who will create the vision, or they can create a vision and entrust the CKO to carry it out. This process depends on where the CKO ranks on the corporate structure, and the needs and preferences of management. *The author argues that it is not important whether the CKO is a member of the board of directors or not, nor is it important to whom he/she reports to. By appointing a CKO, the board of directors conveys a clear message to the rest of the organisation that knowledge management is a serious issue for the organisation.*

5.2.13.1 Managing the Technology

Extract from the Proposed Model:

The author recommends implementing IT infrastructures which will allow easy communication between employees, in other words collaborative technologies. For example, a corporate intranet linked to the knowledge repositories of the organisation could allow employees to access and retrieve information about past projects, and

hence save time and money when starting a new project. This intranet in turn could be connected to the Internet, and provide access to a world of information.

It is also important that the IT infrastructure of the organisation be able to link easily with that of customers and suppliers, in order to allow a seamless flow of information between the business and its partners. This will allow the organisation to collect knowledge about its business partners and vice-versa.

The paragraph in italics has been removed from the Modified Model:

The author recommends implementing IT infrastructures which will allow easy communication between employees, in other words collaborative technologies. For example, a corporate intranet linked to the knowledge repositories of the organisation could allow employees to access and retrieve information about past projects, and hence save time and money when starting a new project. This intranet in turn could be connected to the Internet, and provide access to a world of information.

It is also important that the IT infrastructure of the organisation be able to link easily with that of customers and suppliers, in order to allow a seamless flow of information between the business and its partners. This will allow the organisation to collect knowledge about its business partners and vice-versa.

7.7 Summary of Modified Model

The majority of the model did not require any change. However, the section dealing with the creation of a vision for knowledge management and providing a leader for the effort required some modification. Hence, it was acknowledged that the Chief Knowledge Office of the organisation did not need to be a member of the board of directors, and did not require independence from other sections of the organisation.

The section dealing with managing the technology that supports knowledge management also required modification. It was acknowledged that the technologies of the organisation did not need to be interlinked with those of their suppliers and customers.

7.8 Conclusions

This chapter discussed the results of empirical study of this research, and recommended changes to the model where appropriate. It should be noted that due to the small sample size, the results of the study should be viewed with caution. However, the author deems these results to reflect the trends in the sample with regards to good knowledge management practices. All the Critical Success factors were confirmed by the study, and two were confirmed subject to modifications. The model was then modified in line with the indications from the results. The following chapter concludes the research by summarising the major aspects of the study, and illustrates the main contribution of this research to the body of knowledge.

Chapter 8

Conclusion

8.1 Introduction

The previous chapter discussed the results of empirical study of this research, and recommended changes to the model. This chapter concludes the research and recommends areas of future research. Firstly, the research is discussed, and contribution of this research to the body of knowledge is discussed, followed by a discussion of the proposed model, and its validity according to the empirical study. Finally, possible areas of future research are proposed.

8.2 The Research

This research was initiated in response to a need expressed by the South African Motor Vehicle Industry for a knowledge management implementation strategy tailored to their needs. Therefore, the aim of this research was to develop a knowledge management implementation strategy aimed at this industry.

Firstly the literature was surveyed for knowledge management practices, knowledge management strategies, and knowledge management case studies. Secondly, the

author conducted a survey of the South Africa Motor Vehicle Industry using Duffy's Knowledge Benchmarking Questionnaire to obtain a clear idea of the state of knowledge management in that industry. Using the literature as a starting point, and drawing from the results of the study, the author then constructed a knowledge management strategy suited to the industry. Importantly, after the development of the model, it was concluded that due to the strategic and holistic nature of the model, it could be applied to any organisation and not only to the target industry.

The Critical Success Factors were derived from the model, and these CSFs were then formulated into questions. These questions were empirically tested, and the results of the study suggested that overall the model was correct, with some minor modifications required.

8.3 Contribution of the Research

The field of Knowledge Management is rapidly gaining ground in business, due to its promise of delivering knowledge and information when it is needed and where it is needed. The growing importance of Knowledge Management is illustrated by the growing monetary value spent by organisations on knowledge management and knowledge management solutions. However, there is a tendency for KM initiatives to fail according to the literature. In most cases, this can be attributed to organisations starting out by buying a product rather than creating a culture or a process by which knowledge can be shared.

However, when properly implemented, knowledge management can help organisations to cut back on costs and produce better products and services. Hence, there is a real need for Knowledge Management practices in the workplace so that managers can promote the sharing of knowledge and allow the organisation to acquire and retain intellectual capital. The automotive industry, for example, is highly competitive and innovative, customer needs are constantly changing, and the technology is also always changing. Nevertheless, there is a lack of formal procedures and strategies, technology and metrics to ensure that a knowledge management initiative succeeds. Hence, amongst other things, there is a need for

implementation strategies for KM that ensure the success of the knowledge management initiative and of the business itself.

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The main contribution of this research, therefore, was the development of a knowledge management implementation strategy which fulfils the needs of the South Africa motor vehicle manufacturing industry, and which can also be applied in other organisations.

The proposed model consists of three main interlinked components: Knowledge Management of the Organisation, Knowledge Management of the People, and Knowledge Management of the Infrastructure and Processes. The argument proposed by the model is that the organisation needs to balance its focus on these three subsystems in order to achieve a successful knowledge management effort. Furthermore, this produced a framework which was in line with the systems approach.

The emphasis of the model is on the importance of aligning the knowledge management strategy of the organisation to the overall business strategy of the organisation. The culture and managing the culture change when implementing knowledge management are also of utmost importance. A holistic approach to managing knowledge by including in the process customers, suppliers, stakeholders, and environmental factors is proposed. The concept of organisational learning is also catered for in this framework.

The importance of the employees of the organisation, and their contribution towards a successful knowledge management effort is recognised. There should also be a concerted effort to make people feel part of the change when implementing knowledge management. The organisation should also encourage individual learning, and innovative thinking with employees, and reward those that do produce such results.

Finally, the infrastructure and business processes of the organisation cannot be neglected when implementing knowledge management. The importance of hardware and software that will facilitate employees to share and disseminate knowledge

throughout the organisation is also highlighted. The business processes are also mentioned as they need to allow for formal as well as informal sharing and use of knowledge within the workplace.

The essence of the model as formulated in the form of seven critical success factors and tested empirically is as follows:

1. **Alignment of KM strategy with Business Strategy**

This is the most important factor in this model. Aligning the knowledge management strategy of the organisation with its business strategy will result in a knowledge management effort which will succeed. Knowledge management cannot exist in a vacuum, and needs to be closely aligned to the rest of the organisational goals in order to achieve a tangible result.

2. **Top Management Support**

A knowledge management effort that does not enjoy the support of the most senior managers in the organisation is doomed to failure.

3. **Create and Manage Knowledge Culture**

The CKO also needs to create a knowledge culture, which will provide the support from employees for the effort. Furthermore, the CKO also needs to manage the knowledge culture on a continual basis, by ensuring that people are contributing freely and willingly.

4. **Use of a Pilot Project**

The use of a pilot project is essential to the success of the knowledge management effort. The pilot project will demonstrate to the rest of the organisation the benefits of knowledge management, and warn the CKO of the possible pitfalls for the main project.

5. **Create and Manage Organisational Learning**

The CKO needs to be aware that organisational learning is crucial to the long-term effectiveness of the organisation's knowledge management effort. The CKO needs

to put into place the necessary structures and processes to encourage people to share and use knowledge in the workplace.

6. Manage People

The support and contribution of the employees of the organisation are crucial to the success of the knowledge management effort. The CKO should provide the employees with the right environment in which they will feel secure enough to share their most valuable knowledge, and to use it to promote the knowledge culture.

7. Choosing the Right Technology

It is also very important that the CKO chooses the right technology to implement any knowledge management system.

8.4 Future Research

The author recommends future research to be conducted in the following areas:

8.4.1 The Proposed model

Although the main aspects of the model have been validated by the empirical study, the author argues that only a full-scale implementation using the model can validate fully the model. By definition, this research must be lengthy, in order to ascertain the medium- and the long-term benefits of the model. However, a pilot project on a smaller scale might also be undertaken to validate the model.

8.4.2 Other Areas

The author also recommends conducting research in the following areas of knowledge management:

8.4.2.1 The effectiveness of information and communication technologies (ICT) in knowledge management implementations.

The findings of this research highlight the importance of the human factor in knowledge management. However, it would be important to investigate the precise influence, if any, of the role of ICT in a knowledge management implementation. On a more detailed level, the importance of the hardware and software an organisation chooses to use could be investigated with regard to their influence on their knowledge management effort.

8.4.2.2 The impact of culture on knowledge management

The literature recognises the importance of organisational culture in knowledge management. Future research is recommended in investigating the differences in cultures in different organisations and how these differences affect knowledge management.

8.4.2.3 The importance of knowledge management at all managerial levels

This research proposed a model targeted at the top levels of management. It would be important to investigate how knowledge management affects other managerial levels in organisations. For example, an investigation of what type of knowledge, if any, factory workers possess, and whether or not it is important to capture that knowledge and disseminate it to the rest of the organisation. It would also be important to explore the feasibility of implementing knowledge management in an environment where factory workers are not computer-literate, and hence require other means to share and distribute knowledge.

8.4.2.4 Applicability of the model to other industries

Future research is also recommended to investigate the applicability of the model to other industries. Investigations of the applicability of the model to the academic, retailing, and governmental sectors are recommended.

8.5 Concluding Remarks

The aim of this research was to develop a knowledge management implementation strategy for the South African Motor Vehicle Manufacturing Industry to suit its needs. The author constructed such a model, relying on the systems approach and a holistic approach to knowledge management. Thus, the resulting model was also deemed to be applicable to the target industry, as well as to other organisations. The results of the empirical study indicate that the model is acceptable, and few modifications were required. There are numerous advantages to using good knowledge management practices in organisations, and it is hoped that this research contributes to a better understanding of KM in organisations.

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Appendix A Duffy's Knowledge Management Benchmarking Questionnaire

Section 1 Background Details

1	**Background Details**
1.1	Name of Respondent ……
1.2	Job Title ……
1.3	Company/Organisation ……
1.4	Address ……
1.5	Telephone …… 1.6 Fax …… 1.7 E-mail ……
1.8	Size (No of Employees) ……
1.9	Type of Organisation/Industry ……

Section 2 Knowledge Assets

The following instructions were issued to respondents with regards to the questions from Section 2 onwards:

In the questions that follow please enter a number from 1 - 10 in each box. The importance is for your organisation and the performance indicates how well your organisation is doing for that item.

10 = very high importance 1 = very low importance
10 = very high performance 1 = very low performance

2. Knowledge Assets

		Importance	Performance
2.1	The quality of data, information and knowledge is managed		
2.2	Knowledge assets are formally identified		
2.3	The locations of knowledge assets are known		
2.4	Knowledge requirements are related to business needs		
2.5	Specific plans and policies exist for growing knowledge		
2.6	Knowledge assets are measured		
2.7	**Formal systems exist to**:		
2.7.1	Identify required knowledge		
2.7.2	Acquire knowledge		
2.7.3	Store knowledge		
2.7.4	Facilitate access to knowledge		
2.7.5	Distribute knowledge		
2.7.6	Protect knowledge		
2.7.7	Purge knowledge		

Section 3 Learning People

3	Learning People	Importance	Performance
3.1	Never stop learning	☐	☐
3.2	Are constantly alert for new information	☐	☐
3.3	Create and accumulate knowledge	☐	☐
3.4	Accept change	☐	☐
3.5	Are willing to communicate and share knowledge	☐	☐
3.6	See knowledge as fuelling personal growth	☐	☐
3.7	Have a high tolerance for complexity	☐	☐
3.8	Think systematically (e.g. about the underlying causes)	☐	☐
3.9	Continually search for ways to do things cheaper, better, faster	☐	☐
3.10	Are willing to experiment	☐	☐
3.11	Are not afraid to question the status quo	☐	☐
3.12	Can interact with people as well as technology	☐	☐
3.13	Are not complacent	☐	☐
3.14	Are keen to solve problems and help colleagues to do so too	☐	☐
3.15	Can work in teams	☐	☐
3.16	Welcome empowerment by their organisations	☐	☐
3.17	Use information technology effectively in pursuing knowledge	☐	☐

Section 4 A Learning Organisation

4	A Learning Organisation	Importance	Performance
4.1	Rewards employee knowledge	☐	☐
4.2	Rewards knowledge sharing and dissemination	☐	☐
4.3	Encourages the acceptance of personal responsibility for learning	☐	☐
4.4	Has a high computer literacy level	☐	☐
4.5	Devotes time and resources to training and education	☐	☐
4.6	Rewards team performance	☐	☐
4.7	Rewards knowledge outputs (eg patents, papers)	☐	☐
4.8	Measures knowledge sharing	☐	☐
4.9	Teaches its staff to learn	☐	☐
4.10	Has someone responsible for knowledge management	☐	☐
4.11	Has a flat organisational structure	☐	☐
4.12	Grows its research capability	☐	☐

Section 5 Information Technology

5	Information Technology	Importance	Performance
5.1	A high level of systems integration exists	☐	☐
5.2	There is extensive access to external databases	☐	☐
5.3	The Internet (intranet and/or extranet) is used extensively	☐	☐
5.4	Data base management systems are used extensively	☐	☐
5.5	Electronic mail is used extensively	☐	☐
5.6	The IT architecture is network-centric	☐	☐
5.7	Knowledge-based systems (expert systems, neural nets) are used extensively	☐	☐
5.8	Simulation (including what if models) is used extensively	☐	☐
5.9	Management support systems are used extensively	☐	☐
5.10	Data mining is used extensively	☐	☐
5.11	Groupware (eg Lotus Notes) is used extensively	☐	☐
5.12.	People databases are used extensively	☐	☐

Section 6 Knowledge Management

6	Knowledge Management	Importance	Performance
6.1	Top management is committed to knowledge management	☐	☐
6.2	Knowledge intensive products or services play a key role	☐	☐
6.3	A formal knowledge strategy is in place	☐	☐
6.4	Users are committed to knowledge management	☐	☐
6.5	A formal knowledge plan exists	☐	☐

Section 7 Knowledge Intensity

7 Knowledge Intensity

The knowledge intensity of your organisations ☐

10 = very high importance of knowledge as a resource, in the products/services offered and in the value chain

1 = very low importance of knowledge as a resource, in the products/services offered and in the value chain

Appendix B: Detailed Analysis of the Knowledge Management Benchmarking Questionnaire

Section 2 Knowledge Assets

2. Knowledge Assets

		Importance		Performance	
		Mean	SD	Mean	SD
2.1	The quality of data, information and knowledge is managed	9.5	0.5	6.2	1.2
2.2	Knowledge assets are formally identified	8.2	2.2	4.7	1.6
2.3	The locations of knowledge assets are known	8.0	1.7	5.5	2.1
2.4	Knowledge requirements are related to business needs	8.8	1.2	7.7	1.4
2.5	Specific plans and policies exist for growing knowledge	8.5	2.3	6.0	2.4
2.6	Knowledge assets are measured	8.5	1.5	4.5	1.4
2.7	**Formal systems exist to**:				
2.7.1	Identify required knowledge	8.0	2.1	4.5	1.6
2.7.2	Acquire knowledge	8.3	2.3	5.0	2.4
2.7.3	Store knowledge	8.8	1.3	5.5	2.2
2.7.4	Facilitate access to knowledge	9.0	1.1	5.5	1.6
2.7.5	Distribute knowledge	9.3	0.8	6.0	1.8
2.7.6	Protect knowledge	9.5	0.8	7.3	1.8
2.7.7	Purge knowledge	7.8	2.3	5.3	1.4

Table 4.5.2: Knowledge Assets

Question 2.1, which asked the respondents to rate the importance of managing the quality of the data, information and knowledge of the organisation, yielded the highest score on the *Importance* section, with a mean of 9.5, and the lowest standard deviation, 0.5. This reveals that the respondents value high quality data, information and knowledge for their organisations. The low standard deviation indicates that there is agreement among the respondents. However, in the *Performance* section, the score obtained was only 6.2, and the standard deviation 1.2, indicating that these organisations are not performing well in this area, and there is little difference between their performance.

Question 2.2 queried the respondents about the formal identification of the knowledge assets in their organisations. The *Importance* section yielded a mean of

8.2, and a standard deviation of 2.2, indicating that the respondents thought it was important, but with relatively high disagreement. In the *Performance* section, however, the mean was relatively low, 4.7, with a standard deviation of 1.6, indicating that most of them were performing poorly in this area, with relatively little difference among the performance of the organisations.

Question 2.3 asked the respondents to indicate the importance of the organisation knowing where its knowledge assets were located, and again they assigned a high importance to this area, with a mean of 8.0, and the standard deviation of 1.7 indicated that there was little disagreement among the companies. However, when it came to their performance in this area, the respondents achieved only a score of 5.5, indicating that they are performing poorly, and the standard deviation of 2.1 indicates some differences in this area.

Question 2.4 asked the respondents to indicate the importance that their organisations attach to their knowledge requirements being related to their business needs. A relatively high mean of 8.8 was scored, with a standard deviation of 1.2, indicating that the respondents value this aspect importantly, with relatively little disagreement. In the *Performance* section, the highest score in the Knowledge Assets section was achieved, with a mean of 7.7, and a standard deviation of 1.4, indicating that most of them were performing quite well in this area.

Question 2.5 queried the respondents about the specific plans and policies in their organisation that exist to grow knowledge. In the *Importance* section, a mean of 8.5 indicated a high importance was attached to this area, but a relatively high standard deviation of 2.3 indicated that there was some disagreement. In the Performance section, a mean of 60 indicated that the respondents were not performing well in this area, and a standard deviation of 2.4 indicated that there were marked differences between the organisations with regards to their performance in this area.

Question 2.6 handled the aspect of measuring the knowledge assets of the organisation. In this area, the respondents indicated that they rated its importance quite highly, with a mean of 8.5, but there was some disagreement, showed by a standard deviation of 1.5. However, in the *Performance* section, a mean of 4.5

indicated that the respondents were performing poorly, and a standard deviation of 1.4 indicated some discrepancy in their respective performances.

The next sub-section, 2.7, queried respondents about the existence of formal systems in their organisations that dealt with specific aspects of managing the knowledge assets of their organisations.

Question 2.7.1 asked respondents about the systems in place that identify the required knowledge of their organisation. A mean of 8.0 and a standard deviation of 2.0 in the *Importance* section indicated that they valued the importance of systems that identified required knowledge, but there was disagreement amongst them as to how important the existence of these systems were. In the *Performance* section, a mean of 4.5 indicated that they were performing poorly in this area, and a standard deviation of 1.6 indicated some difference in their respective performances.

Question 2.7.2 handled the systems responsible for the acquisition of knowledge, and respondents indicated they were quite important, with a mean of 8.3, but again there was a high level of disagreement, indicated by the high standard deviation of 2.3. In the *Performance* section, the respondents indicated that they were not doing so well, with a mean of 5.0, but there was a marked variation among the organisations, with a standard deviation of 2.4.

Question 2.7.3 dealt with the existence of systems within the organisation which store knowledge. The mean score of 8.8 indicated that the respondents thought it was very important to have systems in place to store the organisation's knowledge. The relatively low standard deviation of 1.3 also indicated that there was little disagreement among respondents on this issue. In the *Performance* section, however, a mean score of only 5.5 indicated that the respondents were performing poorly, and a relatively high standard deviation of 2.2 also indicated marked differences in performance among the organisations.

Question 2.7.4 asked respondents about the organisational systems in place which facilitate access to their knowledge. A high mean of 9.0 was recorded, indicating that respondents thought it was very important to have such systems in place. A low

standard deviation of 1.1 also indicated that most of the respondents were in agreement on this issue. On the other hand, a low mean of 5.5 in the *Performance* section again indicated that respondents felt that their organisations were performing poorly in this area, and a standard deviation of 1.6 reinforced this opinion.

Question 2.7.5 queried respondents on the systems that distribute knowledge in their organisation. Again, a high mean of 9.3 coupled with a low standard deviation of 0.3 indicated that there was agreement among respondents that this was a very important issue. However, a relatively low mean of 6.0 and a standard deviation of 1.8 in the *Performance* section suggested that respondents did not think that their organisations were performing particularly well in this area, and there was some difference in performance among the organisations surveyed.

Question 2.7.6 asked respondents about the importance of protecting the knowledge of their organisation, and a high score of 9.5 was obtained, indicating the high importance that these organisations attach to the protection of their knowledge, together with a low standard deviation of 0.8, indicating agreement among the respondents. Although the relatively high mean of 7.3 meant that on the whole the organisations were doing well in this area, a relatively high standard deviation in the *Performance* section suggested that there were marked differences between the performances of the organisations

Question 2.7.7 dealt with the systems available to the organisation to purge knowledge, i.e., to get rid of irrelevant knowledge. Again, the respondents attributed quite a high importance to this system, with a mean of 7.8, but there was some disagreement among the respondents as illustrated by the relatively high standard deviation of 2.3. In the *Performance* section, the respondents indicated that they were not doing very well in this area, with a mean of only 5.3, and this performance seemed to be common with the respondents, with a low standard deviation of 1.4.

Section 3 Learning People

3	Learning People	Importance		Performance	
		Mean	SD	Mean	SD
3.1	Never stop learning	9.0	1.3	6.0	1.8
3.2	Are constantly alert for new information	8.5	1.2	5.8	1.5
3.3	Create and accumulate knowledge	9.2	0.8	6.3	1.0
3.4	Accept change	9.2	0.8	5.5	1.5
3.5	Are willing to communicate and share knowledge	9.3	0.8	6.0	1.7
3.6	See knowledge as fuelling personal growth	9.2	1.0	7.5	0.5
3.7	Have a high tolerance for complexity	8.7	1.0	6.2	1.9
3.8	Think systematically (e.g. about the underlying causes)	8.3	1.4	7.0	1.4
3.9	Continually search for ways to do things cheaper, better, faster	9.2	1.3	8.0	1.5
3.10	Are willing to experiment	8.0	1.1	6.3	2.0
3.11	Are not afraid to question the status quo	8.5	1.2	5.5	2.1
3.12	Can interact with people as well as technology	8.5	1.8	6.3	2.0
3.13	Are not complacent	8.8	1.8	6.0	1.8
3.14	Are keen to solve problems and help colleagues to do so too	9.3	1.0	6.8	1.3
3.15	Can work in teams	9.3	1.2	7.3	1.4
3.16	Welcome empowerment by their organisations	8.8	1.3	6.8	2.0
3.17	Use information technology effectively in pursuing knowledge	9.2	1.2	6.2	1.7

Table 4.5.3: Learning People

Question 3.1 asked the respondents to rate the ability of people to never stop learning, and not surprisingly, they rated as very important, the mean being 9.0, and the standard deviation being 1.3, suggesting agreement among respondents on this issue. However, the respondents did not think that their organisations were performing well in this area, the mean score being only 6.0, and the standard deviation reaching 1.8, suggesting that there was some difference in the performance figures among the organisations surveyed.

Question 3.2 queried respondents on the ability of learning people to be constantly looking out for new information. Respondents thought this was quite important, the mean score reaching 8.5, and the standard deviation 1.2, indication agreement among respondents. However, in the *Performance* section, again respondents did not feel

that their organisation was performing well, the mean score being only 5.8. The standard deviation reached a relatively low figure of 1.5, suggesting no marked difference in performance figures among the organisations surveyed.

Question 3.3 asked respondents to rate the importance of learning people being able to create and accumulate knowledge. The mean score was 9.2, which indicated that respondents thought this characteristic was very important, and the standard deviation was quite low, 0.8, which suggested no disagreement among respondents. However, in the *Performance* section, the mean score was only 6.3, indicating that the respondents feel that their organisation is not performing well in this area, and the standard deviation was 1.0, suggesting that there was not much difference in the performance figures among the organisations surveyed.

Question 3.4 dealt with the ability of learning people to accept change, and again respondents felt that this was very important, the mean score reaching 9.2. The standard deviation was also low, at 0.8, and this suggested that there was no disagreement among respondents. In the *Performance* section, however, the mean score was only 5.5, indicating that respondents did not think their organisations were performing well in this area, and the standard deviation figure of 1.5 suggested that there was some difference in performance among the organisations surveyed.

Question 3.5 queried respondents about the willingness of learning to communicate with other people and share knowledge. Respondents thought this was very important, with a mean score of 9.3, the highest in this Section 3, and a low standard deviation of 0.8 suggested that there was little disagreement among respondents . However, in the Performance section, the mean score of only 6.0 indicated that respondents felt that their organisations were not doing well in this area, and a standard deviation of 1.7 suggested that there was some difference in the performance among the organisations surveyed.

Question 3.6 asked respondents to evaluate the level at which they thought knowledge should fuel a person's growth in the organisation. This question yielded a high mean score of 9.2, indicating that respondents felt it was a very important characteristic of a learning person. A low standard deviation of 1.0 suggested that

there was little divergence between the views of respondents. In the *Performance* section, a relatively middle-ground mean of 7.5 was achieved, highlighting some success in this area. A low standard deviation of 0.5, the lowest in this section suggested very little difference in the performance of organisations in this area.

Question 3.7 queried respondents on the ability of a learning person to have a high tolerance for complexity. Respondents thought this was important, but not overly so, as indicated by the mean score of 8.7, and there was relatively little difference in opinion, as suggested by the low standard deviation of 1.0. In the *Performance* section, the respondents fared poorly, with a mean of 6.2, indicating that their organisations are not succeeding in this area. The standard deviation yielded a value of 1.9, suggesting that there was some difference in performance among the organisations.

Question 3.8 asked the respondents to rate the ability of learning people to think in a systematic fashion. In the *Importance* section, this resulted in a mean score of 8.3, suggesting that this is indeed an important aspect of a learning person. The relatively low standard deviation of 1.4 also suggested that there was little divergence of opinion among the respondents. In the *Performance* section, the mean score was lower, at 7.0, indicating that organisations were having some success in this characteristic. A relatively low standard deviation of 1.4 again suggested that there was some difference among the performance of the organisations.

Question 3.9 yielded the highest mean scores in both the *Importance* and *Performance* sections, primarily because organisations have traditionally looked for this characteristic in people they hire. In the Importance section, a high mean score of 9.2 suggested that respondents thought this was a very important characteristic of learning people, and a relatively low standard deviation of 1.3 indicated that there was some divergence of opinion among respondents. However, in the *Performance* section, a high mean score of 8.0 was yielded, which is indicative of the high success of organisations in getting their employees to reduce costs, increase profits and reduce product development time. A relatively low standard deviation of 1.5 suggested some difference in performance among the organisations surveyed.

Question 3.10, which dealt with the willingness of learning people to experiment resulted in a mean score of 8.0 in the *Importance* section. This suggests that respondents felt it was quite important, and a low standard deviation of 1.1 suggested that there was some difference in opinion among respondents. In the *Performance* section, a low mean of 6.3 suggested that organisations were not having much success in this area. A relatively high standard deviation of 2.0, the second highest in this section of the questionnaire, was suggestive of the difference in performance among organisations surveyed.

Question 3.11 asked respondents about the ability of learning people to question the state of affairs in their organisations. A high mean of 8.5 in the *Importance* section suggested that they thought this was quite important. A relatively low standard deviation of 1.2 indicated some difference in opinion. In the *Performance* section a low mean of 5.5 highlighted the poor success of organisations in promoting this characteristic in employees. A high standard deviation of 2.1, the highest in this section, also pointed to the difference in performance among the organisations surveyed.

Question 3.12 dealt with the social interactions of learning people, and respondents thought that it was quite important that people be able to interact with people as well as with technology, as suggested by a high mean of 8.5. However, a relatively high standard deviation of 1.8 suggested that there was a marked difference in opinion among respondents on this subject. In the *Performance* section, a relatively low mean of 6.3 suggested that organisations were not having much success in this area. A high standard deviation of 2.0 also implied that there were differences in performance among the organisations surveyed.

Question 3.13 asked respondents about the ability of learning people not to be complacent. The majority of the respondents thought this was very important, as suggested by a high mean of 8.8, but a high standard deviation of 1.8 pointed towards a marked difference in opinion on this characteristic. In the *Performance* section, a low mean score of 6.0 indicated that organisations were not very successful in this area, and a high standard deviation of 1.8 again was indicative of a marked difference in the performance of organisations.

Question 3.14 asked respondents about the eagerness of learning people to solve problems and help other people solve problems. Respondents felt this was very important, as suggested by a mean score of 9.3, and a relatively low standard deviation of 1.0 indicated that there was some difference in opinion on the matter. In the Performance section, a relatively low mean score of 6.8 implied that organisations were achieving some success, but a standard deviation of 1.3 pointed to a difference in performance among organisations.

Question 3.15 queried respondents about the ability of learning people to work in teams, and not surprisingly, respondents thought this was a very important characteristic, with a mean score of 9.3. A relatively low standard deviation of 1.2 pointed to some difference in opinion among respondents. However, in the *Performance* section, a relatively high mean score of 7.3 indicated some success in this area, and a relatively low standard deviation of 1.4 suggested some difference in performance among organisations.

Question 3.16 asked respondents about the willingness of learning people to welcome empowerment by their employers, and a mean score of 8.8 indicated that this was not overly important. A relatively low standard deviation of 1.3 suggested that there was some divergence in opinion on the matter. In the Performance section, a relatively low mean score of 6.8 suggested that organisations were achieving some success in this respect, but a high standard deviation of 2.0 implied differences in performance among organisations.

Question 3.17 asked respondents about the effectiveness of using IT in pursuing knowledge, and a mean score of 9.2 indicated this was indeed very important to their organisations. A Relatively low standard deviation of 1.2 suggested there was some difference in opinion on the subject. In the Performance section, however, a relatively low mean score of 6.2 implied that respondents did not think that their organisations were achieving much success in this respect, and relatively high standard deviation of 1.7 pointed to differences in performance among organisations.

Section 4 A Learning Organisation

4	A Learning Organisation	Importance		Performance	
		Mean	SD	Mean	SD
4.1	Rewards employee knowledge	**8.5**	**1.2**	**6.3**	**1.9**
4.2	Rewards knowledge sharing and dissemination	**8.7**	**1.5**	**4.8**	**1.8**
4.3	Encourages acceptance of personal responsibility for learning	**9.0**	**1.3**	**6.8**	**1.6**
4.4	Has a high computer literacy level	**8.5**	**1.0**	**6.0**	**2.7**
4.5	Devotes time and resources to training and education	**8.8**	**1.3**	**7.2**	**2.0**
4.6	Rewards team performance	**8.5**	**1.4**	**5.8**	**2.9**
4.7	Rewards knowledge outputs (eg patents, papers)	**8.2**	**1.2**	**5.0**	**2.4**
4.8	Measures knowledge sharing	**7.5**	**2.0**	**3.3**	**2.8**
4.9	Teaches its staff to learn	**7.7**	**2.1**	**5.7**	**2.6**
4.10	Has someone responsible for knowledge management	**7.7**	**2.3**	**5.3**	**2.4**
4.11	Has a flat organisational structure	**8.3**	**1.0**	**6.2**	**1.5**
4.12	Grows its research capability	**7.3**	**2.0**	**5.5**	**2.1**

Table 4.5.4: A Learning Organisation

Question 4.1 asked respondents about the issue of rewarding employees for their knowledge. A high mean score of 8.5 indicated that they felt it was quite important, and a relatively low standard deviation of 1.2 suggested some disagreement among respondents on this issue. In the Performance section, a low mean score of 6.3 was indicative of a lack of success in this area, and a relatively high standard deviation of 1.9 suggested differences in the performances of organisations.

Question 4.2 dealt with the issue of the organisation rewarding employees for sharing and distributing knowledge. A high mean score of 8.3 implied that respondents felt this was quite important, and a relatively low standard deviation of 1.5 indicated that respondents has some difference in opinion on this subject. In the *Performance* section, a low mean score of 4.8 was suggestive of poor performance from organisations, and a relatively high standard deviation of 1.8 suggested differences in the performance of organisations.

Question 4.3 asked respondents about the organisation encouraging their employees to accept responsibility for their own learning. Surprisingly, respondents thought this was very important, yielding a mean score of 9.0, and a relatively low standard deviation of 1.3, implying that there was little difference of opinion on this matter. However, organisations did not seem to be very successful on this subject, with a mean score of only 6.8, and a standard deviation of 1.6 indicating some difference in performance.

Question 4.4 queried respondents about the importance and performance of their organisations with regards to computer literacy levels. Respondents thought that it was highly important, with a mean score of 8.5, and a low standard deviation of 1.0, suggesting little difference in opinion. In the *Performance* section, a relatively low mean of 6.0 implied that organisations were not very successful at this, and a high standard deviation of 2.7 indicated marked difference in performance among organisations.

Question 4.5 dealt with the issue of organisations devoting time and resources to training and education of employees. In the *Importance* section, respondents felt that it was very important, with a mean score of 8.8, and there was some disagreement as suggested by the relatively low standard deviation of 1.3. In the Performance section, a relatively high mean score of 7.3 indicated some success in this area, but the relatively high standard deviation of 2.0 suggested differences in the performance of organisations.

Question 4.6 asked respondents about the organisations rewarding team performances. In the *Importance* section, respondents indicated that they thought it was very important, with a mean score of 8.5, and a relatively low standard deviation of 1.4 suggested some difference in opinion in this area. In the Performance section, a relatively low mean score of 5.8 indicated that organisations were not having much success, and a very high standard deviation of 2.9, the highest in this section of the questionnaire, indicated that there were many differences in performance of the organisations.

Question 4.7 queried respondents about the organisation rewarding knowledge outputs, such as patents and papers. A high mean score of 8.2 showed that

respondents felt this was very importance, and a relatively low standard deviation of 1.2 suggested little difference in opinion on this matter. However, a low mean score of 5.0 in the performance section indicated that respondents felt their organisations were not performing well in this area, and a high standard deviation of 2.4 suggested differences in performance of the organisations.

Question 4.8 dealt with the issue of the organisation measuring knowledge sharing. In the *Importance* section, a relatively high mean score of 7.5 indicated that respondents thought this was quite important, but a relatively high standard deviation of 2.0 also indicated diverging opinions among respondents. In the *Performance* section, it was clear that they also felt that organisations were falling short in this area, with a *Performance* mean of only 3.3, although the high standard deviation of 2.8 suggested that some organisations were better at it than others, while others were faring even worse.

Question 4.9 asked respondents about the organisation's responsibility to teach its staff to learn. Respondents felt this was important to some extent, as suggested by the relatively high mean score of 7.7, although a high standard deviation of 2.0 also indicated differences in opinion from respondents. In the *Performance* section respondents indicated again that their organisations were not succeeding very well in this area, with a mean score of 5.7, and a high standard deviation of 2.6 indicated marked differences in performance among organisations.

Question 4.10 dealt with whether an organisation should have someone who was responsible for knowledge management. Respondents indicated that it was quite important, with a mean score of 7.7, although a high standard deviation of 2.3 also indicated disagreement among respondents. In the *Performance* section, a relatively low mean score of 5.3 indicated that organisations were not very successful in this, and a high standard deviation of 2.4 suggested marked differences in performance among organisations.

Question 4.11 asked respondents about the importance of the organisational structure being flat. With a high mean score of 8.3, respondents indicated that this was quite an important aspect of a learning organisation, and a relatively low standard

deviation of 1.0 indicated that there was little difference in opinion among respondents. However, in the Performance section, a relatively low mean score of 6.2 suggested that respondents felt that their organisations were not successful in this area, and a relatively low standard deviation of 1.5 suggested there was some difference in the performance among organisations.

Question 4.12 dealt with the issue of a learning organisation growing its research capability. In the *Importance* section, respondents felt that this was not overly important, indicated by a relatively mean score of only 7.3, and a high standard deviation of 2.0 suggested very differing opinions among respondents. In the *Performance* section, respondents indicated that their organisations were not performing very well, as suggested by a relatively low mean score of 5.5, and a high standard deviation of 2.1 indicated differences in performance among organisations.

Section 5 Information Technology

5	Information Technology	Importance		Performance	
		Mean	SD	Mean	SD
5.1	A high level of systems integration exists	9.5	0.8	7.7	1.4
5.2	There is extensive access to external databases	7.5	1.6	6.0	2.1
5.3	The Internet (intranet and/or extranet) is used extensively	8.5	1.0	7.2	1.9
5.4	Data base management systems are used extensively	9.5	0.8	7.3	2.4
5.5	Electronic mail is used extensively	9.0	1.3	8.7	1.2
5.6	The IT architecture is network-centric	9.3	0.8	8.2	1.2
5.7	Knowledge-based systems (expert systems, neural nets) are used extensively	8.8	1.3	5.3	2.5
5.8	Simulation (including what if models) is used extensively	8.5	1.2	6.0	3.0
5.9	Management support systems are used extensively	9.3	0.8	7.3	2.0
5.10	Data mining is used extensively	8.8	1.2	4.8	2.7
5.11	Groupware (eg Lotus Notes) is used extensively	8.8	1.9	6.8	2.5
5.12.	People databases are used extensively	9.2	1.2	6.3	2.3

Table 4.5.5: Information Technology

Question 5.1 queried respondents about systems integration. Respondents indicated that it was very important that systems were integrated in their organisations, yielding a very high mean score of 9.5, and there was little divergence in opinion, as suggested by the low standard deviation of 0.8. Respondents also indicated that their organisations were performing relatively well, with a mean score of 7.7, and a relatively low standard deviation of 1.4 suggested that there were some differences in performance among organisations.

Question 5.2 asked respondents about the need for access to external databases. Respondents did not think that this was overly important, with a mean score of only 7.5, and a relatively low standard deviation showing some disagreement in opinion among respondents. In the Performance section, respondents indicated that their organisations were not performing very well in this area, with a mean score of 6.0 and a high standard deviation of 2.1 implied marked differences in performance among organisations.

Question 5.3 dealt with the use of the Internet in organisations. Respondents felt this was very important, as suggested by the high mean score of 8.5, and a relatively low standard deviation of 1.0 was evidence of little divergence of opinion on the subject. In the *Performance* section, organisations were seen to be doing fairly well, with a mean score of 7.2, but a high standard deviation of 1.9 suggested marked differences in performance among organisations.

Question 5.4 asked respondents about the use of database management systems in their organisations. They responded that it was very important for their organisations to have DBMS in place, with a very high mean score of 9.5, and a low standard deviation which suggested little difference in opinion. In the *Performance* section, respondents felt that their organisations were doing relatively well, yielding a mean score of 7.3, but a high standard deviation of 2.4 suggested major differences in performance among organisations.

Question 5.5 dealt with the use of email in the organisations. Respondents thought this was very important, as suggested by the high mean score of 9.0, and a relatively low standard deviation of 1.3 indicated some disagreement on the subject. Respondents also felt that their organisations were doing well in this area, with a

high mean score of 8.7 and a relatively low standard deviation of 1.2 in the *Performance* section.

Question 5.6 queried respondents with the issue of the IT infrastructure of their organisations being network-centric. In the *Importance* section, respondents thought this was particularly important, as implied by a high mean score of 9.0, and a low standard deviation of 0.8 indicated little disagreement among them. Organisations seemed to be doing well in this area, indicated by the high mean score of 8.2, and a relatively low standard deviation of 1.2 indicating some difference in performance among them.

Question 5.7 asked respondents about the use of knowledge-based systems such as expert systems and neural nets. They thought it was very important, yielding a mean score of 8.8, and there was some divergence in opinion, indicated by the relatively low standard deviation of 1.3.

Question 5.8 queried respondents about the use of simulations in their organisations. Respondents felt that this was particularly important, with a high mean score of 8.5, and a standard deviation of 1.2 indicated some disagreement. In the *Performance* section, a relatively low mean score of 6.0 suggested that respondents felt their organisations were not very successful in this area. However, a very high standard deviation of 3.0 indicated very different performances among organisations.

Question 5.9 dealt with the use of management support systems. Respondents indicated that they thought this was very important for their organisations, yielding a mean score of 9.3, and there was little disagreement with a low standard deviation of 0.8. Respondents also indicated that their organisations were doing relatively well, with a mean score of 7.3, but a high standard deviation of 2.0 implied marked differences in performance among organisations.

Question 5.10 asked respondents about the use of data mining. A high mean score of 8.8 indicated respondents thought this was very important for their organisations, and a relatively low standard deviation of 1.2 suggested some divergence in opinion. However, in the *Performance* section, a low mean score of 4.8 indicated that

respondents though their organisations were not doing well in this area, and a high standard deviation of 2.7 suggested very different performances among organisations.

Question 5.11 dealt with the use of groupware in the organisations. Respondents indicated that it was very important, as suggested by a high mean score of 8.8, but a relatively high standard deviation of 1.9 also indicated differences in opinion. In the *Performance* section, a relatively low mean score of 6.8 indicated organisations were not doing so well in this area, and a high standard deviation of 2.5 suggested marked differences in performance among organisations.

Question 5.12 queried respondents about the use of people databases. In the *Importance* section respondents indicated it was very important, as implied by the high mean score of 9.2, and a relatively low standard deviation of 1.2 suggested some difference in opinion. In the Performance section, a relatively low mean score of 6.3 implied that organisations were not very successful in this area, but a relatively high standard deviation of 2.3 also indicated differences in performance among organisations.

Section 6 Knowledge Management

6	Knowledge Management	Importance		Performance	
		Mean	SD	Mean	SD
6.1	Top management is committed to knowledge management	**8.8**	**1.3**	**6.3**	**2.3**
6.2	Knowledge intensive products or services play a key role	**8.8**	**1.2**	**6.0**	**2.0**
6.3	A formal knowledge strategy is in place	**8.8**	**1.5**	**5.3**	**2.2**
6.4	Users are committed to knowledge management	**8.8**	**1.5**	**4.8**	**2.0**
6.5	A formal knowledge plan exists	**8.5**	**1.5**	**4.7**	**2.1**

Table 4.5.6: Knowledge Management

Question 6.1 queried respondents about the role of top management in knowledge management, and a high mean score of 8.8 indicated that commitment from top

managers to knowledge management was very important, and a relatively low standard deviation of 1.3 suggested some difference in opinion. However, it seemed that organisations were not performing very well on this subject, with a mean score of only 6.3, and a high standard deviation of 2.3 indicated differences in performance among organisations.

Question 6.2 dealt with the subject of knowledge-intensive products in the organisations. Respondents indicated that they thought it was very important, with a mean score of 8.8, and a relatively low standard deviation of 1.2 suggested some divergence in opinion. However, respondents also thought that their organisations were not doing very well, with a mean score of 6.0 and a high standard deviation of 2.0 suggested differences in performance among respondents.

Question 6.3 asked respondents about the existence of a formal knowledge strategy in their organisations, and they felt it was very important, as suggested by a high mean score of 8.8. A relatively low standard deviation of 1.5 indicated some difference in opinion among respondents. However, in the *Performance* section, a low mean score of 5.3 indicated that organisations were not performing very well, and a high standard deviation of 2.2 suggested differences in performance among respondents.

Question 6.4 queried respondents about the commitment of employees to knowledge management, and they felt it was very important, as suggested by a high mean score of 8.8. A relatively low standard deviation of 1.5 indicated some difference in opinion among respondents. However, in the *Performance* section, a low mean score of 4.4 indicated that organisations were not performing very well, and a high standard deviation of 2.0 suggested differences in performance among respondents.

Question 6.5 asked respondents about the existence of a formal knowledge plan in their organisations, and they felt it was very important, as suggested by a high mean score of 8.5. A relatively low standard deviation of 1.5 indicated some difference in opinion among respondents. However, in the *Performance* section, a low mean score of 4.7 indicated that organisations were not performing very well, and a high standard deviation of 2.1 suggested differences in performance among respondents.

Section 7 Knowledge Intensity

7	**Knowledge Intensity**	**Importance**	
		Mean	**SD**
	The knowledge intensity of your organisation	**8.0**	**1.4**

10 = very high importance of knowledge as a resource, in the products/services offered and in the value chain

1 = very low importance of knowledge as a resource, in the products/services offered and in the value chain

Table 4.5.7: Knowledge Intensity

Question 7 queried respondents only about the importance of their organisations being knowledge intensive. A high mean score of 8.0 indicated that respondents felt this was important, and a relatively low standard deviation of 1.4 suggested some difference in opinion.

Appendix C Knowledge Management Survey

Introduction to the Survey

Welcome to the Knowledge Management Survey!

This survey has been designed to identify which factors are important to a Knowledge Management Implementation Strategy.

Knowledge Management can be defined as "the identification, growth and effective application of an organisation's critical knowledge" (Duffy, 1999). Knowledge itself can be defined to be the expertise residing inside a person's brain.

The author has designed a model aimed at facilitating the implementation of a Knowledge Management strategy, and needs to test its validity, hence the importance of this survey.

Your assistance is appreciated. Thank you for spending time to fill out this survey!

Section 1 Level of Knowledge Management in your organisation

Section 1 Level of Knowledge Management in your organisation:

Please indicate which of these descriptions best fits your organisation in terms of Knowledge Management (KM):

---

1 of 1

Please indicate which of these descriptions best fits your organisation in terms of Knowledge Management (KM):

- ☐ No formal Knowledge Management initiative exists within the organisation
- ☐ There is an awareness of Knowledge Management, management has recently initiated a programme, but there are no visible results yet.
- ☐ A KM programme exists and has been running for over 6-12 months. Some preliminary results have been achieved

---

Submit Reset

Section 2 Initiating a Knowledge Management Effort

Section 2 Initiating a Knowledge Management effort:

Please rate the importance of carrying out the following tasks/activities when initiating a KM effort in your organisation:

1 of 3
Analyse the Strengths, Weaknesses, Opportunities, and Threats of the organisation in terms of knowledge resources

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

2 of 3
Create a long-term strategy, including core beliefs & values of the organisation, for knowledge management

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

3 of 3
Appoint a leader (Chief Knowledge Officer) for the knowledge management effort

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

Submit Reset

Section 3 Alignment of KM Strategy with Business Strategy

Section 3 Alignment of KM Strategy with Business Strategy:

Please indicate how important it is for your organisation to align its knowledge management effort with the overall organisational strategy:

1 of 4
Derive the difference between what the organisation can do and what it wants to do, that is, its strategic gap

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

2 of 4
Derive the difference between what the organisation knows and what it must know in order to achieve what it wants to do, that is, its knowledge gap

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

3 of 4
Create a high-level plan defining how & where knowledge resources will be used in the organisation, based on its strategic gap and its knowledge gap

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

4 of 4
Knowledge Management must make the organisation more competitive and profitable, enabling it to achieve its goals

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

Submit Reset

Section 4 Top Management Support

Section 4 Top Management Support:

Please indicate how important it is for your organisation to provide top management support for the Knowledge Management effort:

1 of 2
Top Management is aware of KM, and actively promotes KM in the organisation

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

2 of 2
The CKO does not operate under a particular division/department

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

Submit Reset

Section 5 Create and Manage a Knowledge Culture in the Organisation

Section 5 Create and Manage a Knowledge Culture in the Organisation:

Please indicate how important it is for your organisation to create and maintain a working environment where people are encouraged to share knowledge:

1 of 4
View of employees were taken into consideration when initiating the KM effort

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

2 of 4
Senior, middle and line managers involve employees in decision-making

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

3 of 4
Organisation provides a work environment where people are encouraged to share ideas, experiences, successes & failures

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

4 of 4
CKO has devised formal ways of dealing with change and problems arising from change

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

Submit Reset

Section 6 Use of a Pilot Project

Section 6 Use of a Pilot Project:

Please indicate how important it is for your organisation to carry out a Pilot Project for Knowledge Management:

1 of 2
CKO has initiated a pilot project to demonstrate the effectiveness of KM in the organisation

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

2 of 2
The pilot project is implemented like any other project, with deadlines, budgets, etc.

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

Submit Reset

Section 7 Create and Manage Organisational Learning in the Organisation

Section 7 Create and Manage Organisational Learning in the Organisation:

Please indicate how important it is for your organisation to create and maintain organisational learning in the workplace:

1 of 4
All knowledge relevant to the organisation is identified

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

2 of 4
Relevant knowledge is verified and organised in an electronic knowledge repositories

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

3 of 4
Employees are encouraged to use knowledge repositories and disseminate that knowledge

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

4 of 4
Employees are encouraged to re-evaluate old knowledge and assumptions to create innovative ideas

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

Submit Reset

Section 8 Managing People in the Organisation

Section 8 Managing People in the Organisation:

Please indicate how important it is for your organisation to manage people in the KM effort:

1 of 2
Management treat employees on a individual basis, and share knowledge with them

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

2 of 2
Management rewards employees for sharing and using knowledge

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

Submit Reset

Section 9 Choosing the Right Technology

Section 9 Choosing the right technology:

Please indicate how important it is for your organisation to implement the right technology to support the KM effort:

1 of 4
Organisation uses collaborative technologies to facilitate transfer of knowledge among workers

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

2 of 4
Organisation's technologies are easily linked to those of suppliers and customers

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

3 of 4
Knowledge repositories are easy to access and use, even for novice computer users

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

4 of 4
There are alternative technologies for non computer-literate workers to use for collaboration

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

Submit Reset

Appendix D: Results of the Empirical Study

Frequency Tables

Category	Frequency table: Q1: Level of KM (Surveydata1)		
	Count	Percent	Cumulative Percent
No: No Formal KM initiative esists	4	15.38462	15.3846
Awareness: There is an awareness of KM	7	26.92308	42.3077
Exists: KM programme exists and as been	15	57.69231	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q2.1: Knowledge SWOT Analysis (Surv		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Important:	3	11.53846	23.0769
Very Important:	20	76.92308	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q2.2: Create a Knowledge Strategy (Su		
	Count	Percent	Cumulative Percent
Somewhat Important:	1	3.84615	3.8462
Important:	9	34.61538	38.4615
Very Important:	16	61.53846	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q2.3: Appoint a CKO (Surveydata1		
	Count	Percent	Cumulative Percent
Somewhat Important:	8	30.76923	30.7692
Important:	6	23.07692	53.8462
Very Important:	12	46.15385	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q3.1: Derive Strategic Gap (Surveydata		
	Count	Percent	Cumulative Percent
Somewhat Important:	1	3.84615	3.8462
Important:	8	30.76923	34.6154
Very Important:	17	65.38462	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q3.2: Derive Knowledge Gap (Surveyda		
	Count	Percent	Cumulative Percent
Somewhat Important:	4	15.38462	15.3846
Important:	9	34.61538	50.0000
Very Important:	12	46.15385	96.1538
Missing	1	3.84615	100.0000

Category	Frequency table: Q3.3: Create high-level plan (Surv		
	Count	Percent	Cumulative Percent
Somewhat Important:	2	7.69231	7.6923
Important:	8	30.76923	38.4615
Very Important:	16	61.53846	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q3.4: KM must make org. more competitiv		
	Count	Percent	Cumulative Percent
Important:	4	15.38462	15.3846
Very Important:	22	84.61538	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q4.1: Top Management promotes		
	Count	Percent	Cumulative Percent
Somewhat Important:	1	3.84615	3.8462
Important:	2	7.69231	11.5385
Very Important:	23	88.46154	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q4.2: CKO is independent (Survey		
	Count	Percent	Cumulative Percent
Somewhat Important:	13	50.00000	50.0000
Important:	6	23.07692	73.0769
Very Important:	7	26.92308	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q5.1: Views of employees are tak		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Very Important:	23	88.46154	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q5.2: Senior, middle and line mar		
	Count	Percent	Cumulative Percent
Somewhat Important:	2	7.69231	7.6923
Important:	7	26.92308	34.6154
Very Important:	16	61.53846	96.1538
Missing	1	3.84615	100.0000

Category	Frequency table: Q5.3: Org. encourages people to s		
	Count	Percent	Cumulative Percent
Somewhat Important:	1	3.84615	3.8462
Very Important:	24	92.30769	96.1538
Missing	1	3.84615	100.0000

Category	Frequency table: Q5.4: CKO devised formal ways of		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Important:	9	34.61538	46.1538
Very Important:	14	53.84615	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q6.1: CKO has initiated a pilot proj		
	Count	Percent	Cumulative Percent
Somewhat Important:	4	15.38462	15.3846
Important:	9	34.61538	50.0000
Very Important:	13	50.00000	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q6.2: Pilot project is like any other		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Important:	4	15.38462	26.9231
Very Important:	19	73.07692	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q7.1: Knowledge relevant to org. is		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Important:	7	26.92308	38.4615
Very Important:	15	57.69231	96.1538
Missing	1	3.84615	100.0000

Category	Frequency table: Q7.2: Relevant Knowledged is stor		
	Count	Percent	Cumulative Percent
Somewhat Important:	6	23.07692	23.0769
Important:	6	23.07692	46.1538
Very Important:	14	53.84615	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q7.3: Employees are encouraged		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Important:	3	11.53846	23.0769
Very Important:	20	76.92308	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q7.4: Employees are encouraged		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Important:	5	19.23077	30.7692
Very Important:	17	65.38462	96.1538
Missing	1	3.84615	100.0000

Category	Frequency table: Q8.1: Management treat employee		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Important:	7	26.92308	38.4615
Very Important:	16	61.53846	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q8.2: Management rewards empl		
	Count	Percent	Cumulative Percent
Somewhat Important:	3	11.53846	11.5385
Important:	8	30.76923	42.3077
Very Important:	15	57.69231	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q9.1: Org. uses collaborative techn		
	Count	Percent	Cumulative Percent
Somewhat Important:	5	19.23077	19.2308
Important:	10	38.46154	57.6923
Very Important:	11	42.30769	100.0000
Missing	0	0.00000	100.0000

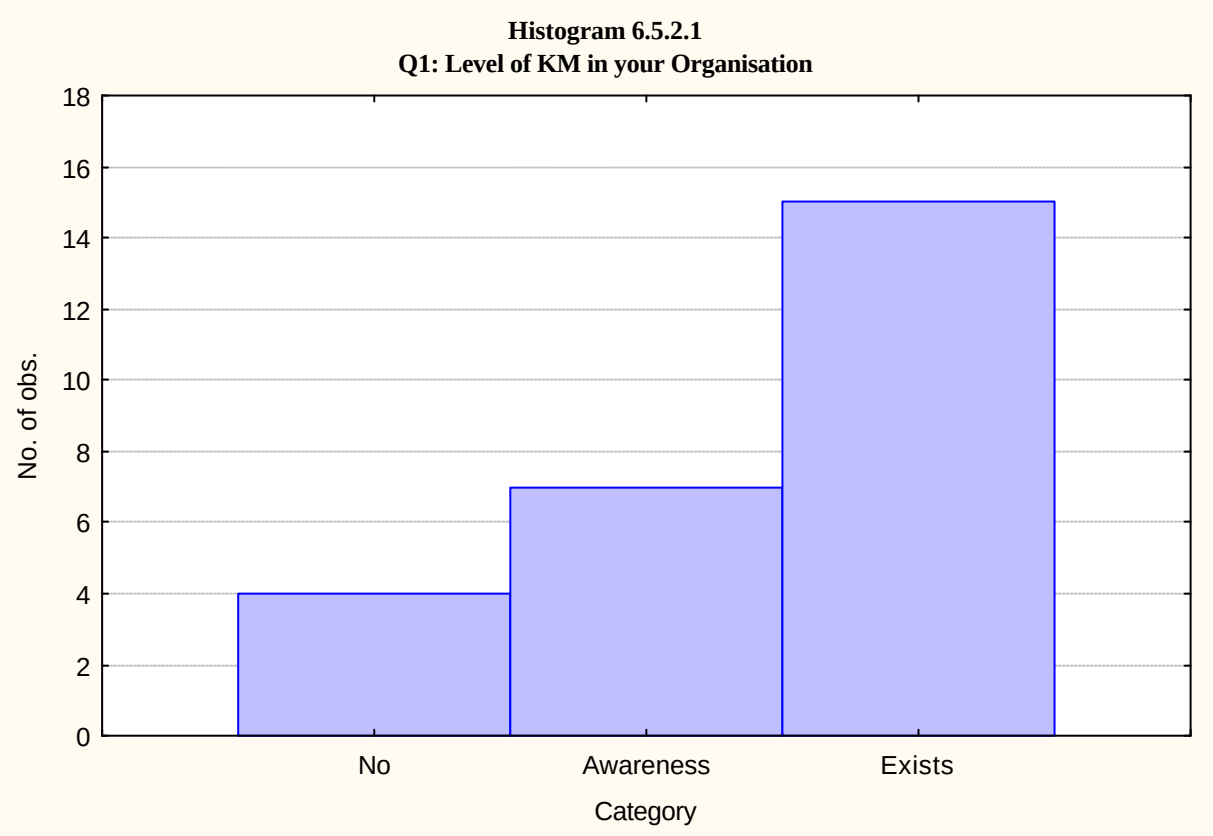
Category	Frequency table: Q9.2: Org. technologies are linked to su		
	Count	Percent	Cumulative Percent
Somewhat Important:	9	34.61538	34.6154
Important:	12	46.15385	80.7692
Very Important:	5	19.23077	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q9.3: Knowledge repositories are easy		
	Count	Percent	Cumulative Percent
Somewhat Important:	2	7.69231	7.6923
Important:	5	19.23077	26.9231
Very Important:	19	73.07692	100.0000
Missing	0	0.00000	100.0000

Category	Frequency table: Q9.4: Alternative technologies exis		
	Count	Percent	Cumulative Percent
Somewhat Important:	10	38.46154	38.4615
Important:	5	19.23077	57.6923
Very Important:	11	42.30769	100.0000
Missing	0	0.00000	100.0000

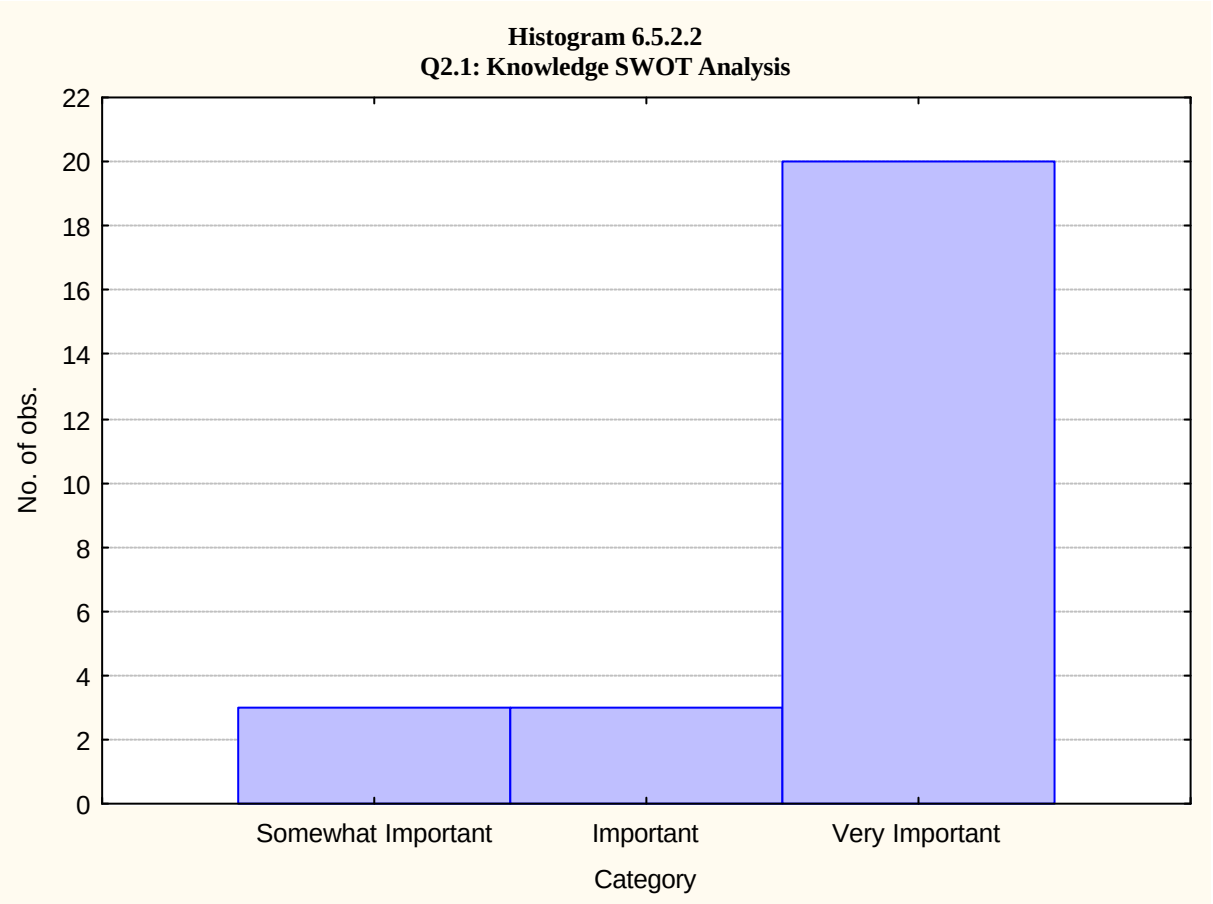
Histograms & Descriptions

Question 1: Level of Knowledge Management in respondents' organisations



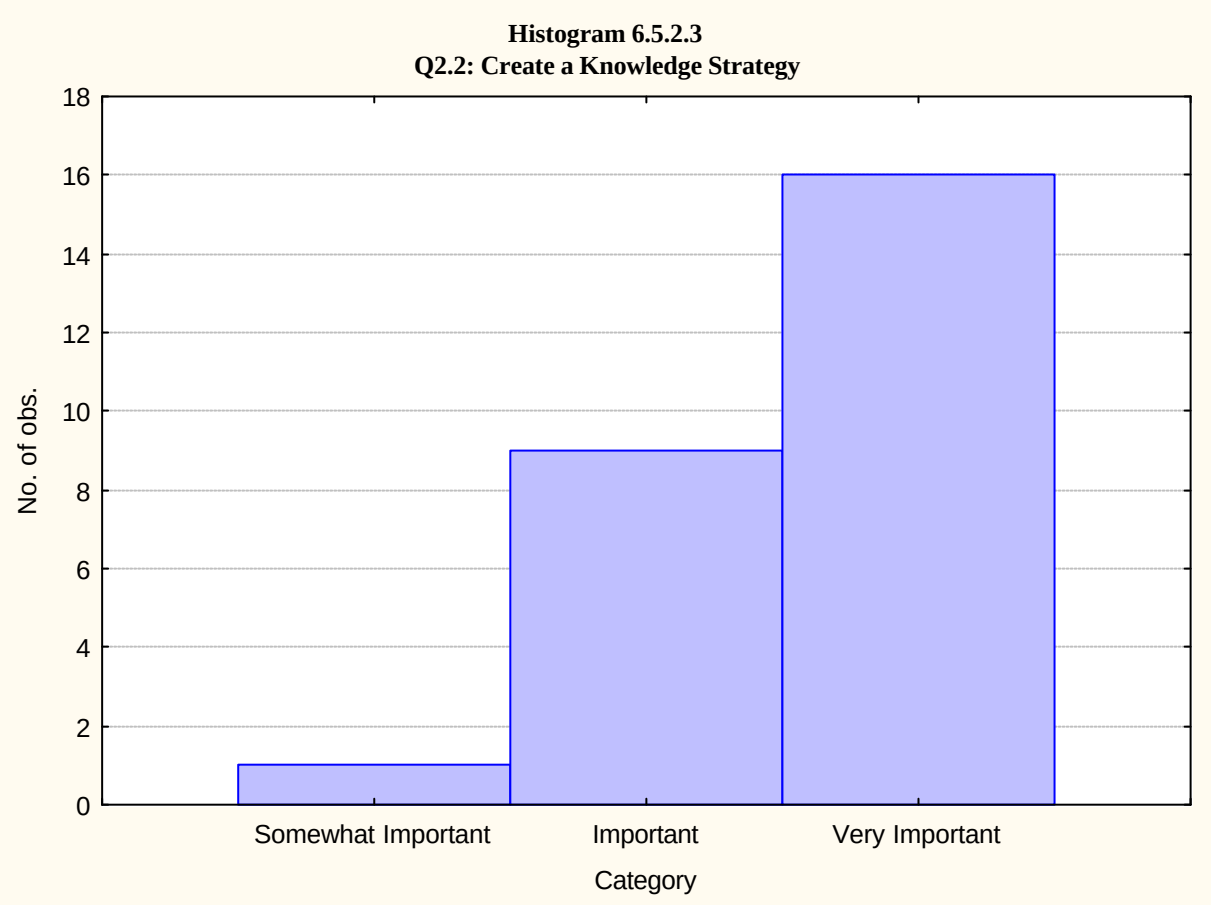
As can be seen from the diagram above, the majority of respondents said that their organisations were carrying out a formal knowledge management strategy: 57.69% (15 respondents). 26.92% (7 respondents) of the organisations had some awareness of knowledge management, and 15.38% (4 respondents) did not have any knowledge management programme in place.

Question 2.1: Importance of performing a SWOT Analysis of the organisation in terms of knowledge resources



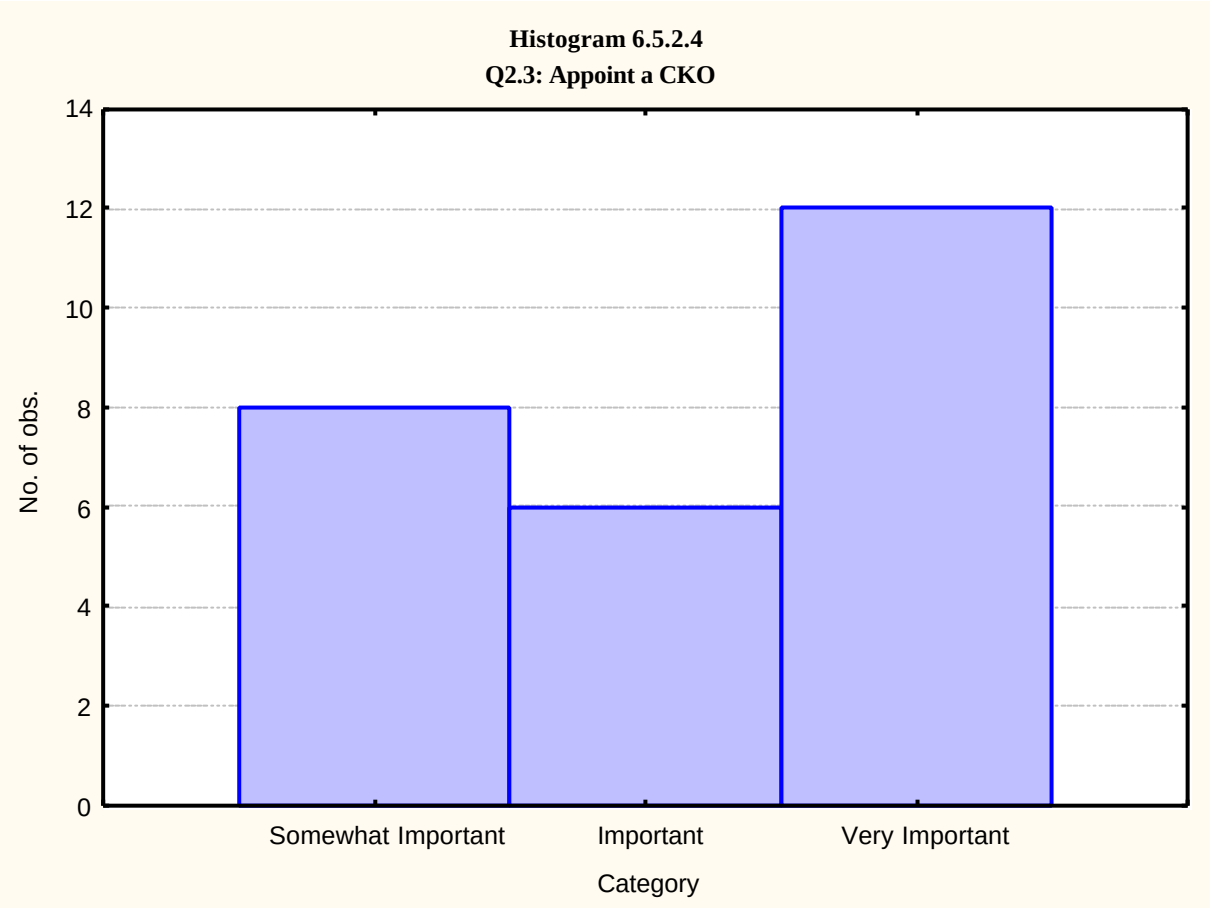
The majority of respondents, 76.92% (20 respondents) also indicated that it was very important to perform a knowledge-based SWOT analysis, whereas only 11.54 % (3 respondents) thought it was important and the remaining 11.54% thought it was somewhat important.

Question 2.2: Create a long-term strategy, including core beliefs & values of the organisation, for knowledge management



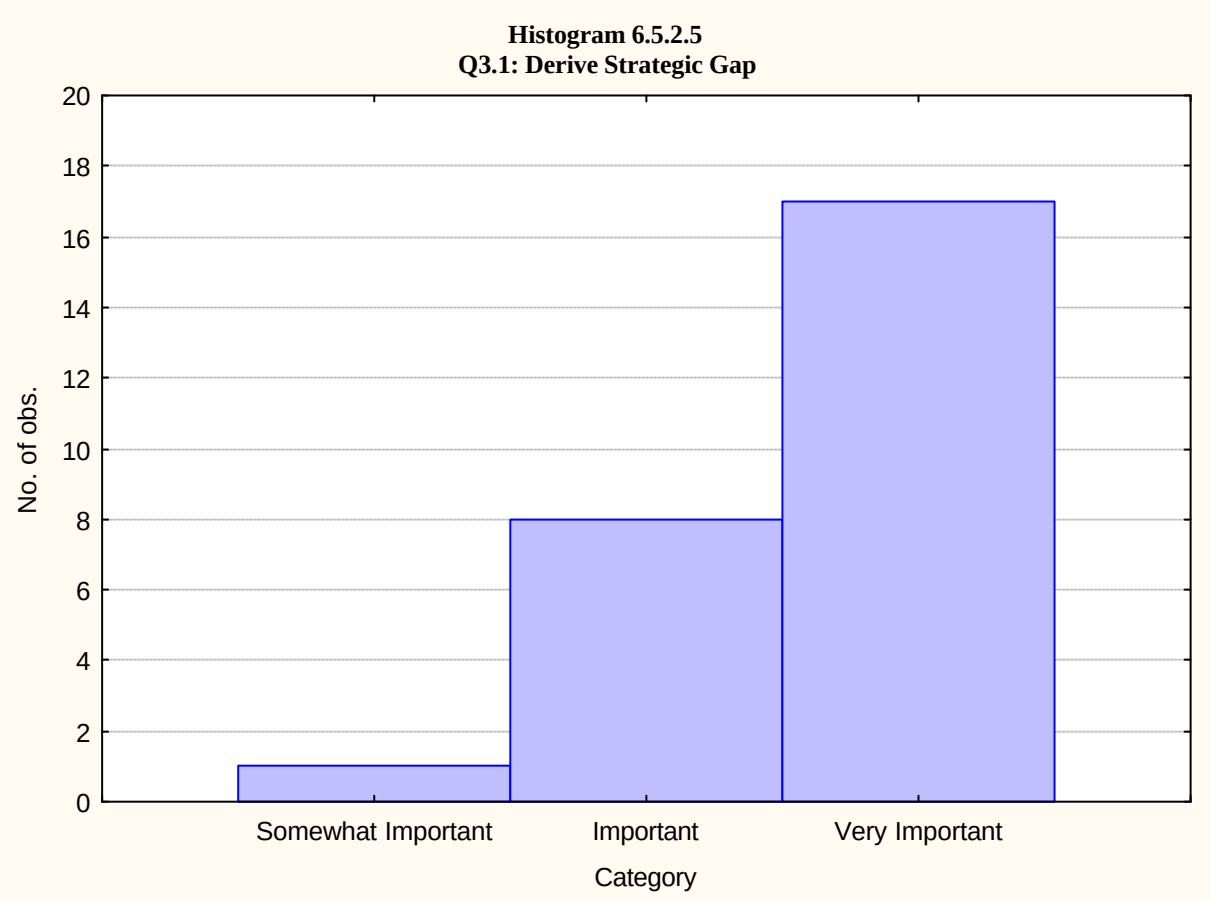
In response to Question 2.2, 61.54% of the respondents (16) indicated that it was very important for their organisations to create a knowledge strategy. 34.52% (9 respondents) indicated that it was important, and only one (3.85%) said it was somewhat important.

Question 2.3: Appoint a leader (Chief Knowledge Officer) to lead the knowledge management effort



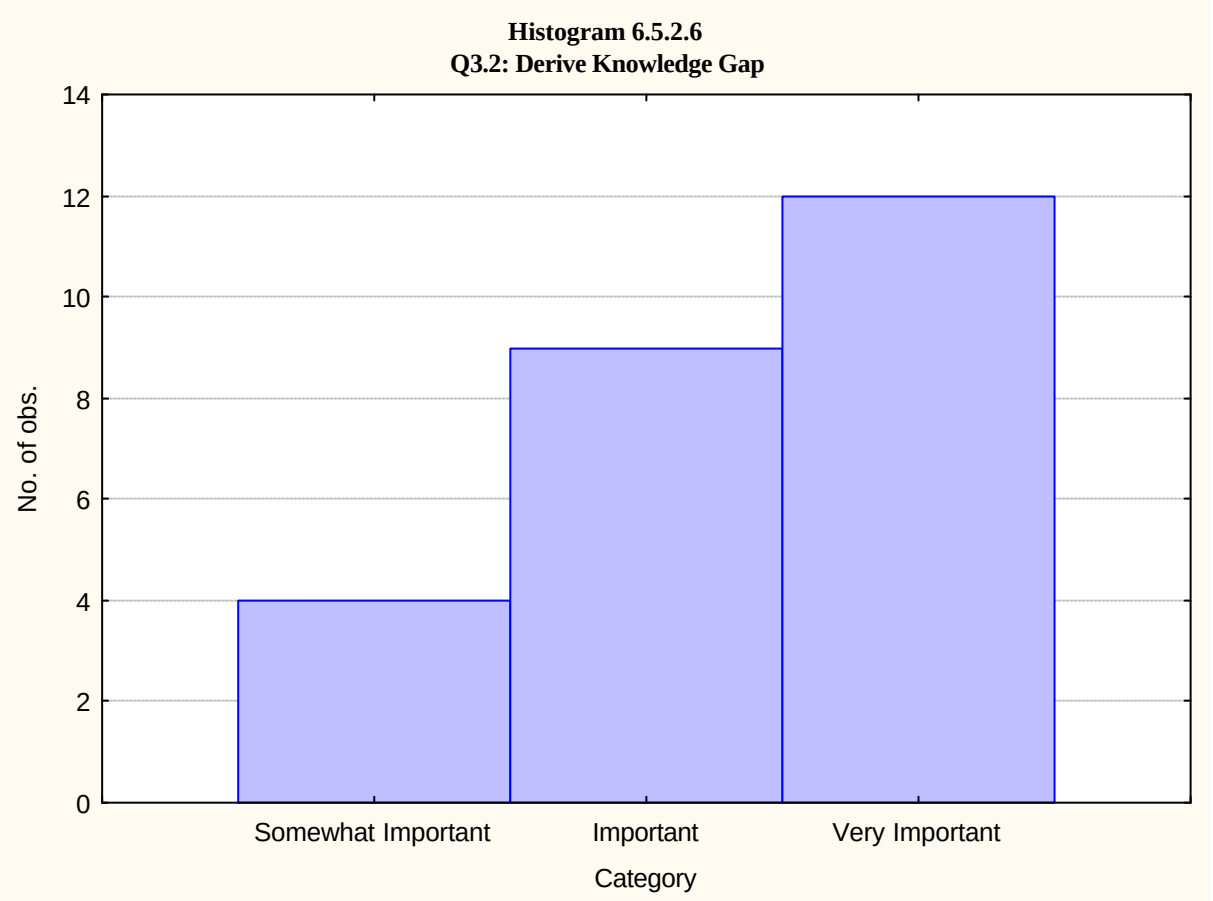
As can be seen from Histogram 6.5.2.4 above, the majority of respondents, 46.15% (12) thought that it was "Very Important" to appoint a Chief Knowledge Officer to lead the knowledge management effort. This was followed by 30.77% of respondents (8) who thought it was somewhat important, and the remaining 23.08% (6 respondents) thought it was important.

Question 3.1 Derive the difference between what the organisation can do and what it wants to do, that is, its strategic gap



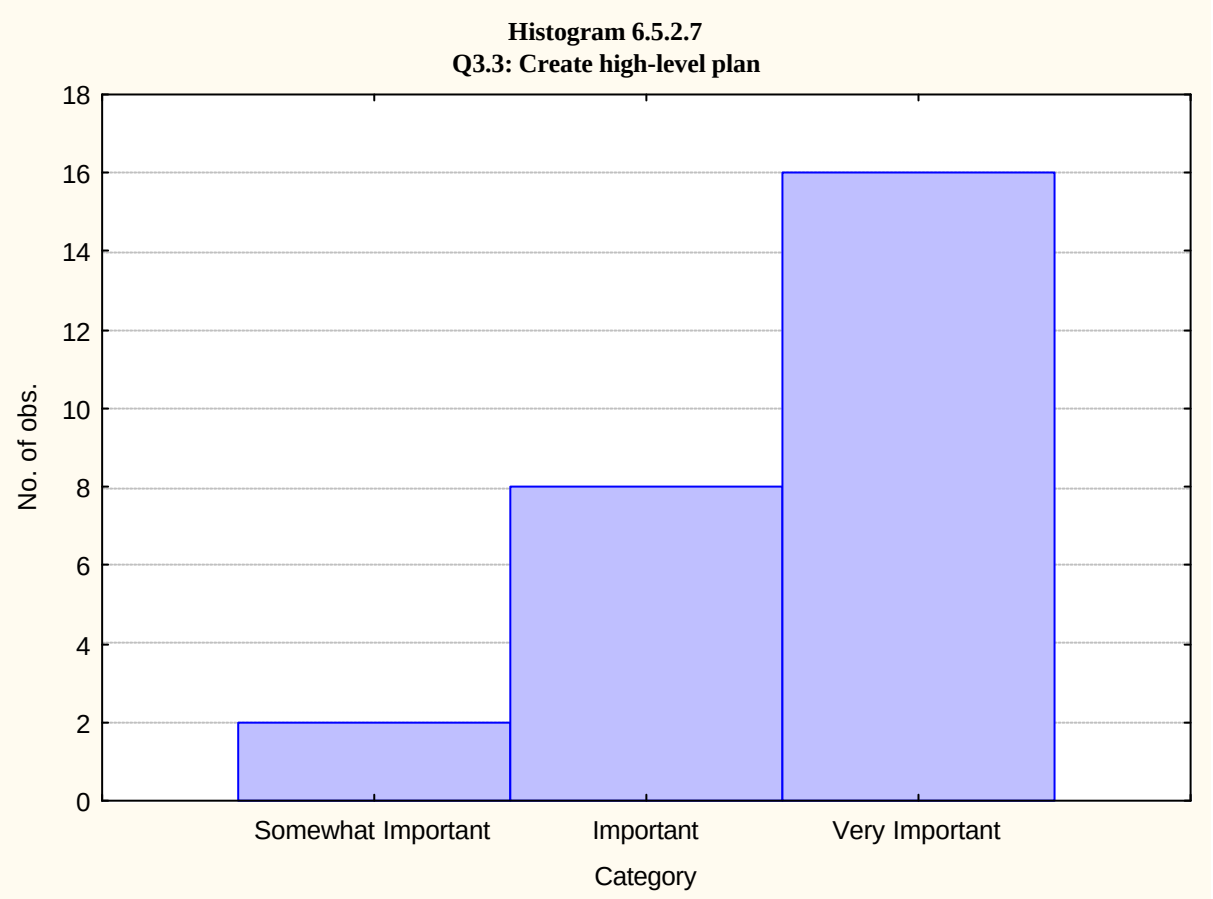
As can be seen from the diagram above, the majority of respondents, 65.38% (17) thought it was very important to define the strategic gap of their organisation. 30.77% (8 respondents) thought it was important, and the one respondent (3.85%) thought it was somewhat important.

Question 3.2: Derive the difference between what the organisation knows and what it must know in order to achieve what it wants to do, that is, its knowledge gap.



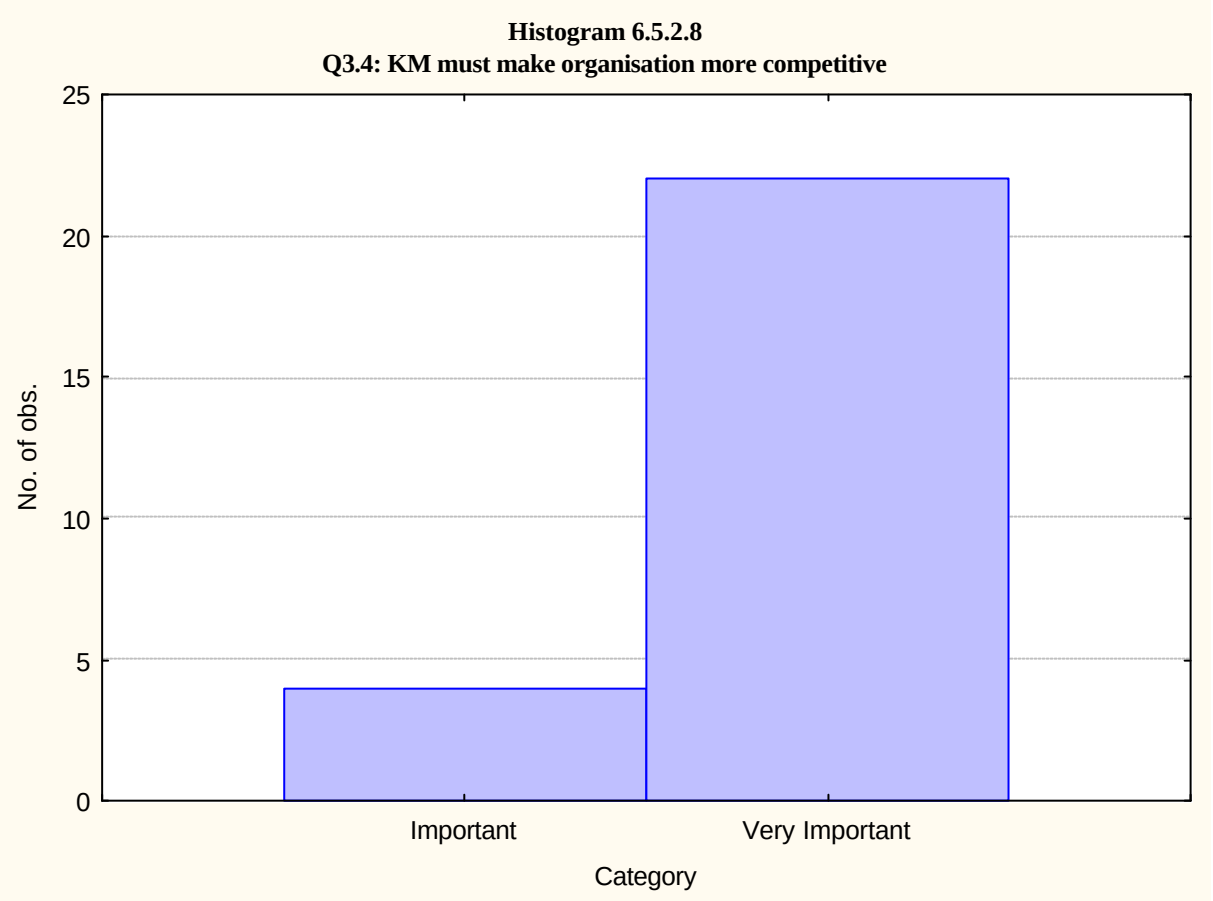
Again, the majority of respondents, 46.15% (12 respondents) thought it was very important to obtain the knowledge gap of the organisation. 34.62% (9 respondents) thought it was important, and the remaining 15.38% (4 respondents) felt it was somewhat important.

Question 3.3: Create a high-level plan defining how & where knowledge resources will be used in the organisation, based on its strategic gap and its knowledge gap.



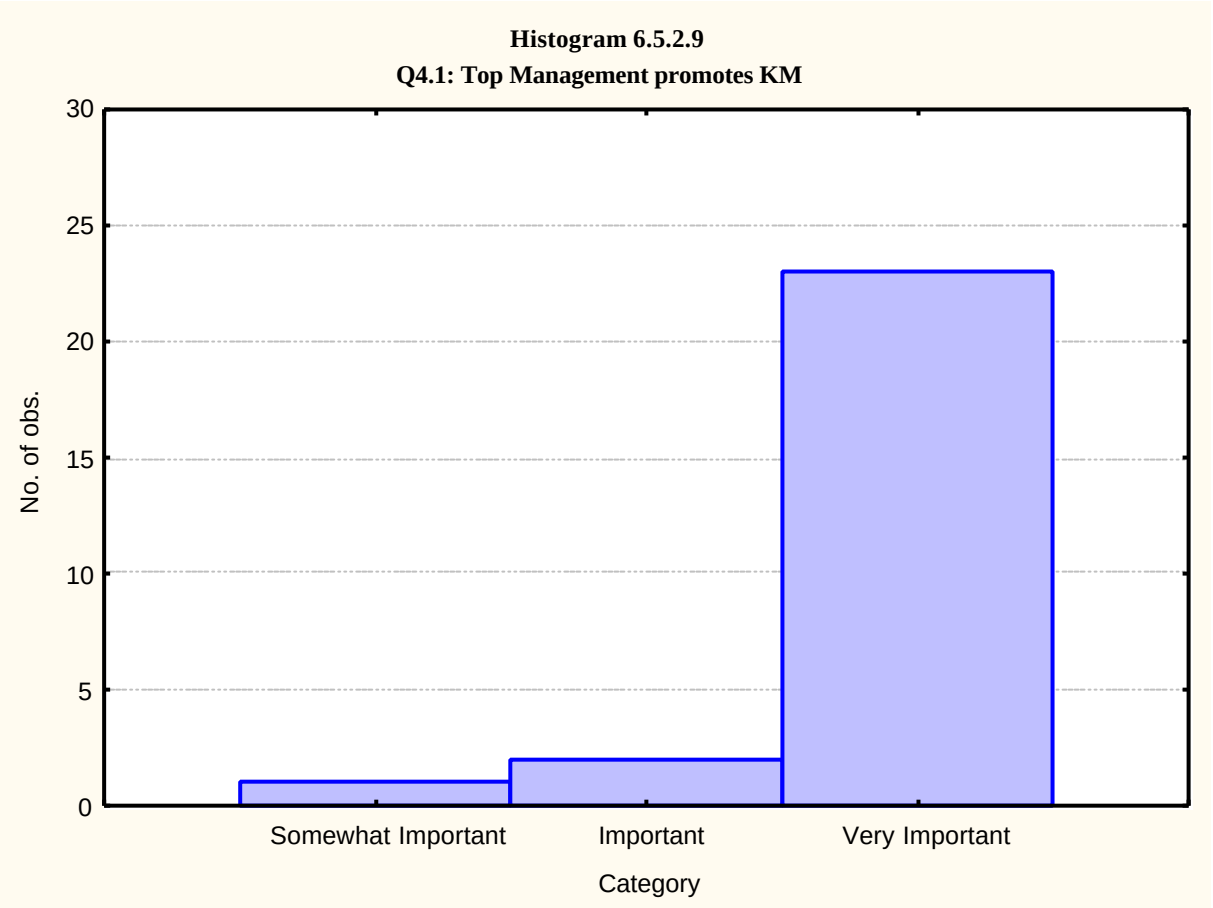
The majority of respondents, 61.54% (16 respondents) felt that it was very important for their organisations to have a high level plan to define and guide the knowledge management effort. 30.77% of the respondents (8) thought it was important, and only 7.69% (2 respondents) thought it was somewhat important.

Question 3.4: Knowledge Management must make the organisation more competitive and profitable, enabling it to achieve its goals.



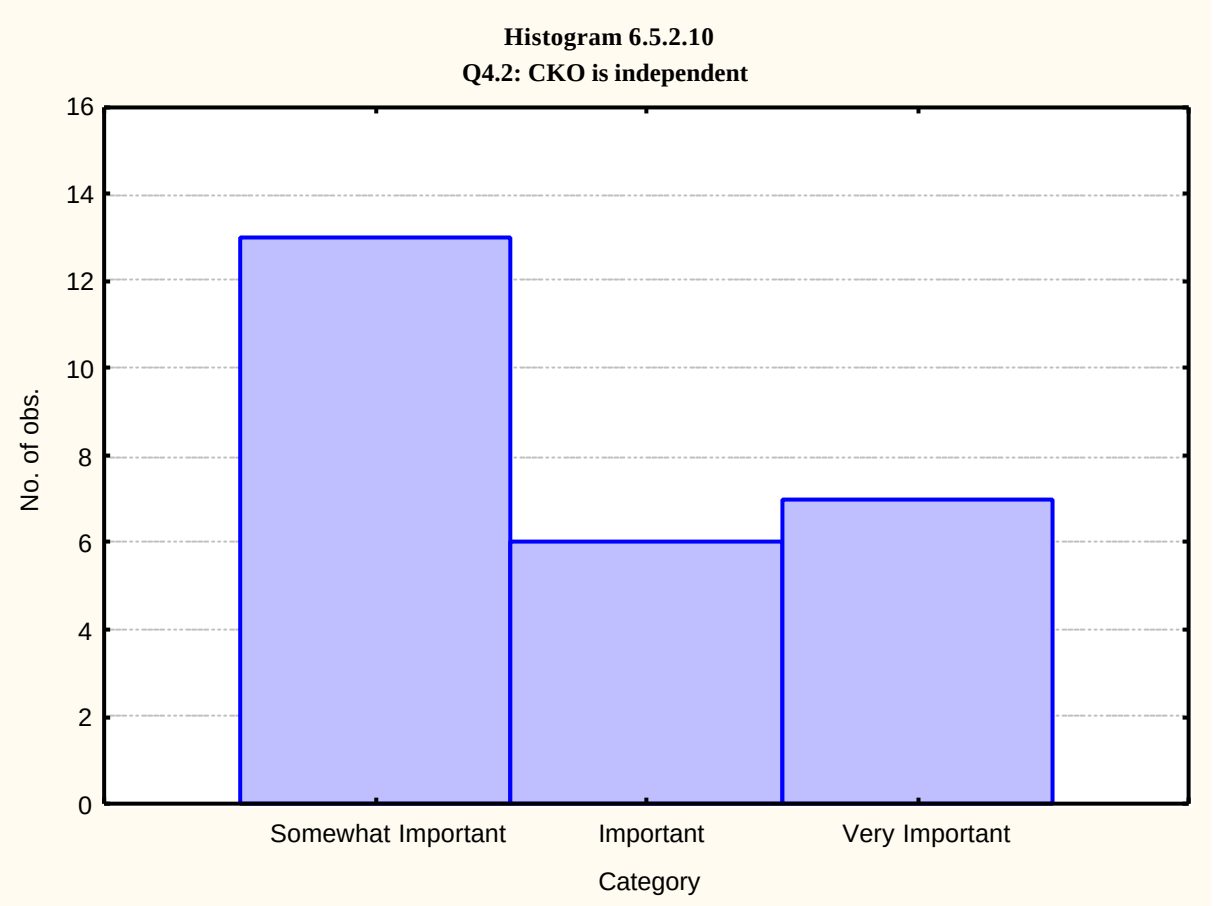
The majority of respondents, 84.62% (22 respondents) thought it was very important that knowledge management bring more competitiveness to the organisation. The remaining 15.38% (4 respondents) thought it was important, and none of the respondents thought it was somewhat important.

Question 4.1: Top Management is aware of KM, and actively promotes KM in the organisation



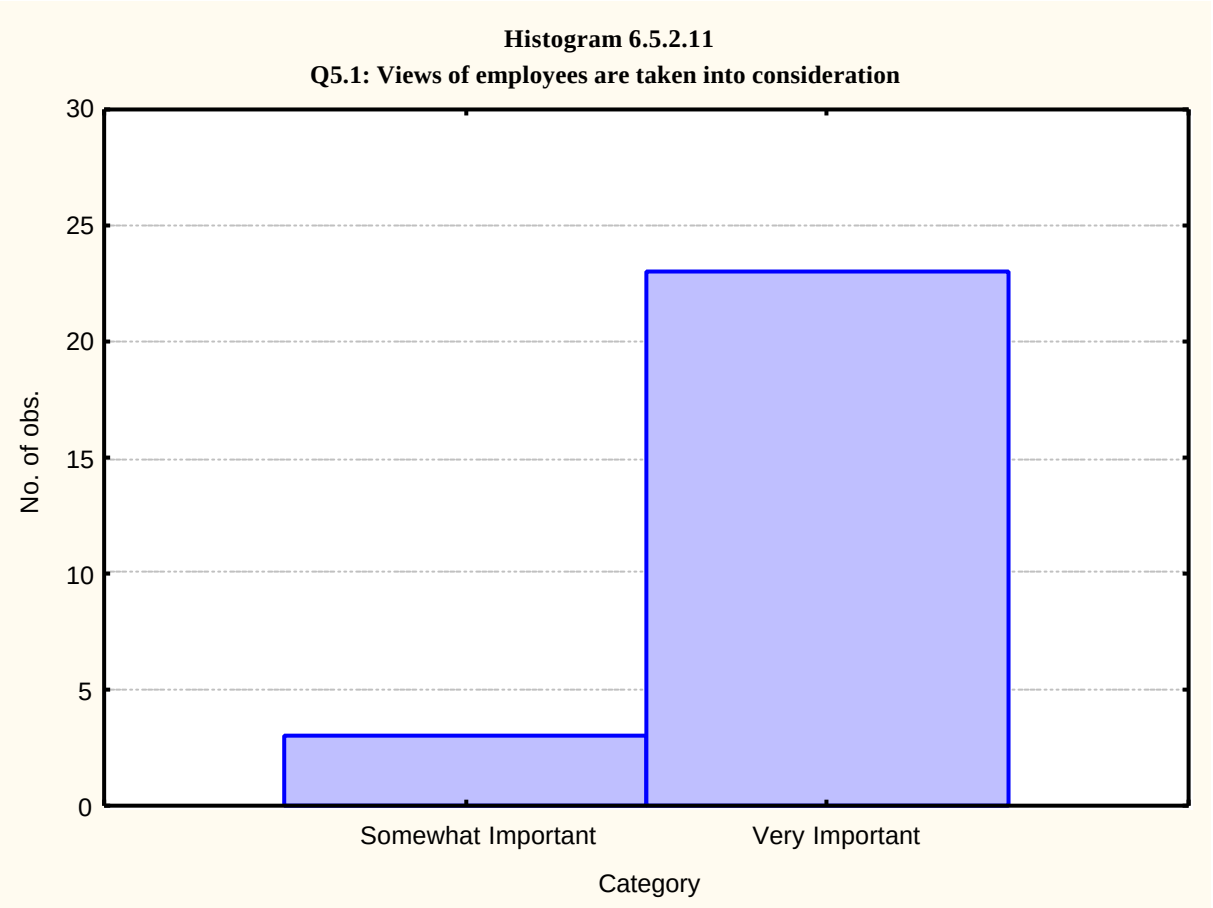
As can be seen from the diagram above, the majority of respondents, 88.46% thought it was very important that top management actively support knowledge management in the organisation. This is indicated by twenty-three (23) respondents answering very important to the question, whereas 7.69% (2 respondents) opted for important, and only 3.85% (1 respondents) for somewhat important.

Question 4.2: CKO does not operate under a particular division/department



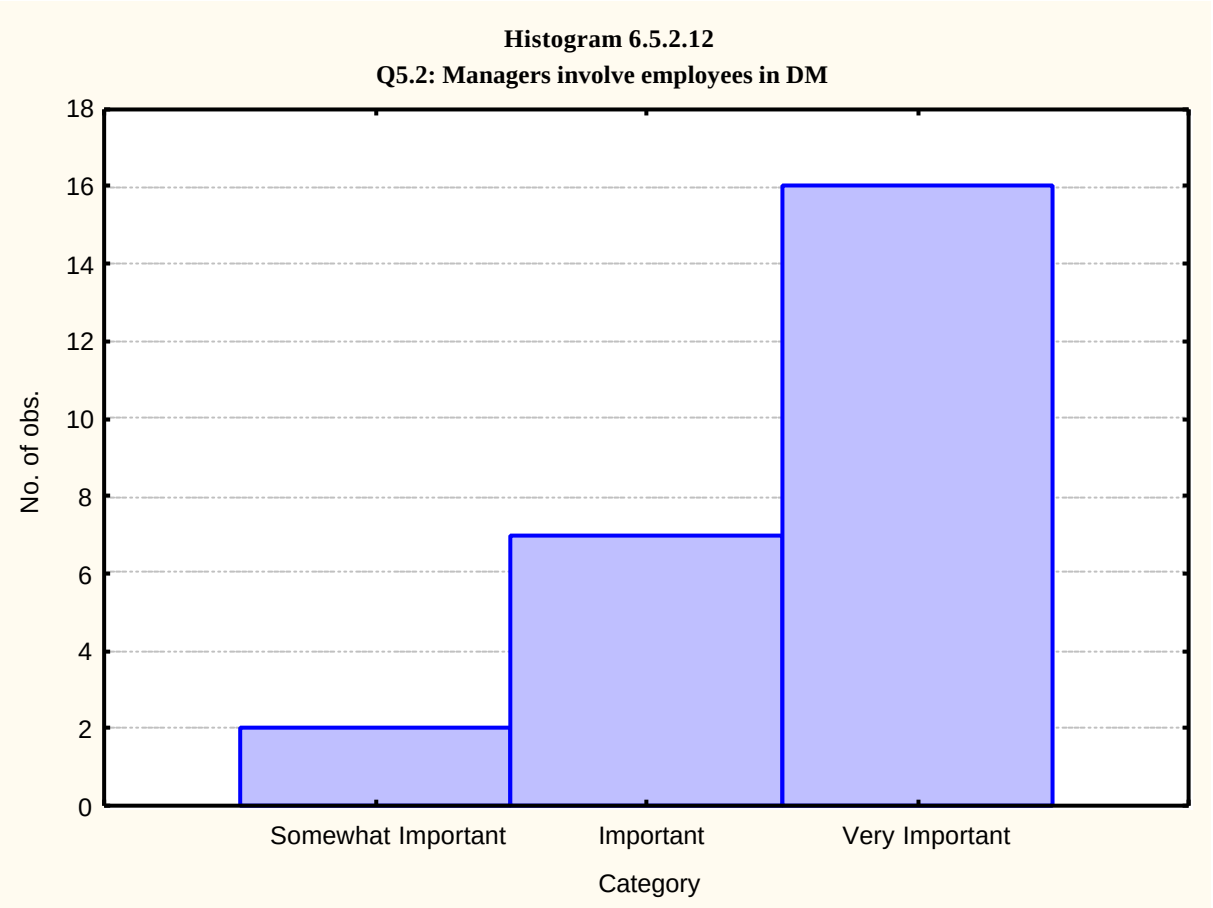
Surprisingly, the majority of respondents thought this issue was not very important, with 50.00% of respondents (13) answering somewhat important, 23.08% (6 respondents) saying it was important, and 26.92% (7 respondents) saying it was very important.

Question 5.1: View of employees are taken into consideration when initiating the KM effort



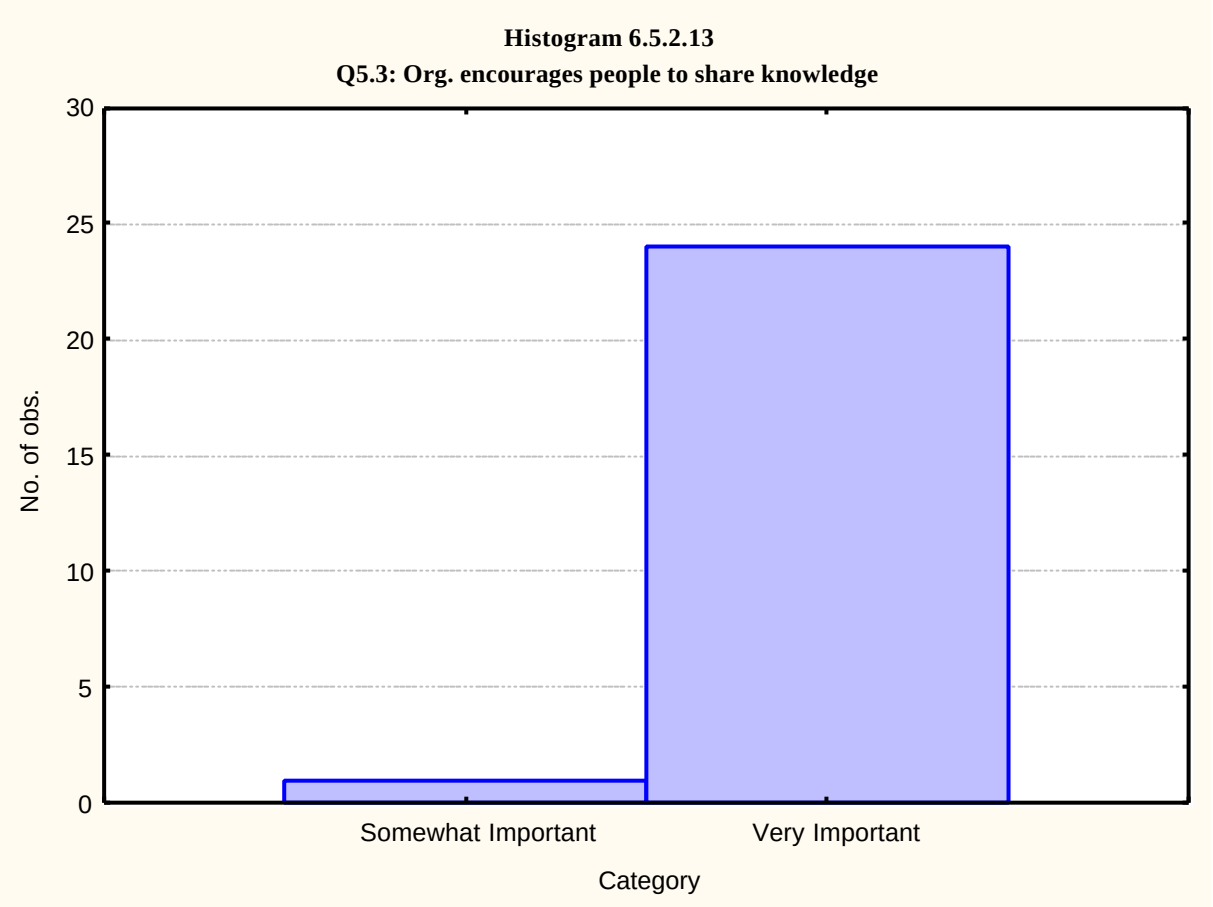
The majority of respondents, 88.46% (23), thought that it was very important to involve employees in the knowledge management effort. Only 11.54% (3 respondents) thought it was somewhat important, and no respondent gave a middle ground answer.

Question 5.2: Senior, middle and line managers involve employees in decision-making



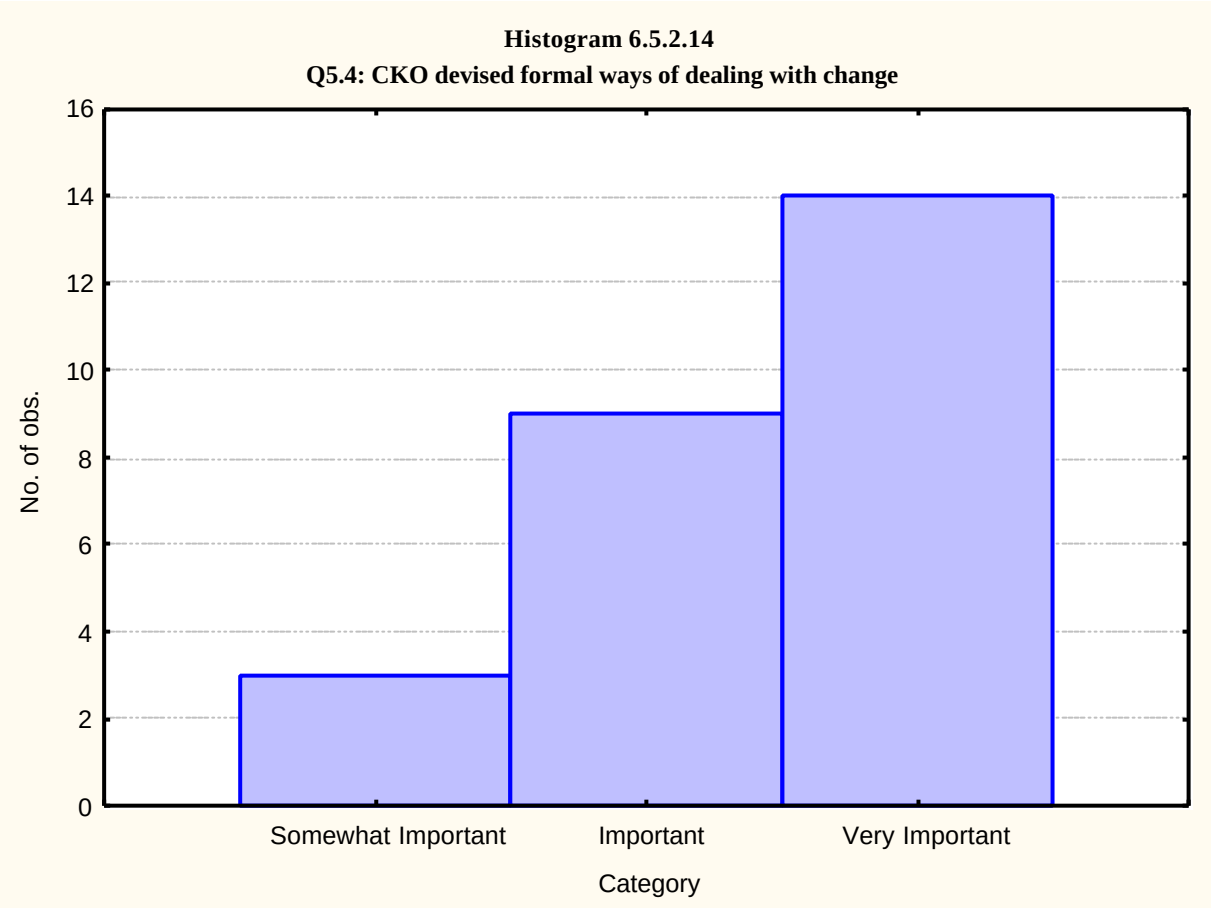
The majority of respondents, 62.54% (16) indicated that it was very important for senior, middle, and line managers to involve employees in decision making. This was followed by 26.92% of respondents (7) who thought this was important, and only 7.69% (2 respondents) thought it was somewhat important. One respondent (3.85%) abstained from answering this question.

Question 5.3: Organisation provides a work environment where people are encouraged to share ideas, experiences, successes & failures



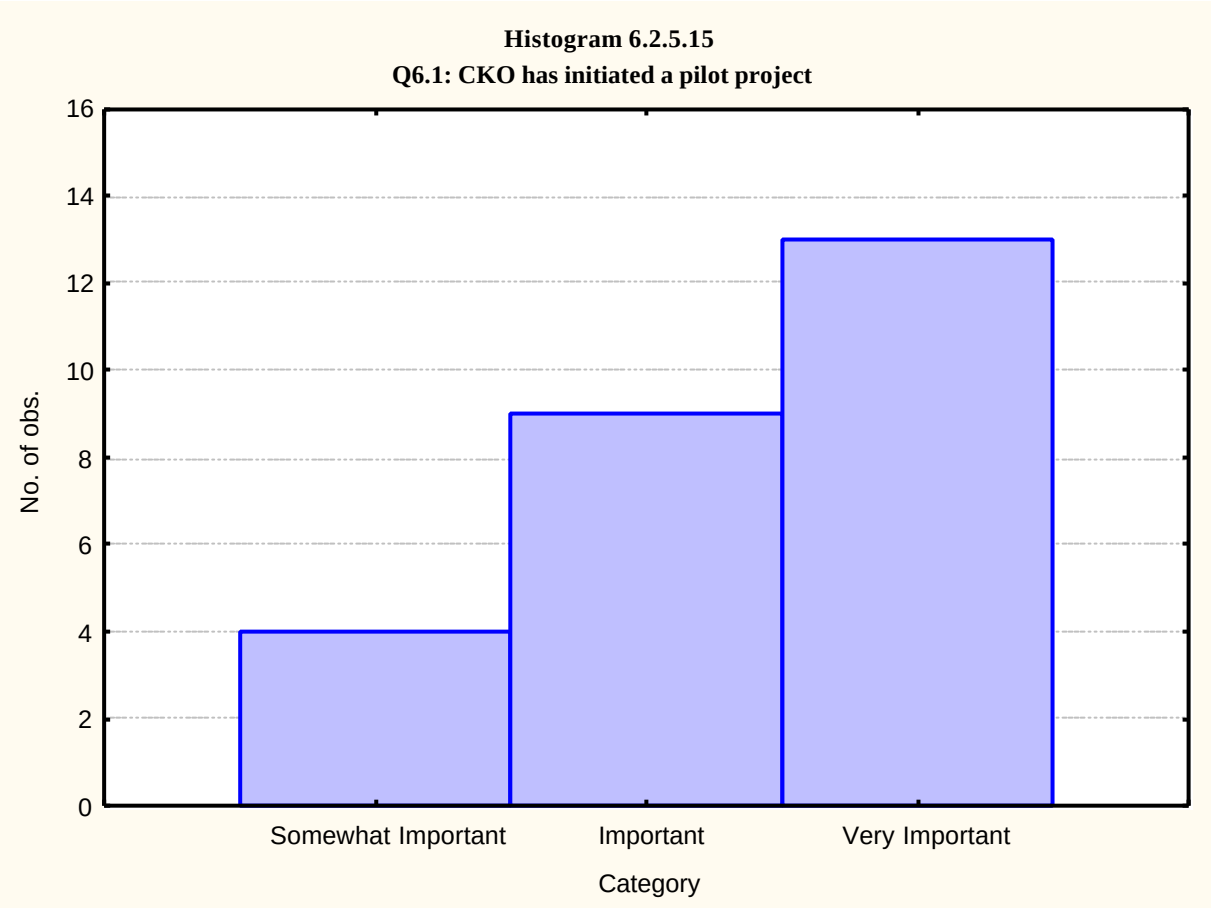
The majority of respondents, 92.31% (24) felt it was very important for the organisation to encourage employees to share knowledge in the workplace. Only 3.85% (1 respondent) thought it was somewhat important, and one respondent (3.85%) abstained from answering.

Question 5.4: CKO has devised formal ways of dealing with change and problems arising from change



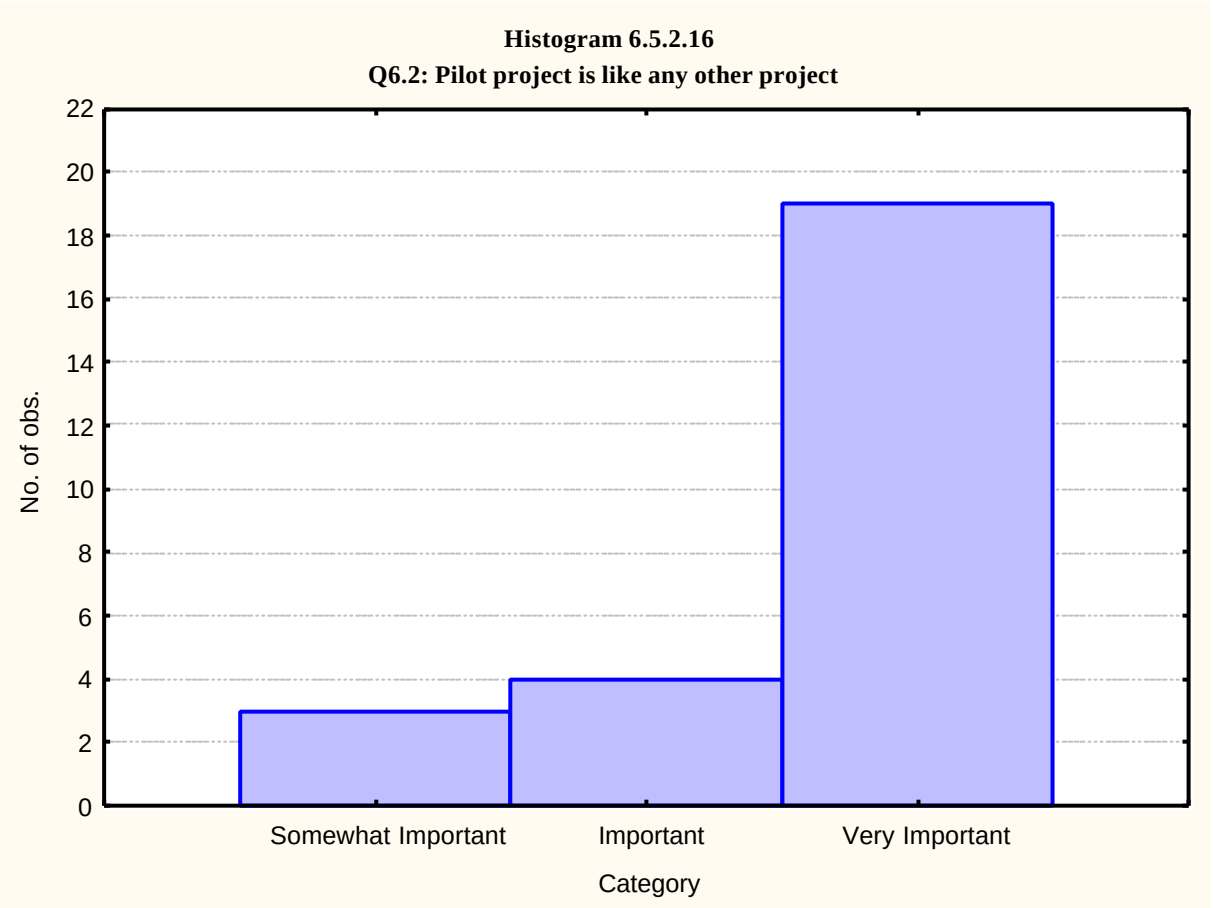
The majority of respondents, 53.85% (14) thought it was very important for the chief knowledge officer of the organisation to have designed formal ways of dealing with change and problems arising from change in the organisation. This was followed by 34.62% of respondents (9) who thought it was important, and the remaining 11.54% (3) thought it was only somewhat important.

Question 6.1: CKO has initiated a pilot project to demonstrate the effectiveness of KM in the organisation



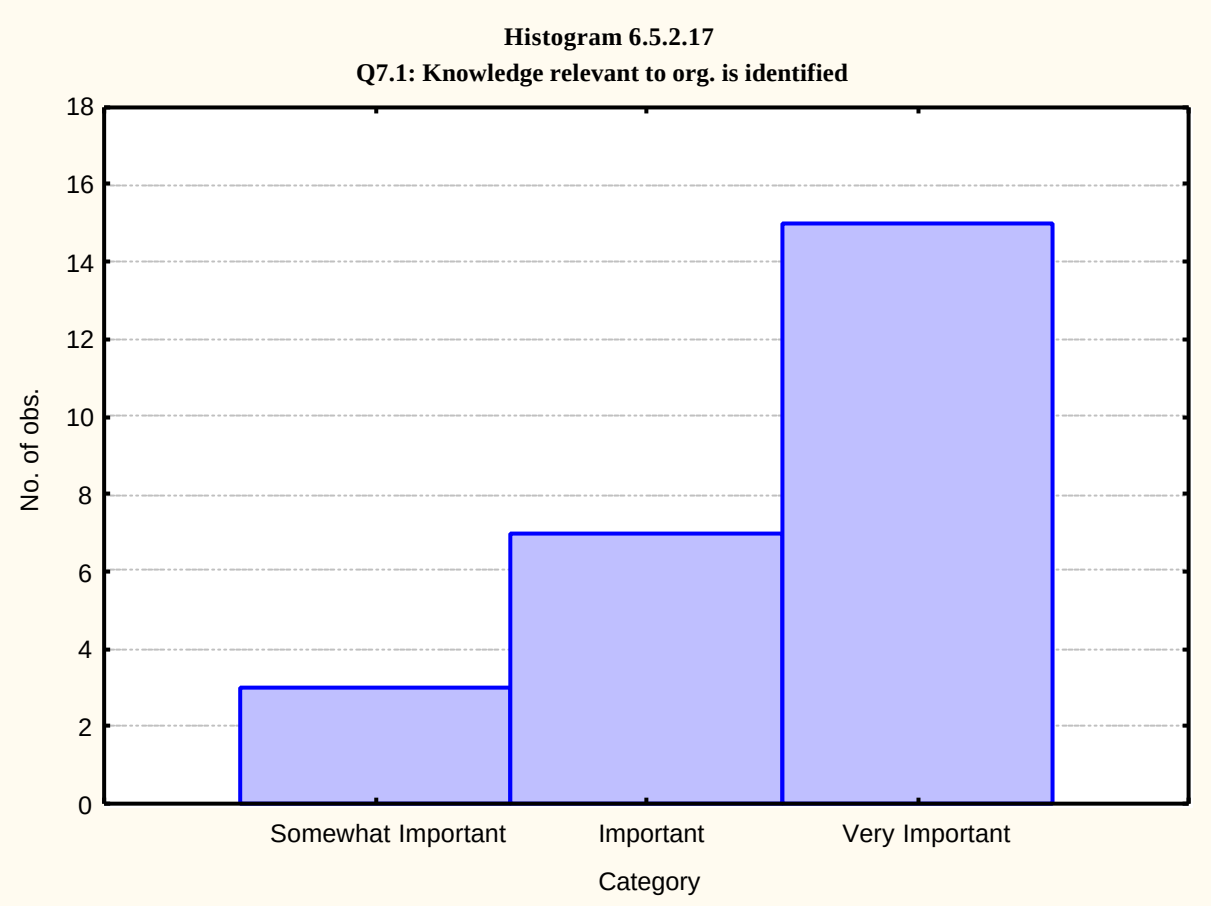
Half of the respondents (13) thought is was very important that the chief knowledge officer initiate a pilot project to demonstrate the effectiveness of knowledge management to the organisation. 34.62% of respondents (9) thought this was important, and the remaining 15.38% (4 respondents) thought it was only somewhat important.

Question 6.2: The pilot project is implemented like any other project, with deadlines, budgets, etc.



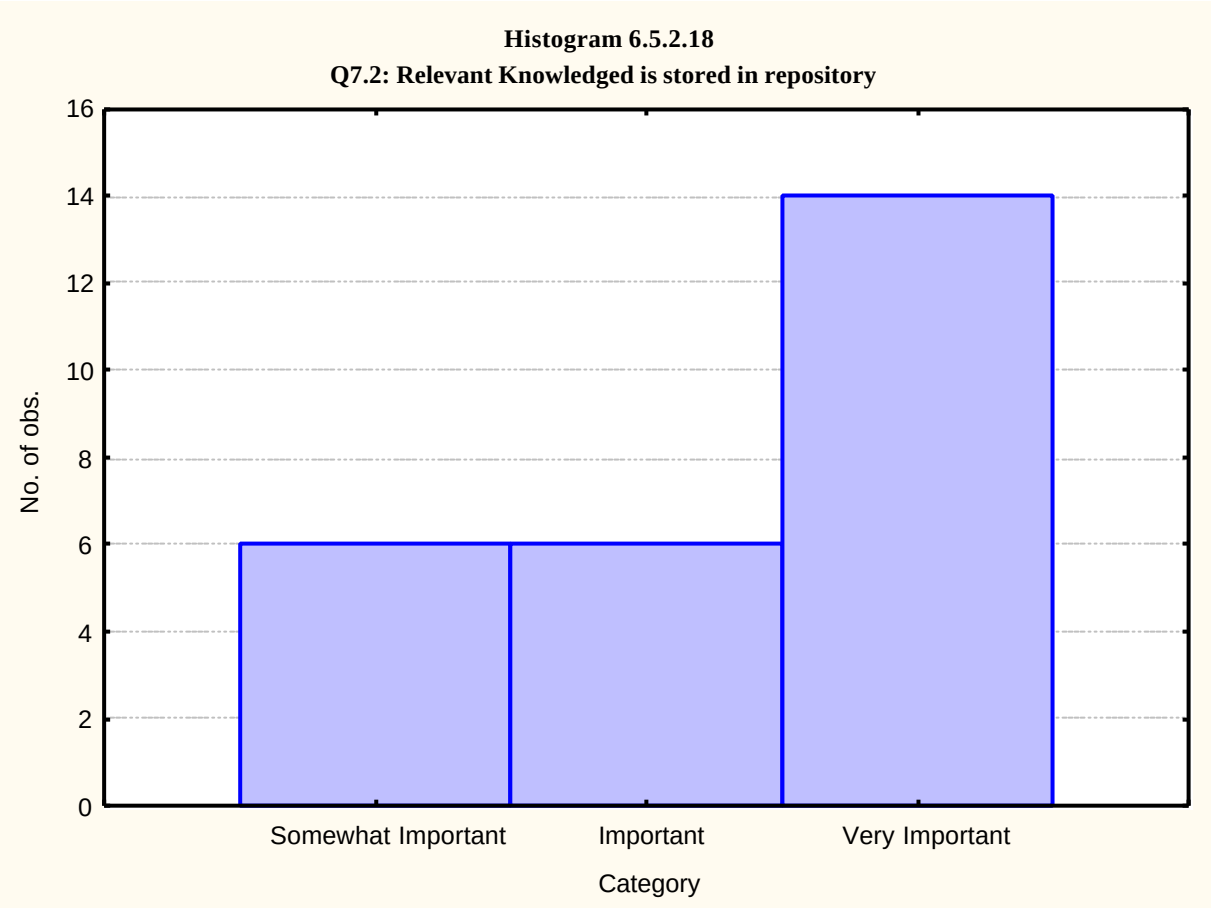
The majority of respondents, 73.08% (19) thought it was very important that the knowledge management pilot project should be treated like any other organisational project. 15.38% (4 respondents) thought this was important, and 11.54% (3 respondents) thought this was only somewhat important.

Question 7.1: All knowledge relevant to the organisation is identified



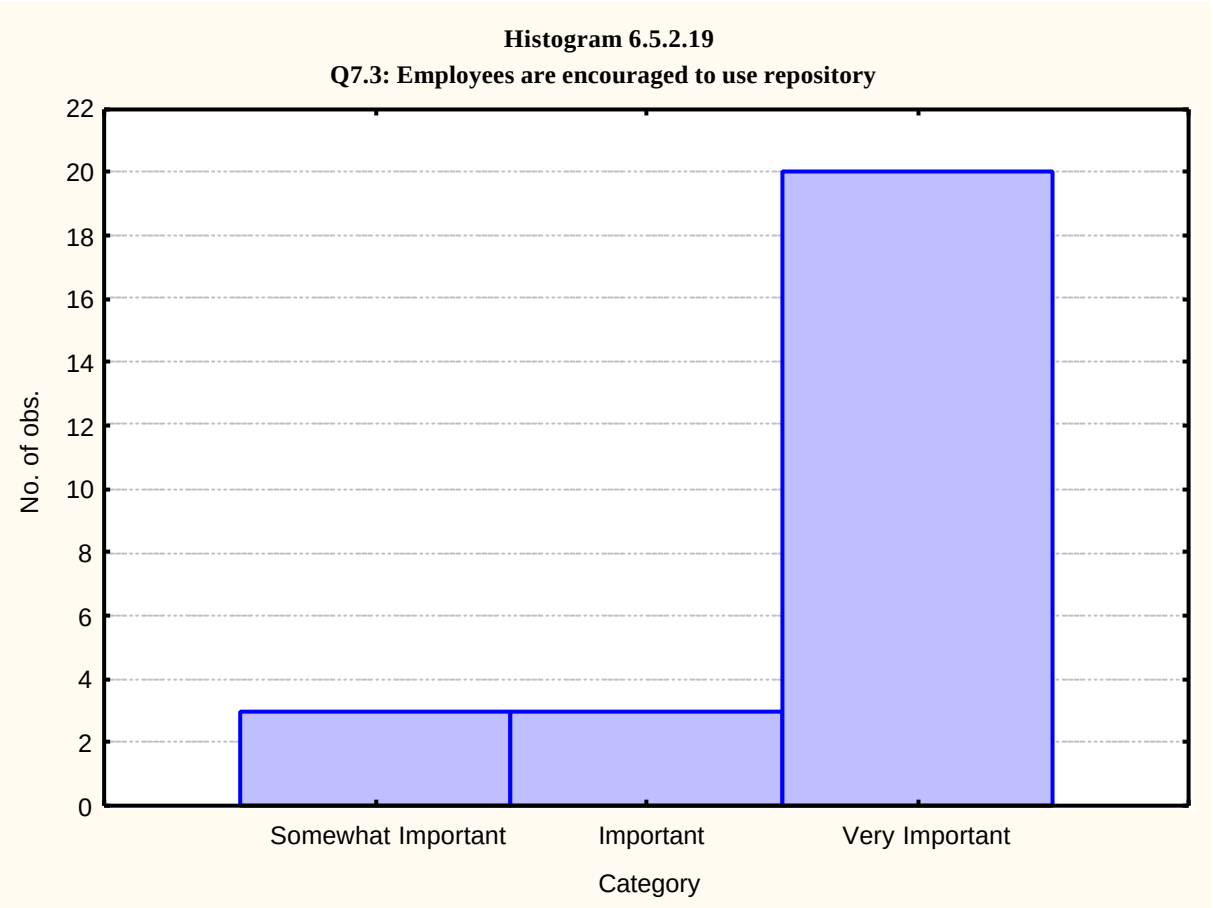
57.69% of respondents (15) thought it was very important that the organisation identified the knowledge that was relevant to its operations. 26.92% (7 respondents) thought this was important, and only 11.54% (3 respondents) thought this was only somewhat important. One respondent (3.85%) abstained from answering this question.

Question 7.2: Relevant knowledge is verified and organised in an electronic knowledge repositories



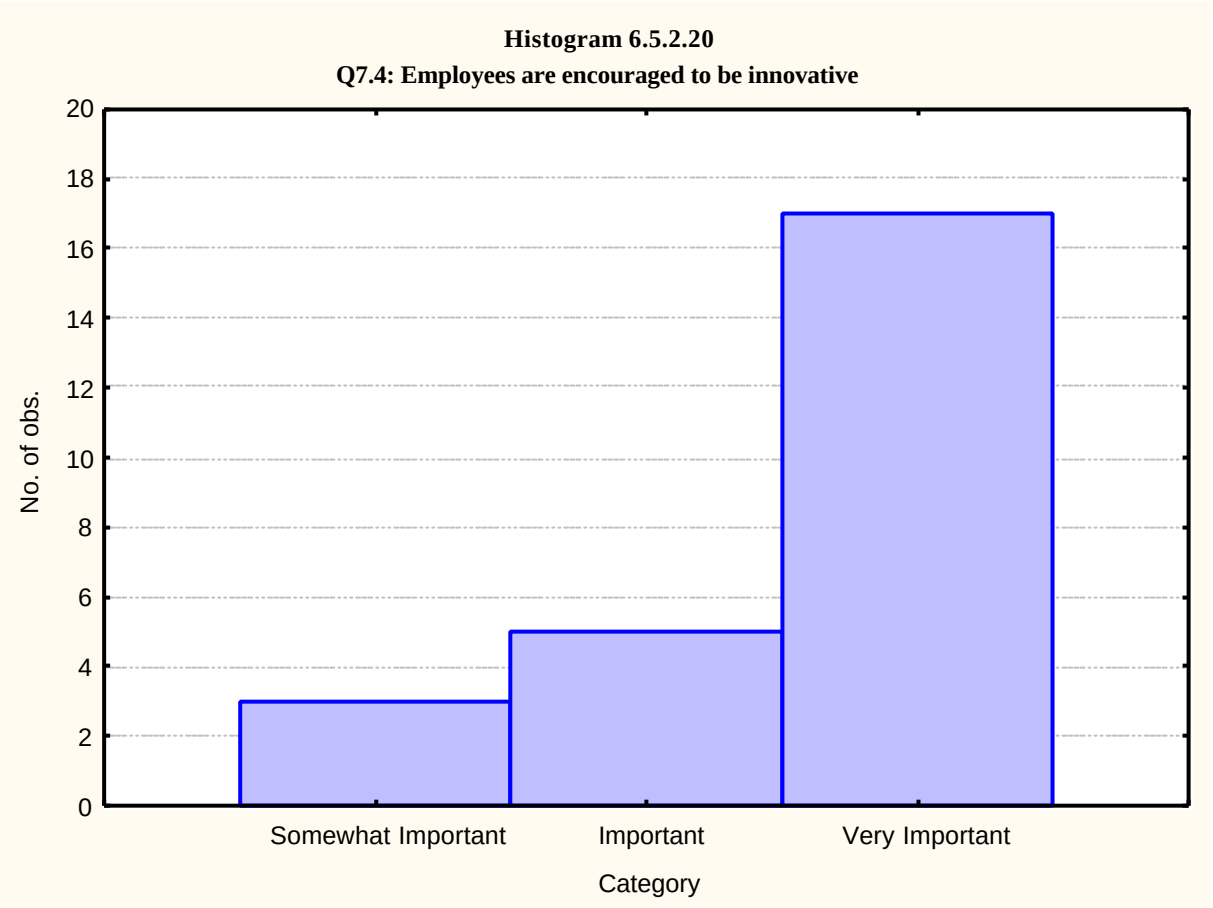
53.85% of respondents (14) thought it was very important that the organisation verify and store the relevant knowledge it identified in knowledge repositories. 23.08% of the respondents (6) thought this was important, and a similar proportion thought this was only somewhat important.

Question 7.3: Employees are encouraged to use knowledge repositories and disseminate that knowledge



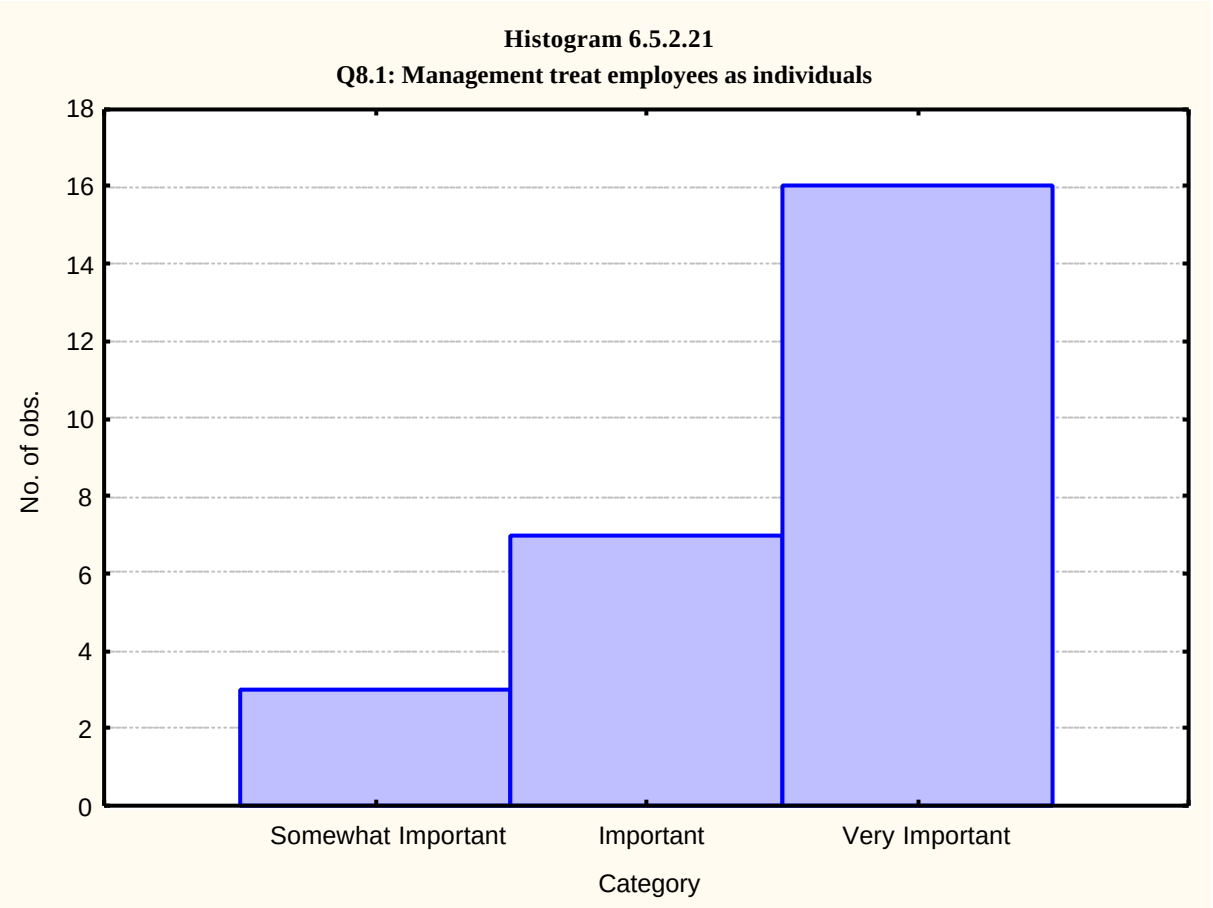
A clear majority of respondents thought that employees should be encouraged to use the knowledge repositories of the organisation. This is indicated by 76.92% of the respondents (20) responding very important to this question. Only 11.54% (3 respondents) thought it was important, and a similar proportion thought it was only somewhat important.

Question 7.4: Employees are encouraged to re-evaluate old knowledge and assumptions to create innovative ideas



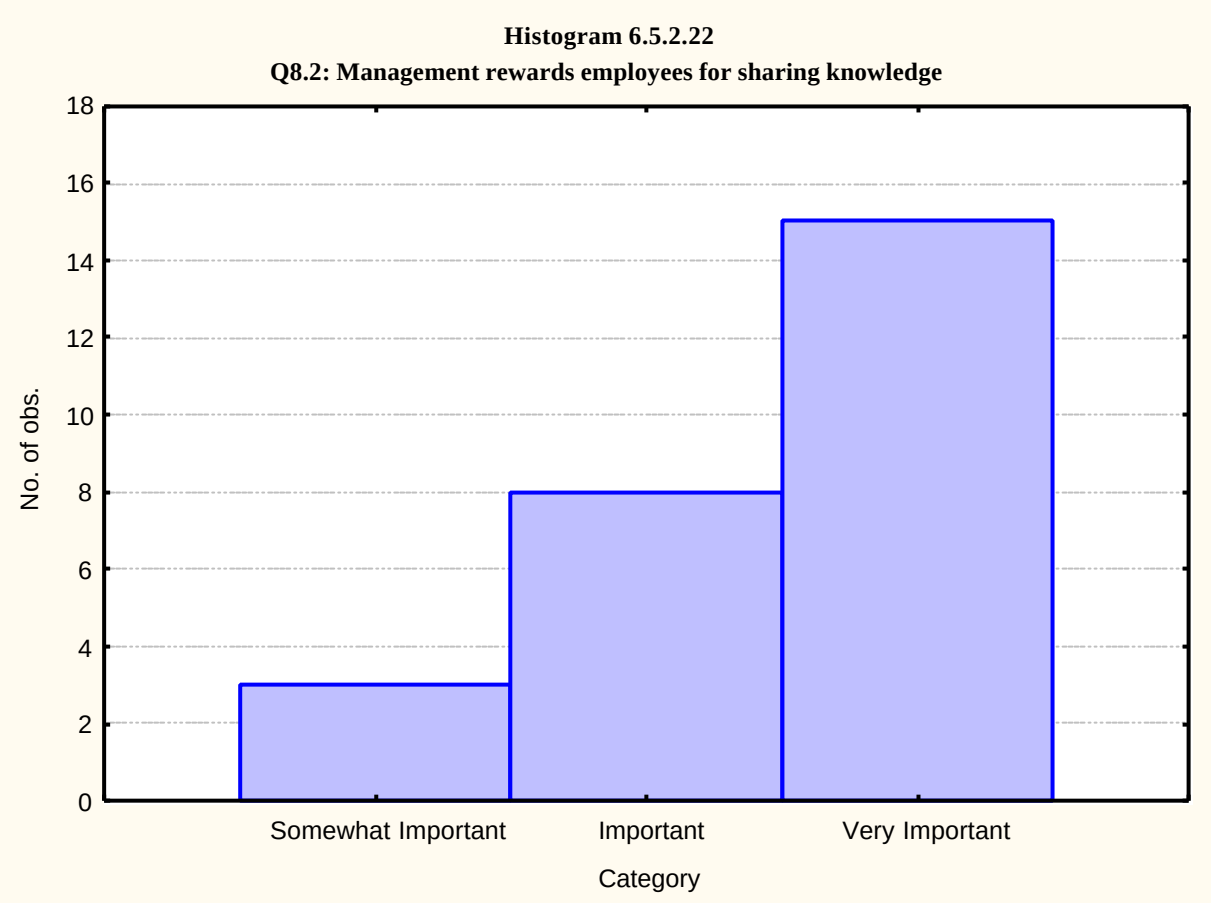
The majority of respondents, 65.38% (17) thought that employees should be encouraged to be innovative in their work. 19.23% of respondents (5) thought this was important, and only 11.54% (3 respondents thought this was somewhat important. One respondent (3.85%) abstained from answering this question.

Question 8.1: Management treat employees on a individual basis, and share knowledge with them



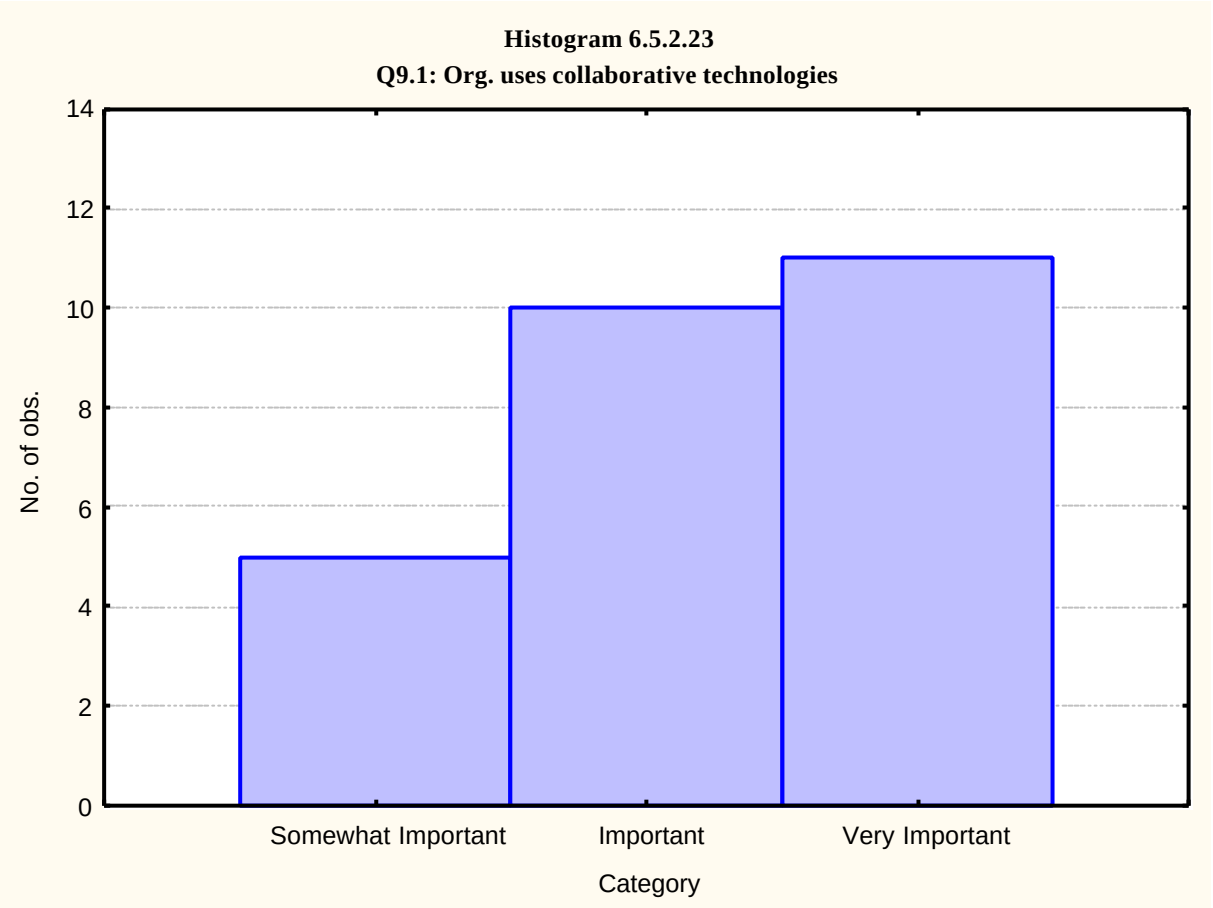
The majority of respondents, 61.54% (16 respondents) thought this managerial practice was very important, followed by 26.92% (7 respondents), and only 11.54% (3 respondents) thought it was only somewhat important.

Question 8.2: Management rewards employees for sharing and using knowledge



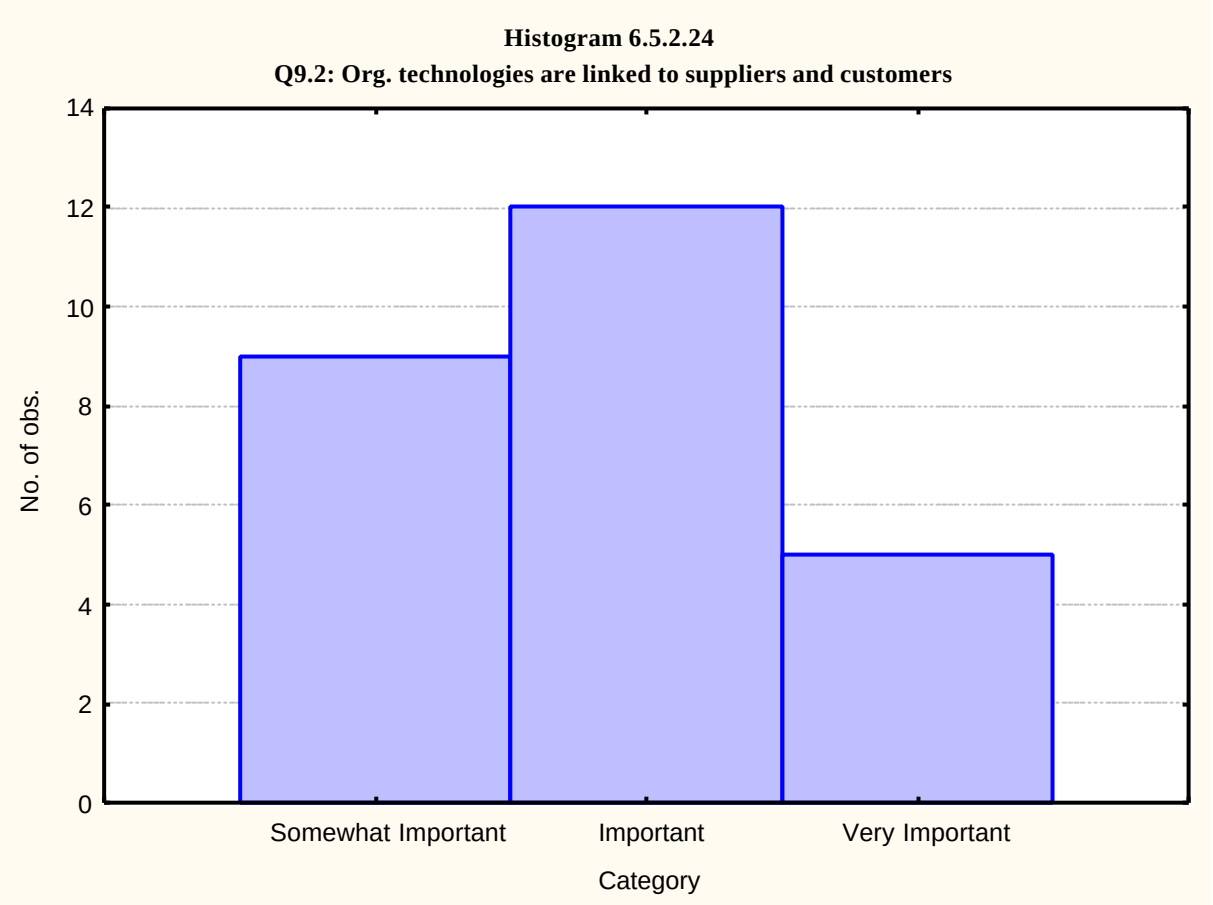
57.69% of respondents (15) thought this was a very important factor for knowledge management in their organisations. 30.77% (8 respondents) thought it was important, and only 11.54% (3 respondents) thought it was only somewhat important.

Question 9.1: Organisation uses collaborative technologies to facilitate transfer of knowledge among workers



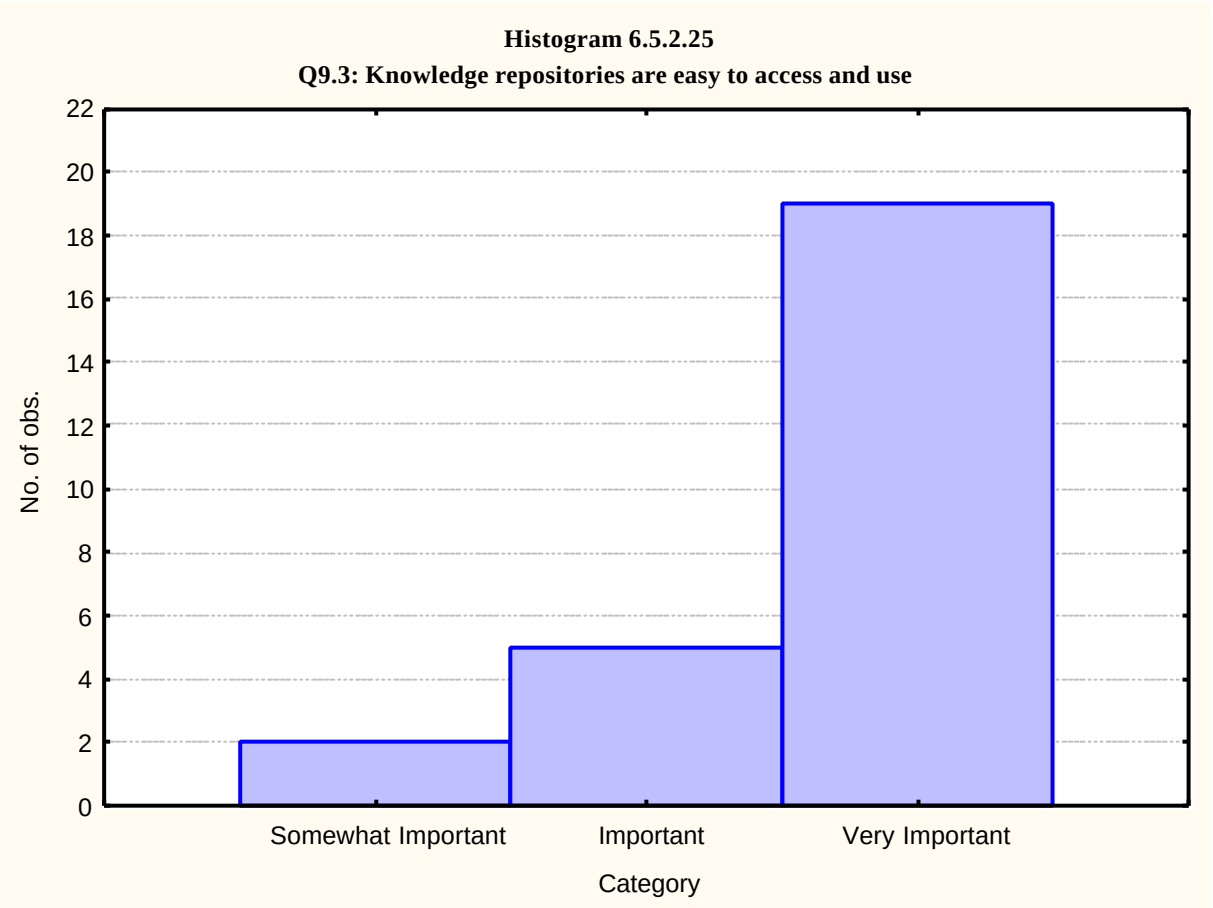
The opinion of respondents was more divided on this question. Only 42.31% (11 respondents) thought it was very important to use collaborative technologies to help knowledge transfer in the workplace. 38.46% of respondents (10) thought it was important, and 19.23% (5 respondents) thought it was somewhat important.

Question 9.2: Organisation's technologies are easily linked to those of suppliers and customers



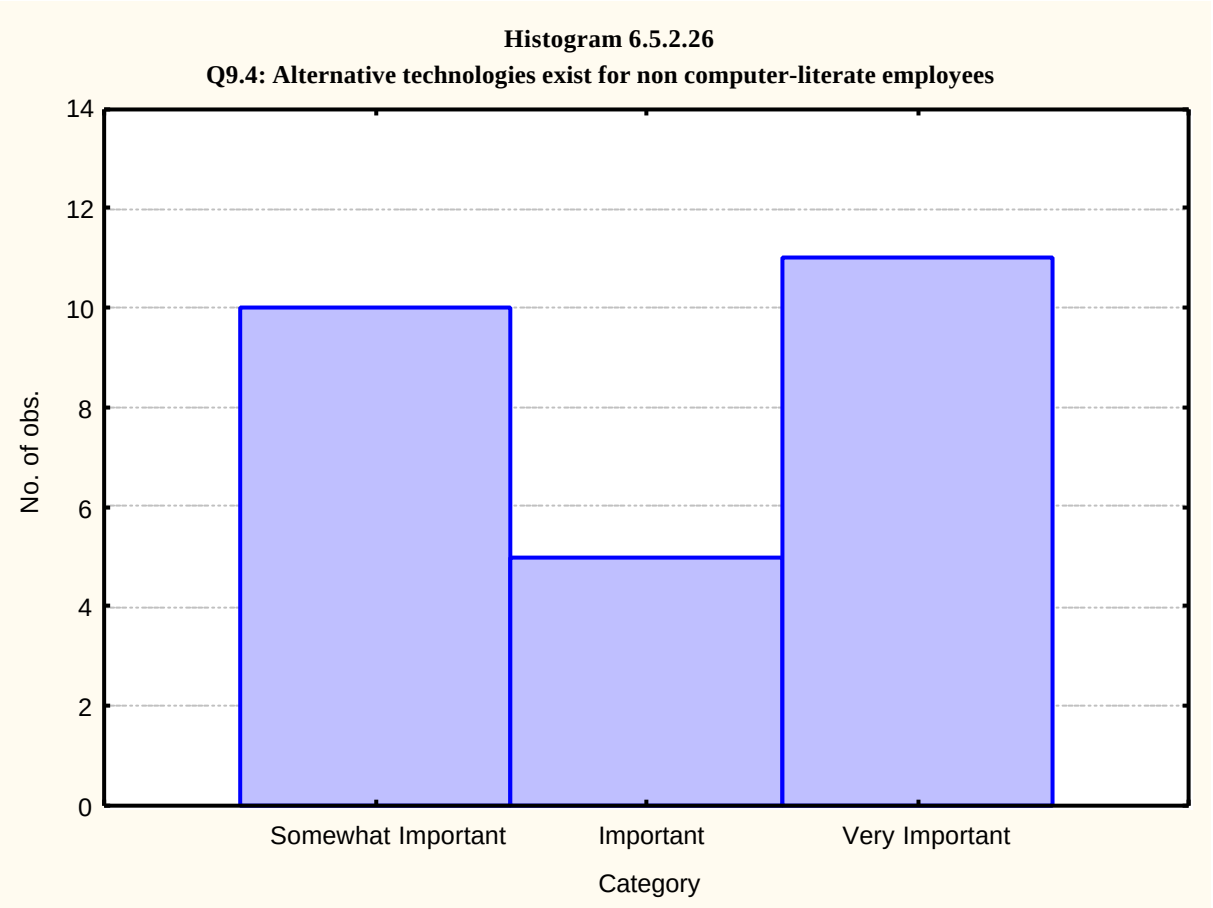
In response to this question, the majority of respondents, 46.15% (12 respondents) thought it was merely important that their organisational technologies be easily linked to those of their suppliers and customers. A further 34.62% of respondents (9) thought it was somewhat important, and only 19.23% (5 respondents) thought it was very important.

Question 9.3: Knowledge repositories are easy to access and use, even for novice computer users



The majority of respondents, 73.08% (19 respondents), thought it was very important for their organisations to have knowledge repositories which were easy to access and use, 19.23% (5 respondents) thought it was important, and only 7.69% of respondents (2) thought it was somewhat important.

Question 9.4: There are alternative technologies for non computer-literate workers to use for collaboration



In dealing with the specific South African problem of a low computer literacy in a large proportion of the working force, respondents were queried about the importance of having organisational systems that allow non-computer literate workers to contribute to the knowledge management effort. Surprisingly, their opinion was quite divided, and only 42.31% (11 respondents) said it was very important. 38.46% of respondents (10) thought it was somewhat important, and only 19.23% (5 respondents) thought it was important.

Appendix E Results of Empirical Study

Correlation between Questions using the Pearson & M-L Chi Square Test

Correlation between Question 1 and Question 2.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 2.12437, df=4, p=.712898

Q1: Level of KM	Knowledge SWOT An Somewhat Important	vledge SWO Important	owledge SWOT Very Important	Row Totals
No	0.461538	0.461538	3.07692	4.00000
Awareness	0.807692	0.807692	5.38462	7.00000
Exists	1.730769	1.730769	11.53846	15.00000
All Grps	3.000000	3.000000	20.00000	26.00000

Correlation between Question 1 and Question 2.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 4.22156, df=4, p=.376856

Q1: Level of KM	reate a Knowledge Str Somewhat Important	a Knowled Important	te a Knowledge Very Important	Row Totals
No	0.153846	1.384615	2.46154	4.00000
Awareness	0.269231	2.423077	4.30769	7.00000
Exists	0.576923	5.192308	9.23077	15.00000
All Grps	1.000000	9.000000	16.00000	26.00000

Correlation between Question 1 and Question 2.3

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: .812500, df=4, p=.936764

Q1: Level of KM	Q2.3: Appoint a CKO Somewhat Important	3: Appoint a C Important	.3: Appoint a Ch Very Important	Row Totals
No	1.230769	0.923077	1.84615	4.00000
Awareness	2.153846	1.615385	3.23077	7.00000
Exists	4.615385	3.461538	6.92308	15.00000
All Grps	8.000000	6.000000	12.00000	26.00000

Correlation between Question 1 and Question 3.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 3.65056, df=4, p=.455362

Q1: Level of KM	.1: Derive Strategic G Somewhat Important	erive Strateg Important	: Derive Strategic Very Important	Row Totals
No	0.153846	1.230769	2.61538	4.00000
Awareness	0.269231	2.153846	4.57692	7.00000
Exists	0.576923	4.615385	9.80769	15.00000
All Grps	1.000000	8.000000	17.00000	26.00000

Correlation between Question 1 and Question 3.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 5.32407, df=4, p=.255640

Q1: Level of KM	: Derive Knowledge G Somewhat Important	ive Knowled Important	erive Knowledge Very Important	Row Totals
No	0.640000	1.440000	1.92000	4.00000
Awareness	0.960000	2.160000	2.88000	6.00000
Exists	2.400000	5.400000	7.20000	15.00000
All Grps	4.000000	9.000000	12.00000	25.00000

Correlation between Question 1 and Question 3.3

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 2.92500, df=4, p=.570456

Q1: Level of KM	3: Create high-level p Somewhat Important	eate high-le Important	Create high-level Very Important	Row Totals
No	0.307692	1.230769	2.46154	4.00000
Awareness	0.538462	2.153846	4.30769	7.00000
Exists	1.153846	4.615385	9.23077	15.00000
All Grps	2.000000	8.000000	16.00000	26.00000

Correlation between Question 1 and Question 3.4

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 4.56407, df=2, p=.102082

Q1: Level of KM	nake org. more cor Important	nust make org. more competi Very Important	Row Totals
No	0.615385	3.38462	4.00000
Awareness	1.076923	5.92308	7.00000
Exists	2.307692	12.69231	15.00000
All Grps	4.000000	22.00000	26.00000

Correlation between Question 1 and Question 4.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 14.6149, df=4, p=.005573

Q1: Level of KM	p Management promo Somewhat Important	nagement p Important	Management pron Very Important	Row Totals
No	0.153846	0.307692	3.53846	4.00000
Awareness	0.269231	0.538462	6.19231	7.00000
Exists	0.576923	1.153846	13.26923	15.00000
All Grps	1.000000	2.000000	23.00000	26.00000

Correlation between Question 1 and Question 4.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 4.79773, df=4, p=.308695

Q1: Level of KM	.2: CKO is independe Somewhat Important	KO is indep Important	: CKO is indepen Very Important	Row Totals
No	2.00000	0.923077	1.076923	4.00000
Awareness	3.50000	1.615385	1.884615	7.00000
Exists	7.50000	3.461538	4.038462	15.00000
All Grps	13.00000	6.000000	7.000000	26.00000

Correlation between Question 1 and Question 5.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: .620842, df=2, p=.733139

Q1: Level of KM	employees are taken into c Somewhat Important	nployees are taken into Very Important	Row Totals
No	0.461538	3.53846	4.00000
Awareness	0.807692	6.19231	7.00000
Exists	1.730769	13.26923	15.00000
All Grps	3.000000	23.00000	26.00000

Correlation between Question 1 and Question 5.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 3.80208, df=4, p=.433458

Q1: Level of KM	d line managers involv Somewhat Important	managers i Important	ne managers inv Very Important	Row Totals
No	0.320000	1.120000	2.56000	4.00000
Awareness	0.480000	1.680000	3.84000	6.00000
Exists	1.200000	4.200000	9.60000	15.00000
All Grps	2.000000	7.000000	16.00000	25.00000

Correlation between Question 1 and Question 5.3

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: .694444, df=2, p=.706649

Q1: Level of KM	encourages people to share k Somewhat Important	ourages people to sha Very Important	Row Totals
No	0.160000	3.84000	4.00000
Awareness	0.240000	5.76000	6.00000
Exists	0.600000	14.40000	15.00000
All Grps	1.000000	24.00000	25.00000

Correlation between Question 1 and Question 5.4

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 3.51924, df=4, p=.474963

Q1: Level of KM	ed formal ways of deali Somewhat Important	mal ways of Important	ormal ways of d Very Important	Row Totals
No	0.461538	1.384615	2.15385	4.00000
Awareness	0.807692	2.423077	3.76923	7.00000
Exists	1.730769	5.192308	8.07692	15.00000
All Grps	3.000000	9.000000	14.00000	26.00000

Correlation between Question 1 and Question 6.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 9.82857, df=4, p=.043423

Q1: Level of KM	KO has initiated a pilo Somewhat Important	as initiated a Important	O has initiated a pi Very Important	Row Totals
No	0.615385	1.384615	2.00000	4.00000
Awareness	1.076923	2.423077	3.50000	7.00000
Exists	2.307692	5.192308	7.50000	15.00000
All Grps	4.000000	9.000000	13.00000	26.00000

Correlation between Question 1 and Question 6.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 4.80359, df=4, p=.308057

Q1: Level of KM	project is like any otl Somewhat Important	ect is like ar Important	roject is like any c Very Important	Row Totals
No	0.461538	0.615385	2.92308	4.00000
Awareness	0.807692	1.076923	5.11538	7.00000
Exists	1.730769	2.307692	10.96154	15.00000
All Grps	3.000000	4.000000	19.00000	26.00000

Correlation between Question 1 and Question 7.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 7.32993, df=4, p=.119456

Q1: Level of KM	edge relevant to org. i Somewhat Important	relevant to Important	ge relevant to org Very Important	Row Totals
No	0.480000	1.120000	2.40000	4.00000
Awareness	0.840000	1.960000	4.20000	7.00000
Exists	1.680000	3.920000	8.40000	14.00000
All Grps	3.000000	7.000000	15.00000	25.00000

Correlation between Question 1 and Question 7.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 3.35760, df=4, p=.499862

Q1: Level of KM	t Knowledged is stored Somewhat Important	wledged is Important	Knowledged is stor Very Important	Row Totals
No	0.923077	0.923077	2.15385	4.00000
Awareness	1.615385	1.615385	3.76923	7.00000
Exists	3.461538	3.461538	8.07692	15.00000
All Grps	6.000000	6.000000	14.00000	26.00000

Correlation between Question 1 and Question 7.3

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 1.57960, df=4, p=.812453

Q1: Level of KM	es are encouraged to Somewhat Important	e encourage Important	are encouraged t Very Important	Row Totals
No	0.461538	0.461538	3.07692	4.00000
Awareness	0.807692	0.807692	5.38462	7.00000
Exists	1.730769	1.730769	11.53846	15.00000
All Grps	3.000000	3.000000	20.00000	26.00000

Correlation between Question 1 and Question 7.4

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 5.07190, df=4, p=.280008

Q1: Level of KM	es are encouraged to Somewhat Important	e encourage Important	s are encouraged t Very Important	Row Totals
No	0.480000	0.800000	2.72000	4.00000
Awareness	0.720000	1.200000	4.08000	6.00000
Exists	1.800000	3.000000	10.20000	15.00000
All Grps	3.000000	5.000000	17.00000	25.00000

Correlation between Question 1 and Question 8.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 5.70924, df=4, p=.221949

Q1: Level of KM	ıent treat employees a Somewhat Important	reat employ Important	t treat employee Very Important	Row Totals
No	0.461538	1.076923	2.46154	4.00000
Awareness	0.807692	1.884615	4.30769	7.00000
Exists	1.730769	4.038462	9.23077	15.00000
All Grps	3.000000	7.000000	16.00000	26.00000

Correlation between Question 1 and Question 8.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 3.80714, df=4, p=.432740

Q1: Level of KM	ewards employees for Somewhat Important	ds employee Important	ards employees Very Important	Row Totals
No	0.461538	1.230769	2.30769	4.00000
Awareness	0.807692	2.153846	4.03846	7.00000
Exists	1.730769	4.615385	8.65385	15.00000
All Grps	3.000000	8.000000	15.00000	26.00000

Correlation between Question 1 and Question 9.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 4.66649, df=4, p=.323267

Q1: Level of KM	uses collaborative tec Somewhat Important	collaborati Important	ses collaborative t Very Important	Row Totals
No	0.769231	1.53846	1.69231	4.00000
Awareness	1.346154	2.69231	2.96154	7.00000
Exists	2.884615	5.76923	6.34615	15.00000
All Grps	5.000000	10.00000	11.00000	26.00000

Correlation between Question 1 and Question 9.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 3.80714, df=4, p=.432740

Q1: Level of KM	ewards employees for Somewhat Important	ds employee Important	ards employees Very Important	Row Totals
No	0.461538	1.230769	2.30769	4.00000
Awareness	0.807692	2.153846	4.03846	7.00000
Exists	1.730769	4.615385	8.65385	15.00000
All Grps	3.000000	8.000000	15.00000	26.00000

Correlation between Question 1 and Question 9.3

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 5.85684, df=4, p=.210106

Q1: Level of KM	epositories are easy to Somewhat Important	ories are e Important	ositories are easy Very Important	Row Totals
No	0.307692	0.769231	2.92308	4.00000
Awareness	0.538462	1.346154	5.11538	7.00000
Exists	1.153846	2.884615	10.96154	15.00000
All Grps	2.000000	5.000000	19.00000	26.00000

Correlation between Question 1 and Question 9.4

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 1.49753, df=4, p=.827078

Q1: Level of KM	ɔgies exist for non cc Somewhat Important	exist for r Important	es exist for non Very Important	Row Totals
No	1.53846	0.769231	1.69231	4.00000
Awareness	2.69231	1.346154	2.96154	7.00000
Exists	5.76923	2.884615	6.34615	15.00000
All Grps	10.00000	5.000000	11.00000	26.00000

Correlation between Question 2.1 and Question 4.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 5.69643, df=4, p=.223004

Q2.3: Appoint a CKO	.2: CKO is independe Somewhat Important	KO is inde Important	CKO is indepe Very Important	Row Totals
Somewhat Important	4.00000	1.846154	2.153846	8.00000
Important	3.00000	1.384615	1.615385	6.00000
Very Important	6.00000	2.769231	3.230769	12.00000
All Grps	13.00000	6.000000	7.000000	26.00000

Correlation between Question 4.1 and Question 5.3

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: .142045, df=2, p=.931441

ɔp Management prom	ourages people to sl Somewhat Important	rages people t Very Important	Row Totals
Somewhat Important	0.040000	0.96000	1.00000
Important	0.080000	1.92000	2.00000
Very Important	0.880000	21.12000	22.00000
All Grps	1.000000	24.00000	25.00000

Correlation between Question 5.1 and Question 8.1

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 11.0711, df=2, p=.003945

nployees are taken ir	ment treat employees Somewhat Important	treat emplo Important	nt treat employe Very Important	Row Totals
Somewhat Important	0.346154	0.807692	1.84615	3.00000
Very Important	2.653846	6.192308	14.15385	23.00000
All Grps	3.000000	7.000000	16.00000	26.00000

Correlation between Question 5.3 and Question 8.2

Summary Table: Expected Frequencies (Surveydata1)
Marked cells have counts > 10
Pearson Chi-square: 7.63889, df=2, p=.021943

ɔurages people to sha	ewards employees for Somewhat Important	s employe Important	ırds employees Very Important	Row Totals
Somewhat Important	0.120000	0.320000	0.56000	1.00000
Very Important	2.880000	7.680000	13.44000	24.00000
All Grps	3.000000	8.000000	14.00000	25.00000

Appendix F Modified Model

F.1 The Modified Model

The modified framework consists of three main interlinked components: Knowledge Management of the Organisation, Knowledge Management of the People, and Knowledge Management of the Infrastructure and Processes. The organisation needs to balance its focus on these three subsystems in order to achieve a successful knowledge management effort.

The emphasis in this model is on the importance of aligning the knowledge management strategy of the organisation to the overall business strategy of the organisation. The culture and managing the culture change when implementing knowledge management are also of utmost importance. This model provides a holistic approach to managing knowledge by including in the process customers, suppliers, stakeholders, and environmental factors. The concept of organisational learning is also catered for in this framework.

The author then focuses on the importance of the employees of the organisation, and their contribution towards a successful knowledge management effort. There should also be a concerted effort to make people feel part of the change when implementing knowledge management. The organisation should also encourage individual learning, and innovative thinking with employees, and reward those that do produce such results.

Finally, the infrastructure and business processes of the organisation cannot be neglected when implementing knowledge management. The author highlights the importance of hardware and software that will facilitate employees to share and disseminate knowledge throughout the organisation. The business processes are also mentioned as they need to allow for formal as well as informal sharing and use of knowledge within the workplace.

The modified knowledge management framework is illustrated below:

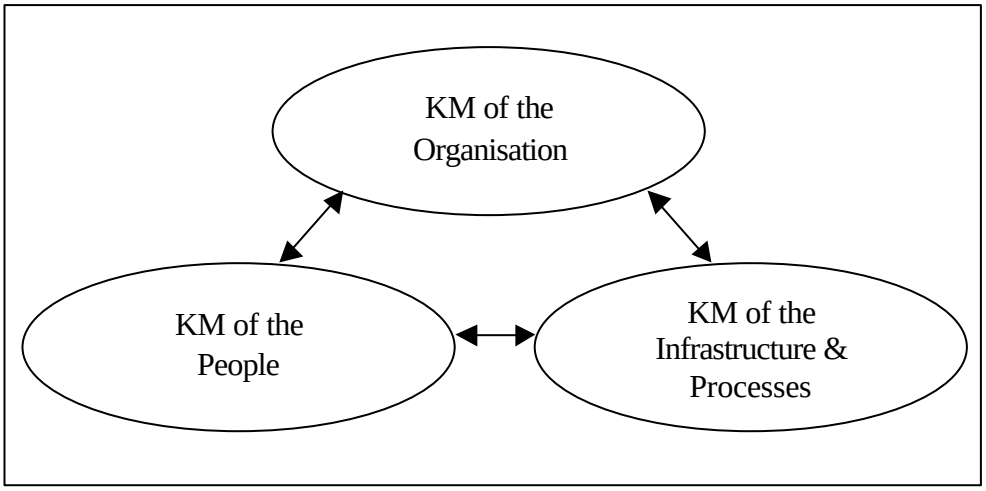


Figure F.1

F.1.1 Knowledge Management of the Organisation

The Knowledge Management of the Organisation component deals with the overall activities that need to be performed in the organisation during the knowledge management effort. At this level, the organisation needs to carry out the high-level activities such as creating a knowledge management strategy, aligning that strategy with the business strategy, etc.

Firstly, at the organisational level, knowledge management must focus on the following key activities:

1. Perform a knowledge-based SWOT analysis.
2. Create a vision for the KM initiative & providing a Leader
3. Align the KM effort with the business strategy
4. Plan & Design the KM project (set goals & objectives)
5. Manage the organisational culture and manage change(s)
6. Manage with a holistic approach, including:
    a. Customers
    b. Suppliers
    c. Shareholders

d. Other Stakeholders
e. Business Environment
f. Competitors
g. Overall Environment

7. Create & Manage organisational learning

F.1.1.1 Perform a Knowledge-based SWOT analysis

Zack (1999a:126) argues that the strengths, weaknesses, opportunities and threats (SWOT) framework is arguably the most well-known approach to defining strategy in business. He (Zack, 1999a:128) therefore recommends using the SWOT framework to identify the organisation's knowledge gap and help it define its knowledge strategy.

This process is illustrated in the figure below (Tiwana, 2000:153):

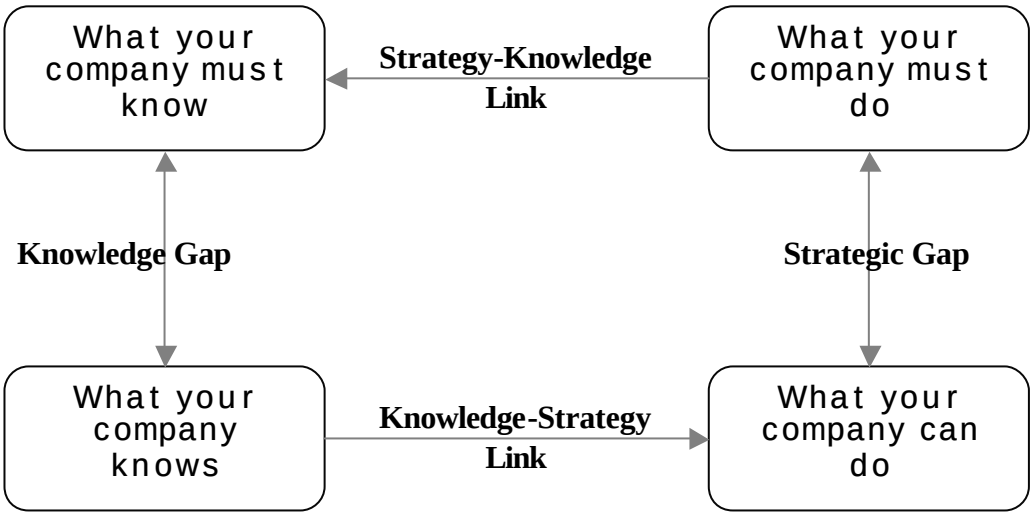


Figure F.1.1.1.1

It is also important to identify the knowledge gaps in terms of the two forms of knowledge, tacit and explicit knowledge. The author argues that it is tacit knowledge that really gives an organisation its competitive edge. Hence, by filling these knowledge gaps, the organisation will be in a better position to compete in an innovative way.

In identifying these knowledge gaps, the employees of the organisation should also be consulted. It is extremely important to involve employees as much as possible in knowledge management, because by allowing them to participate in creating something new, they will support it more readily than if they are told to do so. The input of employees at this level will also reveal some knowledge gaps that management might not have thought of.

It is very important that the knowledge-based SWOT analysis is consistent with systems thinking. This means that the organisation should be considered to be a system, with sub-systems and interactions between these sub-systems. Therefore, any knowledge gap in the organisation should be analysed on the overall picture, and also on the sub-system and interaction level. This will ensure that the KM initiative is consistent with systems thinking.

F.1.1.2 Creating a Vision for Knowledge Management & Providing a Leader

Top management needs to create and share a vision for the knowledge management initiative. Senior levels of management, together with the employees need to articulate how they expect the organisation to benefit from the knowledge management effort, and how this will benefit the employees and their work. The vision is the long term strategy that will drive the knowledge management initiative and provide the scope within which the knowledge management effort and the organisation will grow. The vision should also encompass the core beliefs and values of the organisation.

A very important aspect of the vision is a working definition of knowledge and knowledge management for the organisation. Top management should clearly define what they mean by knowledge and knowledge management in the context of their organisation and their line of work. In particular, one of the most important points is the distinction between data, information and knowledge. By not having a clear definition of knowledge, this can lead to confusion in the minds of employees and hamper the knowledge management effort. This will also help employees better

understand what they are being asked to contribute to the knowledge management effort, and help bring about knowledge-sharing in the organisation.

The creation of the vision can be done in two ways. Top management can either appoint a chief knowledge officer (CKO), who will create the vision, or they can create a vision and entrust the CKO to carry it out. This process depends on where the CKO ranks on the corporate structure, and the needs and preferences of management. *The author argues that it is not important whether the CKO is a member of the board of directors or not, nor is it important to whom he/she reports to. By appointing a CKO, the board of directors conveys a clear message to the rest of the organisation that knowledge management is a serious issue for the organisation.*

It is extremely important at this point, that the employees of the organisation are allowed to share in the making of vision of the organisation. The author suggests that management consider assembling working groups of employees from different sectors of the organisation, and allow them to brainstorm about their vision statement for the organisation. This will create a sense of belonging for the employees, and allow them to participate in the change process. It will also make them accept the change process more readily than if they were not allowed to participate in it. This process will ideally result in a vision statement where top management's aspirations as well as the workers' aspirations are met.

The leader of the knowledge management effort should ideally be the chief executive officer (CEO). This will send a clear message to the employees that the organisation is serious about KM, and will provide the commitment from top management for the knowledge management initiative. In particular, the knowledge leader should act as a role model for sharing and disseminating knowledge in the organisation and should be seen doing so. They should champion knowledge management frequently and emphasise the sharing of knowledge in everyday work, projects and research, between business units, departments and across the entire organisation.

In many instances, the CEO is taken up by other responsibilities, and the task of being the knowledge management leader can be left to the CKO. The CKO should

be the person in the organisation who champions the knowledge management effort, and who acts as an intermediary between the various parties in the organisation. The main responsibilities of the CKO should be to help integrate the three levels of knowledge management, namely the organisation, the people and the processes and infrastructure. The CKO should help bring down barriers to knowledge sharing and distributing, and the hierarchy that exists in the organisation. Ideally, the CKO would bring people of different business units, departments and across geographical locations together in a bid to encourage them to share and distribute knowledge among themselves and others. However, the CKO should avoid getting involved in the day-to-day running of projects or details that should be best delegated to front-line managers. It is important that the CKO act as a visionary and champion, and channel the efforts of others in order to further the knowledge management effort instead of dealing with technology or human resources problems.

The CKO should also be responsible for the following:

- Building KM awareness
- Developing KM processes
- Coordinate KM activities among business unites
- Assessing KM effectiveness

These activities are crucial to the success of the KM effort in the organisation, and the CKO should take into consideration the organisational culture while carrying out these activities.

F.1.1.3 Aligning KM with Business Strategy

It is crucial that the KM effort is not a project that is undertaken on its own without any link to the overall business strategy. The literature consistently emphasises the importance of the link between the business strategy and knowledge management, and the author agrees on this point. The organisation's overall strategy can be defined as the high-level plan that directs the business while balancing its resources, internal forces and external influences. A knowledge management strategy can be defined as the high-level plan that defines how and where the knowledge resources of the organisation are used to further the competitive edge of the organisation.

The author again refers to Tiwana (2000:153) to illustrate how the organisation can derive this linkage:

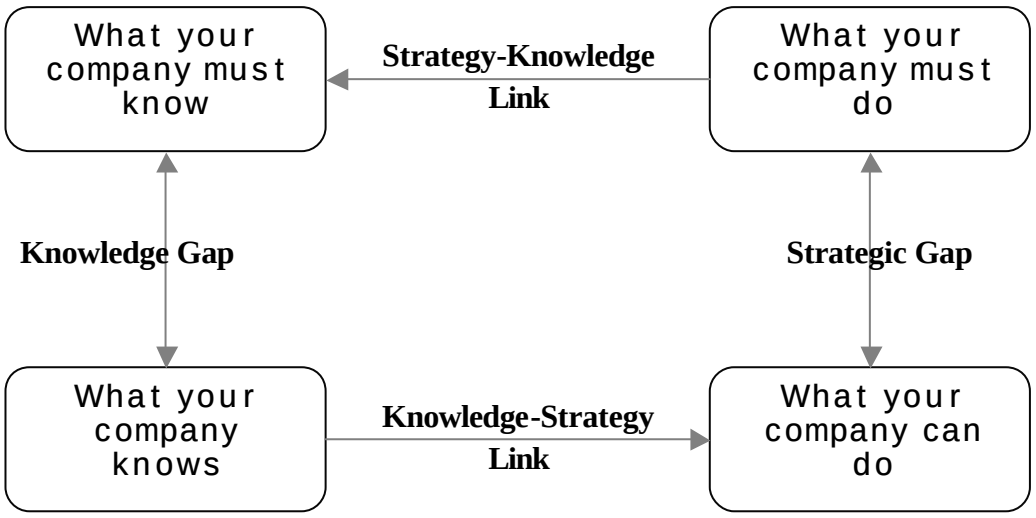


Figure F.1.1.1.3

The organisation should look at its knowledge gap and its strategic gap, according to figure F.1.1.1.3 above. By looking at the strategic gap, the organisation will discover the difference in what it wants to do and what it can do, and by looking at its knowledge gap, it will determine the difference between what it knows and what it needs to know in order to carry out its strategy. Explicating this link between what it must know and what it can do is extremely important, since it will determine how the organisation aligns the knowledge management strategy to the business strategy.

The most basic component of the knowledge strategy of any organisation is to determine the tacit and explicit knowledge gaps that will provide it with a competitive edge. Furthermore, as part of aligning knowledge management strategy to the business strategy, the organisation must also look at its tangible and knowledge resources and clearly define how these resources will be put to use in order to achieve the goals of the KM effort.

The KM strategy of the organisation should take into consideration its organisational culture. The literature contains numerous examples where knowledge management initiatives have failed in organisations because their approach was incompatible with

their culture. Therefore the organisation needs to look at the way its business is carried out, and the culture in the workplace and design a knowledge management strategy that does not conflict with that culture.

In keeping the knowledge management effort consistent with systems thinking, the organisation must extend the knowledge strategy to the sub-systems of the organisation. This might entail explicating knowledge strategies for each sub-system, and in this case, it should be ensured that the strategies in the sub-systems are compatible with the overall knowledge strategy.

Management should also involve employees in this process. One way of doing this would be to have groups of employees brainstorm about their views on the knowledge strategy of the organisation and how it links to the overall business strategy. Again, by allowing employees to participate in the change process, they will support it.

It is also crucial that the knowledge strategy of the organisation is not defined without regard to what its competitors are doing. The organisation needs to look at the knowledge trends in the industry and its markets and define its knowledge strategy accordingly.

F.1.1.4 Plan & Design the KM project (set goals & objectives)

The knowledge effort of the organisation should start with a pilot project. Once the pilot project is complete, the CKO can review its effectiveness, and then decide how the knowledge initiative should be implemented in the rest of the organisation. The CKO must make sure that the pilot project(s) is started in an area(s) where there is already an inclination towards or an understanding of knowledge management. This will ensure that the people are enthusiastic about trying something new and achieving results in the project. By achieving visible results in the pilot project(s), the CKO will encourage other people in the organisation to learn how they can use KM to perform better and that sharing and distributing knowledge does benefit everyone. The pilot project itself can take three different approaches: organisational-wide, departmental- or unit-wide, or a mixture of both.

With the first approach, the knowledge management project is rolled out throughout the entire organisation, with all divisions, departments and business units participating. This approach obviously carries the most risk, because of the logistics problems and cultural factors associated with rolling out a new project. The author does not recommend implementing knowledge management in this way, because it will not be perceived to be a real project by the employees. This is because unlike normal projects, people are used to deadlines and concrete results, and a knowledge management initiative seldom yields such results in the short to medium term on an organisational-wide scale. Furthermore, all employees will not be willing the change the way they are used to working or communicating, because they do not see the benefit in doing so. The concept of knowledge sharing will take some time to get used to, and will require several workshops and seminars and continuous education to convince employees to do so.

The second approach is a safer one, requires the organisation to initiate the knowledge management project to be rolled out within a business unit or a division or a department. The CKO should choose a unit where the people will be more willing to accept new ideas and new ways of working and communicating than the rest of the organisation. This kind of test project is more easily controlled, and involves the least risk, since it only involves a few people, and the CKO should ensure that they have been briefed on the concept and practices of knowledge management and knowledge sharing. The author proposes that the project should last between six to twelve months, in order for results to be apparent. Once this test project proves successful, then knowledge management can be gradually implemented in other business units. This will make sure that after the test project, the results and benefits can be advertised to the rest of the organisation, and this will make implementing knowledge management to other business units much more easier. This method will also acclimatise employees to the concepts and practices of knowledge management, and help change the organisational culture. This will ensure that there is the least resistance from employees when knowledge management is being rolled out in their units.

A combination of the first two approaches results in a mixed approach, involving rolling out the knowledge management project in a number of business units that are totally separate from one another over a period of six to twelve months. This method involves more risks that the single approach, but less risks than the organisational-wide approach, since monitoring a few projects for the CKO will prove more difficult that monitoring a single project. However, the author thinks that this method might actually be more beneficial to the organisation in the sense that the CKO will be able to observe how different types of employees react to the same project. By choosing business units which are as different and separate to one another as possible, the CKO will be able to experiment on a wide variety of people, and work processes. This will enable the CKO to observe how people doing different work will react to the concepts and practices of knowledge management, and this will be useful when knowledge management is rolled out to the rest of the organisation.

Once a method of implementation is chosen, the CKO needs to plan and design the roll out of the project. The author proposes that the initial pilot project should be implemented as any other project, with deadlines, budget considerations and reward incentives. This will ensure that the employees take this project seriously, and participate fully towards the goals of the project. It is very important that the CKO sets reasonable and attainable goals and objectives for the test project, otherwise the employees participating in the project will become disillusioned with knowledge management and the advertised benefits of sharing knowledge. The objectives and goals of the test project should be attainable in a period of six to twelve months, in order for people to be able to see the benefits of knowledge management, and become convinced of its usefulness.

The CKO should also involve employees on the planning and design of the pilot project. This will ensure that they will support the pilot project, and also help the CKO in setting reasonable objectives and benchmarks. The CKO should then initiate the project.

After the test project has been completed, the CKO should then re-evaluate the effectiveness of the goals and objectives of the project, and if need be, modify the

goals and objectives for the full implementation of KM in the organisation, after consultation with the employees who participated in the pilot project(s).

F.1.1.5 Manage the organisational culture and manage organisational change

The CKO has the very important task of managing the change in organisational culture that implementing knowledge management demands. In most cases, the CKO will have to help move the organisational culture from a closed structure to an open, flowing one, institute new working methods, encourage people to share their experiences and knowledge, provide inspirational leadership, and involve everyone in the organisation to participate in and contribute to the change. It should be taken into consideration that the change in culture will take a long time to happen. Other norms that will probably need to be altered are: shared responsibility between management and workers; a continuous learning environment; promote accountability; and a values-based environment. A very important aspect of the knowledge management culture is that is should be an environment where people are encouraged to share ideas, problems, successes and failures. This will lead the way to the organisation learning from its people.

It would be inappropriate for the CKO to plan and initiate a knowledge management project and expect it to be carried out. What actually takes place in the organisation depends on a large extent on the people and their behaviour in the work place, and on the organisational culture. The literature abounds with case studies of organisations where knowledge management initiatives have failed because of improper management of culture. Therefore, the author recommends that the objective of the change is not to change the organisational culture drastically, but to modify the behaviour of people in a way that suits the demands of knowledge management in the context of the organisation, in the same way that the KM strategy needs to be compatible with the organisational culture. It should also be noted that the literature supports the view that there is no right way of doing knowledge management, and that whatever means that suit the organisation should be used.

The author argues that the most important factors in managing the change in culture are: a shared vision by employees and management, support and commitment from top management, trust between employees and management, communication and acceptable reward incentives. Hence, it is important that top management initiate the process, and provide support for the rest of the organisation. Top management can then delegate day-to-day training and support to middle management, who will be responsible for communicating top management's intentions to the workforce. Therefore, the CKO should ensure that all these factors are present before initiating a full project for the organisation.

The author recommends that one way to bring about a change in culture effectively is to educate people continually about knowledge management, and inform them of what is required of them. The employees should also be involved in determining what needs to change, and how to change it. This will ensure their support in the knowledge management initiative.

The author also contends that no amount or extent of existing technology can replace human interaction in the organisation. This is especially evident when it comes to transferring tacit knowledge, where human contact is essential. Hence, top management need to communicate this properly to middle management, who will be responsible for providing an environment conducive to tacit knowledge transfers in the workplace.

The implementation of suitable reward schemes is also of utmost importance. Top management need to realise that this does not only mean monetary rewards, but also includes recognition of the individual's or the team's achievements. In some instances, monetary rewards may even be detrimental to the knowledge management initiative. Hence, a combination of cash rewards and recognition rewards would be better suited. One example of such a reward structure would be to institute an award based on an innovative idea or invention in a particular field, or a performance-based award. These awards could be presented at annual general meetings, staff meetings or the organisation could organise a special annual event for the purpose of rewarding staff. The author argues that it would be the responsibility of middle managers to ensure that rewards and recognitions are awarded to the right people.

Finally, the CKO should put into place formal structures and processes that will deal with the various organisational changes that will take place during the implementation of the knowledge management initiative. This will ensure that problems and issues which manage to filter through the newly-implemented channels will be dealt with swiftly. This is important because the employees should not be made to feel left out of the knowledge transformation process. It is important to remember that knowledge management is not a once-off project, but an incremental process, whereby change is constantly challenging the organisation and its people.

F.1.1.6 Manage with a holistic approach

The author argues that a knowledge management effort should not take place with the organisation focusing only on itself. Based on Skyrme's (1998) Knowledge Layers in his Knowledge Strategy, the author proposes four environmental factors which also need to be managed by the CKO and the organisation within its context of managing knowledge. These factors are :

a. Stakeholders
b. Competitors
c. Business Environment
d. Overall Environment

It is very important that the organisation should also pay attention to its various stakeholders, namely the customer, suppliers, shareholders, employees, and its immediate community. By developing and analysing knowledge about these factors, the organisation will be in a position to identify and forecast trends in its environment.

Firstly, the organisation must take into consideration its customers and their needs and knowledge needs. It is crucial that the organisation develops an understanding of what the customers want, and what knowledge they want, since this will affect the way the organisation acquires knowledge about its customers. Furthermore, by acquiring knowledge about the customers and sharing knowledge with the customers, the organisation will be in a position to analyse trends with customers as well as with the market. Furthermore, the organisation might even be able to forecast trends in

the market based on the knowledge it has acquired. This will provide the organisation with the opportunity to become proactive in meeting customer needs, generating new opportunities for business.

It is also important that the organisation carry out the same process with its suppliers. This will enable the organisation to share with its suppliers the knowledge that they need to provide the best service to the organisation. By creating a flow of knowledge between the organisation and its suppliers, the organisation should be in a position to forecast its supply needs in terms of the trends it has identified in the market. This will allow the business to take a proactive stance when it comes to securing its supplies.

Thirdly, the organisation needs to pay attention to its shareholders, and their views on the operations of the organisation. Shareholders can provide valuable insights into the strategic running of the organisation if they are given the opportunity to participate and share knowledge with the organisation. This will ensure that shareholders know what the organisation is doing, and will feel a sense of belonging with the organisation.

The author argues that the contribution of the employees in a knowledge management effort is invaluable to any organisation. In this respect, the organisation should create and improve the knowledge flows between its employees and management. This will provide the opportunities for employees to share their valuable knowledge with management, and participate fully in the knowledge management effort. The employees of the organisation are its most valuable assets, and the author holds the view that any knowledge management effort is doomed to fail if the employees are not fully participative in that process. This point will be discussed further during the Knowledge Management of the People section.

It is also important for the organisation to look at what its competitors are doing, and to collect and analyse knowledge about them. The author argues that this is especially important in the early stages of knowledge management, when the organisation might learn valuable lessons from what the competition has already done in this field. For example, by adopting a practice of a competitor, the

organisation might discover useful knowledge about the market. Imitating the competition in the early days of knowledge management might also save the organisation a lot of time and money in developing their own practices and systems while bringing them up to the same level of knowledge management. If this strategy works, the organisation can then start developing its own practices and systems, and gain a lead on the competition.

The organisation does not operate in a vacuum. It is therefore very important that it performs an assessment of its business environment in terms of the knowledge that it needs in order to remain competitive and innovative. By acquiring and analysing knowledge in of the business environment, the organisation can identify and predict trends thus preparing itself to meet future needs of the market.

Furthermore, the organisation should also not lose sight of the overall environment in which it operates. It is important that the organisation analyses knowledge about governmental regulations, global market trends, social and political trends, technological trends, and finally community demands. This will allow the organisation to market itself in a way that takes into consideration the needs of the immediate environment in which it operates, while remaining at the forefront of innovative products and services.

F.1.1.7 Create and Manage Organisational Learning

The author proposes a 'knowledge life-cycle' in order to create and maintain individual and organisational learning in the organisation. According to Rubenstein-Montano, *et al*, (2000) the literature abounds with such frameworks which are mostly prescriptive. Rubenstein-Montano, *et al*, (2000) argue that the ideal knowledge management framework should have both descriptive and prescriptive characteristics. Therefore the author has devised this cycle with a prescriptive approach, the rest of the framework being descriptive in nature. The author has also included double-loop feedback in this cycle, following Rubenstein-Montano, *et al*, (2000) recommendations. The knowledge life-cycle is shown below:

1. Create New Knowledge
    a. Identify new knowledge
    b. Identify old & existing knowledge
2. Identify Knowledge relevant to organisation
3. Verify selected Knowledge
4. Capture & Organise Knowledge
5. Disseminate & Use Knowledge
6. Combine new knowledge and re-evaluate assumptions to Create Knowledge

Firstly, knowledge needs to be created for the organisation, based on a selection of the internal and external knowledge needed by the organisation. The internal knowledge can be found within the organisation, particularly with the employees, and to a certain extant, in documents or previous knowledge repositories. The external knowledge should be identified from external sources, such as customers, competitors, stakeholders, business environment, etc. Furthermore, the organisation also needs to identify old and existing knowledge as well as any new knowledge which it might need during the course of the knowledge management effort, and for the business in general. It is important at this stage to identify which knowledge is explicit and which knowledge is tacit in nature, since this will affect the storage medium of the knowledge

The next step in the cycle is to identify which knowledge is relevant to the organisation in terms of its knowledge management strategy and its business strategy. It is important at this point, that useless knowledge is not accumulated, in order to avoid clutter in the knowledge repositories. Furthermore, if the repositories are easy to search and employees do not have to sift through useless knowledge, this will increase the likelihood of employees using the repositories to look for knowledge.

It is also important that the knowledge which has been selected to be included in the repository is verified, in terms of its relevancy and importance to the organisation. This will avoid any decisions being made on the basis of erroneous or outdated

knowledge later on. Again, by avoiding useless knowledge in the repository, employees will be encourage to use the repositories to look for relevant knowledge.

The next step is to capture that knowledge, and organise it in relevant sections. For example, knowledge repositories could be created which include the explicit knowledge that has been identified and verified. Such repositories could be in the form of databases, data warehouses, intranet or internet web pages, text documents, and the likes. For storing tacit knowledge, the author recommends using a 'human' medium, such as cross-functional 'knowledge teams', which would be responsible for the sharing and disseminating knowledge throughout the organisation. This is due to the difficulties of translating tacit knowledge into explicit knowledge. However, by encouraging employees to use the knowledge repositories to retrieve and store knowledge, more and more tacit knowledge will be transferred to those knowledge repositories.

This knowledge also needs to be organised in a meaningful way so that when employees are looking for something specific, they can find it easily and quickly. A meaningful data storage structure can be worked out by the CKO taking into consideration how it will best suit the organisation and the employees. However, the author warns of classifying knowledge only according to traditional ways, such as content. P Novins & R Armstrong (1997:45) argue that knowledge could also be classified in terms of its users, applicability, transferability, richness, age and reliability. They (Novins & Armstrong, 1997:47) state that their work has revealed that knowledge is useful when classified in terms of applicability and transferability, and the author agrees.

The CKO should also encourage people to disseminate that knowledge, and to use it. Using cross-functional knowledge teams is a very good way of disseminating knowledge throughout the organisation, since it ensures that knowledge from different parts of the organisation will be shared with other parts of the organisation. The knowledge can also be disseminated through the use of intranet web pages, newsletters, knowledge forums, etc. There is also a need for the CKO to encourage the employees to use that knowledge. This is important because it might cut down on time and monetary resources when it comes to product development or project

management. By looking at what has been done before, and how it has been done, time and money can be saved on delivery times.

The last step of the cycle is a double-loop learning feedback. The author proposes this loop to conform to the systems thinking advocated by Rubenstein-Montano, *et al* (2000). This step involves re-evaluating assumptions held by the organisation and using these new assumptions with the knowledge created by the organisation to create new knowledge. The author argues that this process will generate innovative knowledge and allow the organisation to produce innovative products and business processes. The author also argues that for this process to be successful, cross-functional knowledge teams are needed, because of their varied knowledge and assumptions. By using different or even conflicting assumption, cross-functional teams will be in a position to produce new assumptions which can be innovative when combined with the new knowledge of the organisation.

F.1.2 Knowledge Management of the People

At the Knowledge Management of the People level, the focus is on managing people, their behaviour, their expectations, and their potential to contribute to the success of the knowledge management effort. There should also be a concerted effort to encourage employees to share and use knowledge in the workplace, and to reward people who do so.

The most important asset of any organisation is its employees, since most of the knowledge resides in their minds. Hence the author proposes that the CKO puts in place specific processes in order to manage the employees, since learning and knowledge creation can only occur through them. The framework proposes the following activities to achieve this:

1. Manage people as individuals
2. Encourage Sharing and Use of Knowledge
3. Encourage Individual Learning and Innovative Thinking

4. Implement reward plans and incentives to promote above

F.1.2.1 Manage People as Individuals

It is important that management recognise that organisational learning can only take place through individual learning. It is only through a person's willingness and ability to learn and use new knowledge that the organisation can in turn learn and use that knowledge. Hence it is important that the employees in the organisation are treated as individuals and that management considers each person's opinion and input. This will ensure that employees feel that they are important and will reinforce the fact that they are more willing to accept change if they are part of that change.

This does not mean that management should hold face-to-face meetings with every employee. Management can easily make people feel important by creating teams of four to five employees, who get together and discuss business practices, their role in the organisation, their contribution, and their suggestions about how to improve their work conditions. Each team then submits their best idea or suggestion to their manager, who then submits these to the CKO. The best idea or suggestion should be put into practice, and if it results in a noticeable improvement in the business the team should be rewarded for it. However, the author warns about putting too much emphasis on rewarding the team which produced the best idea, since this might make the other teams feel like their ideas were not good enough.

This process might make employees feel that management is more willing to listen to their suggestions and contributions to the organisation. Furthermore, this might produce some innovative thinking from employees in terms of business processes and product development.

F.1.2.2 Encourage Sharing and Use of Knowledge

The CKO should be responsible for putting into place the appropriate structures and processes so that people are motivated to share and use knowledge in the workplace. This might prove to be a difficult task, since the traditional workplace attitude is that of 'knowledge hoarding', whereby the individual makes an effort to acquire and retain as much knowledge about the organisation as possible in order to keep his job.

It is the responsibility of the CKO to change this attitude, and to provide the necessary reward and motivation to encourage people to share more knowledge with their colleagues and with management, as well as with subordinates in a concerted effort to transfer useful knowledge throughout the organisation. The CKO will have to use his leadership skills to demonstrate convincingly that people who divulge what they know will not be retrenched, as traditional organisational values would predict.

The author recommends that the CKO start by sharing with employees something which would never be divulged to the rest of the organisation previously. A decision reached by top management at a board meeting which can affect the entire organisation is a good example of the this. By revealing what was discussed and decided upon at the highest level, the CKO will establish trust with the employees, who will feel that they can be trusted with this knowledge without any risks. In turn, they will feel that they can trust the CKO with their personal knowledge. It is imperative that this process be successful, otherwise the entire knowledge management effort will be a failure.

At the same time, the CKO needs to establish a 'push' factor to force employees to share knowledge even if they do not want to. A good example, would be to force employees to search through the knowledge repository before starting a project or a business venture. By explaining to employees that this practice could cut the time they spend learning how to solve the problems of their project, the CKO can motivate people to share knowledge about their projects.
McDermott and O'Dell (2001:79) propose three ways by which to make sharing knowledge an important factor in their business:

1. Make sharing knowledge a direct part of the business strategy
2. 'Piggyback' sharing knowledge onto other business initiatives
3. Share knowledge commonly as part of normal work

These practices have proved their worth in companies which have adopted them (McDermott & O'Dell, 2001:79-80), and the author recommends using these methods to encourage people to share and use knowledge in the workplace.

At this point, a very important distinction should be made between the two forms of knowledge, tacit and explicit knowledge. These two forms of knowledge need to be managed differently, since tacit knowledge is embedded inside the minds of people, and need to be shared with the rest of the organisation. The following diagram illustrates the process by which this can be achieved (Nonaka, 1998:28):

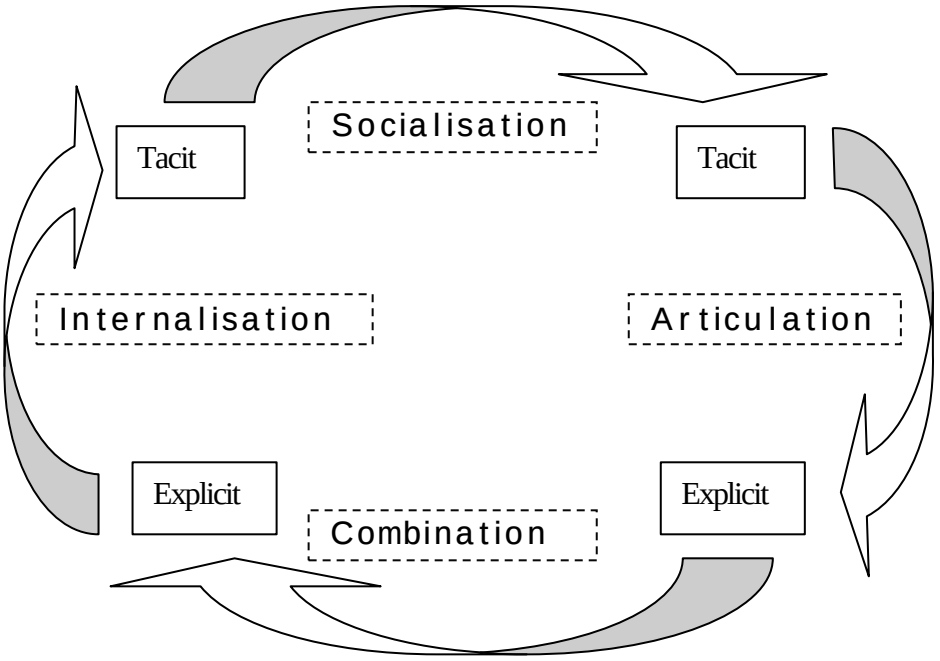


Figure F.1.2.2

By allowing formal and informal tacit to tacit transfer of knowledge, and the subsequent tacit to explicit and explicit to explicit and ultimately explicit to tacit transfers of knowledge, the organisation is creating an extremely important cycle of individual learning, whereby the individuals of the organisation are learning from other individuals. In time, this process will provide the necessary knowledge base for organisational learning, where the organisation itself can be said to be 'learning'.

F.1.2.3 Encourage Individual Learning and Innovative Thinking

Drawing from F.1.2.2 above, the CKO should encourage individual learning in the organisation. This can be done in a variety of ways, the easiest of which would be to demonstrate how sharing knowledge with other employees and learning from them can result in improved products and services and time and cost reduction. The CKO can also organise a number of formal activities, such as knowledge fairs, workshops,

and seminars aimed at creating the environment necessary to share and learn. The employees might resist this process at first, but if the CKO advertises that these will be forums where ideas and opinions taken from employees will be rewarded and maybe even used in the business, then people might be encouraged to participate.

The use of cross-functional knowledge teams is also recommended, since they create knowledge flows between different departments and help to transfer tacit knowledge throughout the organisation. The CKO should choose people who are talented at what they do, and who are willing to learn and share knowledge with others freely, and give them a free mandate to create. This is very important, because different departments harbour different kinds of knowledge about the organisation and its products and services. If these different knowledge items are shared, they might instigate a different line of thinking about a product or process and therefore create a line of innovative thinking. The creation of innovative products and services is extremely important in making the organisation competitive in its market.

The CKO should also implement the notion of double-loop feedback in the form of challenging assumptions in conjunction with new knowledge. This is where cross-functional knowledge teams can make the most impact. While granting them a free license to create knowledge, the CKO should also ensure that they are willing to challenge existing assumptions and look at situations from an unconventional perspective. This will allow them to create innovative products and business processes.

Furthermore, by allowing individuals and teams to learn and to contribute to the overall effectiveness of the organisation, the CKO will ensure that employees will be more willing to be a part of the change process of knowledge management. This commitment from the employees is important for the success of the effort.

F.1.2.4 Implement Reward Plans and Incentives

Another very important part of managing employees in a knowledge management paradigm is the rewards and the incentives that the CKO awards them for their contribution towards the effort.

Unlike traditional reward schemes, where the emphasis is on monetary value, the literature recommends a departure from this norm. As mentioned in F.1.1.6, the author recommends that the CKO implement a scheme where awards and monetary rewards are both awarded to employees who contribute. By recognising an individual's abilities and/or performance, or a team's performance and rewarding them with a coveted award, the CKO can encourage other employees and teams to try and match the same knowledge-based performance and abilities.

It is the responsibility of the CKO to implement a reward scheme which suits the organisational culture that prevails in the workplace. If the reward scheme does not suit the employees, then the knowledge management effort will fail due to lack of support from employees.

F.1.3 Knowledge Management of the Infrastructure and Processes

The third component consists of managing the infrastructure and the processes of the organisation which will support the overall knowledge management effort. The organisation should be concerned with factors such as the corporate intranet, the software and hardware that will assist people in sharing knowledge. The organisation should also re-evaluate its business processes in order to align them with the paradigm of knowledge sharing and people-oriented processes.

There are two distinct parts to this process:

1. Managing the Technology
2. Managing the Processes

The CKO has to manage the technology which will enable the storing, sharing and disseminating of knowledge. The CKO will also have to re-evaluate and/or devise the business process to allow the employees to share and use knowledge.

F.1.3.1 Managing the Technology

Managing the technology which will support the knowledge management effort is as important as managing the people and managing the organisation in a knowledge management effort. The literature abounds of examples of knowledge management efforts where all the emphasis is on the technology and not on the people.

The CKO has to plan what type of technology the knowledge management effort needs in order to be successful, and implement these technologies. In most cases the organisation already will have quite an extensive Information Technology (IT) infrastructure, and the CKO will only need to built upon this to achieve his goals. There are too many IT solutions for the author to be able to recommend any particular one, therefore only brief guidelines will be mentioned.

Firstly, the author argues that a basic networked PC is needed for every knowledge worker who has been identified. This PC needs to be loaded with the following basics software: word processor, spreadsheet, database, presentation tool and a website creation tool. The author recommends using Microsoft's Office suite as a standard office productivity tool, including Microsoft Frontpage.

The author recommends implementing IT infrastructures which will allow easy communication between employees, in other words collaborative technologies. For example, a corporate intranet linked to the knowledge repositories of the organisation could allow employees to access and retrieve information about past projects, and hence save time and money when starting a new project. This intranet in turn could be connected to the Internet, and provide access to a world of information.

Other technologies that the author recommends are electronic meeting rooms and/or videoconferencing capabilities. These will allow communication with employees who are geographically far apart, and allow sharing of knowledge even across national boundaries. The use of such groupware will greatly enhance the ability of employees to communicate over long distances.

The CKO should also choose the medium of the knowledge repository with care. If the access and retrieval time from the repository is long, employees will not use it to look at previous works. The knowledge workers should be able to access and retrieve knowledge from their desktops easily and quickly. If there is a need to build a customised software to communicate to the knowledge repository, the CKO should ensure that the users are involved in the systems development process from the beginning. The author recommends using the organisation's intranet and web facilities to achieve this, since most novice PC users find the Web easy to use and manipulate.

Davenport, et al, (1997:14) argue that the organisation needs to achieve a comfortable balance in its knowledge structure. The author concurs, and argues that on the one hand, the knowledge repository should have an easily understandable structure and categories so that users can find what they are looking for easily. However, the knowledge stored should not be over-categorised and over-structured, otherwise it will lose its essence.

However, every technology has a downfall in that the emphasis shifts from using the technology to enhance or facilitate work to using the technology for the sake of using it, and the CKO must ensure that this does not happen.

Where the workers involved are not computer literate or simply not literate, the CKO should devise ways to ensure that their contributions are not overlooked simply because they cannot read or use a computer. In a South African context, this is a reality which needs to be taken into consideration, especially when it comes to line workers. There are a variety of ways of bypassing this problem, one of which is to train a number of these line workers to be computer literate, and these empowered workers are then responsible to extract the tacit knowledge from their colleagues and document it on the knowledge repository. This will ensure that the tacit knowledge of production workers is not lost, and will further reinforce the feeling that management wants to involve everyone in the knowledge management initiative.

F.1.3.2 Managing the Processes

It is the CKO's responsibility to put processes in place in order to facilitate the creation of organisational learning. The business process should be re-evaluated and modified if need be so that the employees can create, identify, verify, capture, organise, disseminate and use knowledge easily throughout the organisation. In essence, the CKO should devise methodical processes to ensure that the organisation does not lose knowledge, but retains it.

McDermott & O'Dell (2001:82) argue that the organisation should make use of its existing informal networks and the author agrees. The CKO should use these informal networks to the best of their potential, perhaps by making them official, giving them more resources and rewarding them (McDermott & O'Dell, 2001:82).

However, sometimes the workplace processes will need to be modified to suit the knowledge paradigm. The modification of existing processes will imply changing the way people do things in the organisation, and the CKO will undoubtedly encounter resistance to change from the employees. This is why it is important to involve the employees in the process from the beginning. The CKO might find it more useful if the employees are asked to change their own business processes to meet the needs of a knowledge environment. The author argues that employees will be more willing to change the way they do their work if they are asked to devise new and more efficient ways to do so.

It is important to remember that knowledge management is not a once-off project, but an incremental one, and that the business processes should be regularly re-evaluated to gauge whether they are creating an environment where knowledge can flow freely.

Another very important aspect of managing the knowledge management processes is the measurement of the impact of knowledge management on the business. The CKO is responsible for devising suitable metrics that measure how effective the knowledge management effort is to the organisation, and other impacts as well.

However, the author cautions against using only financial indicators as a measure of the success of knowledge management effort. For example, it would be impossible to assign financial value on the know-how and experience of the employees of an organisation. However, one cannot deny the value of such know-how and experience. Hence, knowledge management achievements cannot always be quantified in monetary terms, and the CKO should ensure that top management is made aware of this, and devise other metrics to represent progress accurately. Davenport, De Long, and Beers (1997:9) use the following success indicators, and the author agrees with them:

1. Growth in the resources linked to the project
2. Growth in the volume of knowledge content and usage.
3. Survival of project without support of only one or two individual
4. Some evidence of financial return