CRITICAL FACTORS FOR ENABLING KNOWLEDGE SHARING BETWEEN GOVERNMENT AGENCIES WITHIN SOUTH AFRICA

A MANNIE
CRITICAL FACTORS FOR ENABLING KNOWLEDGE SHARING BETWEEN GOVERNMENT AGENCIES WITHIN SOUTH AFRICA

By

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Submitted in fulfillment of the requirements for the degree of Doctorate in Business Administration to be awarded at the Nelson Mandela Metropolitan University

December 2012

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Prof. C.M. Adendorff
DECLARATION

I, Avain Mannie (Student Number: 209030156), hereby declare that the thesis submitted for Doctorate in Business Administration is my own work and that it has not previously been submitted for assessment or completion of any postgraduate qualification to another University or for another qualification.

Name: Avain Mannie

Date: 19 March 2013
ACKNOWLEDGEMENTS

I would firstly like to dedicate this milestone to my amazing parents and all the close immediate family, even those who have since passed on, but have in some way shaped my curious path. Their positive influences and belief in my abilities have been the genuine urge in whatever I do and shall aim to do.

The old saying that ‘no man is an island’ is very true when it came to this research endeavor. To the research supervisors: Dr. Herman van Niekerk – your initial acceptance in being my promoter, comments on the literature and overall positive support is greatly appreciated. To Prof. Adendorff – your assistance was a ‘breath of fresh air’ required when one almost did not find the time and focus due to other commitments. We live in a chaotic world with enormous challenges and hence your arrival came at the right time as your continuing assertive stance was crucial in putting me back on my destined journey. I would also like to thank Dr. Annelie Pretorius for her patience and advice as always. You have been an invaluable listener and your comments assisted a great deal. To Prof. Boshoff for his advice and honest comments as well as to Mary Jane for her comments and input – all have been welcomed.

Many have advised against doing research in government due to the bureaucratic and silo mentality commonly known. However, being a non-conformist, I have always appreciated and met challenges head on. As such, I would like to thank the relevant heads of departments in the government agencies for rendering their support at a time when information is seen as a ‘confidential commodity’. Within my organisation, I would like to thank Deputy Commissioner Pillay for his belief, guidance and support to me over the years. To my close work colleagues, especially those that have assisted, advised and always given positive support – I thank you whole heartedly. More closely to home, I wish to thank my spouse and children for their patience and understanding for the many nights and weekends when I would appear to have ‘gone missing’. I trust that my efforts will remind us all that learning is but a continuous humble journey for those who seek knowledge and ultimate wisdom.
ABSTRACT

Globally, organisations have recognised the strategic importance of knowledge management (KM) and are increasingly focusing their efforts on practices to foster the creation, sharing and integration of knowledge. Whilst most research in Knowledge Management (KM) has focused on the private sector, there is a breadth of potential applications of KM theory and practice for government agencies to adopt in search of resolving pertinent problems. The purpose of this study is to examine the factors that influence the effectiveness of knowledge management towards collaborative problem solving in government. What is missing is research-based evidence of the factors that influence the main factors for knowledge sharing across government agencies. Given this gap, the researcher addresses the research question: In government agencies mandated to resolve issues of crime, what are the key factors required which support and influence the collaborative sharing culture?

Upon analysing the data, the researcher found the following key factors as being determinants on knowledge management: organisational culture, learning organisation, collaboration, subject matter experts and trust. The two factors – organisational culture and learning organisation were identified as the most significant factors which lay as the root or core for the ‘knowledge tree’. Once these roots are in place, the other factors will gain their significance on knowledge management. These findings serve to extend the findings of the existing literature within the government sector. This study is important because the findings provide government agencies with critically important information to guide their actions towards ensuring a knowledge sharing culture is embedded in government.

Whilst the empirical findings do not focus on databases or information technology specifically, it is important to acknowledge the use of both technology and people. The main concern is with managing an organisation’s knowledge assets: creating, storing, protecting, disseminating and using mission-critical knowledge. When people need knowledge, is it the right knowledge and is it timely and easy to locate and access? Is this precious commodity updated as learning occurs and better ways of doing things are discovered? The awareness of the value of knowledge to a business, coupled with its leadership, acts as an integrator that improves cross-
functional communication and cooperation. Shared knowledge not only makes for a more effective, efficient and agile organisation, but creates a common perspective and culture that produces a natural consistency of successful decisions and actions. The collaborative knowledge tree model proposed in this study uses the analogy of a tree when viewing South African government agencies as the branches of a collective tree (government). This ‘tree’ requires leaders and policy making to ‘dig deep’ into understanding the roots of the tree in order to ensure that the appropriate ‘seeds’ are planted such that the tree grows and is able to provide the necessary fruit required. Ultimately, as suggested by former President Thabo Mbeki (2012) in his address, the role of knowledge would thus be seen as a collaborative means towards the betterment of society.
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<tr>
<td>ANC</td>
<td>African National Congress</td>
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<tr>
<td>BI</td>
<td>Business Intelligence</td>
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<td>C4SIR</td>
<td>Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance</td>
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<td>CEC</td>
<td>Corporate Executive Council</td>
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<tr>
<td>CKO</td>
<td>Chief Knowledge Officer</td>
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<td>COI's</td>
<td>Communities of Interest</td>
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<td>CoP</td>
<td>Communities of Practice</td>
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<td>ECKM</td>
<td>European Conference of Knowledge Management</td>
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<td>GIG</td>
<td>Global Information Grid</td>
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<td>IA</td>
<td>Information Assurance</td>
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<td>IC</td>
<td>Intellectual Capital</td>
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<td>Information and Communication Technology</td>
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<td>IT</td>
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<td>KM</td>
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<td>Nelson Mandela Metro University</td>
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<td>NPA</td>
<td>National Prosecutions Authority</td>
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<td>NSA</td>
<td>National Security Agency</td>
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<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>SARS</td>
<td>South African Revenue Services</td>
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<td>SEM</td>
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<td>SME</td>
<td>Subject Matter Expert</td>
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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND RATIONALE: BUSINESS AND POLITICAL CLIMATE IN SOUTH AFRICA

“We are drowning in information and starved for knowledge” – Tom Peters

In 1994 South Africa began a world renowned transformation process, described by many as ‘miraculous’, which culminated in a new political dispensation. Coupled with this ‘miracle’ came a multitude of problems for the newly elected government to resolve, and many government agencies had their work cut out for them. The South African Revenue Services (SARS), for example, took up the challenge and has increased its revenue collections dramatically since 1994. Indeed, in the 2007/08 tax year, SARS managed to collect R571,8 billion in comparison to 1997/98’s R406,8 billion (SARS Strategic Plan 2008/09), reflecting a whopping 40.56 % increase (or R165 billion). Whilst this might appear to be a substantial achievement, the current target for the 2012-2013 financial year has increased to R818, 298 billion (SARS Strategic Plan 2010/11-2012/13). The question now being asked by many in the organisation is whether the organisation can continue to improve, or even sustain the increasing need to collect more revenues? The ‘honeymoon’ period, as depicted in the media, is thought to have to come to an end, and at a time of global financial crisis.

Effective resolution of such challenges require government organisations to improve their operational efficiencies, information management and overall management of their knowledge capabilities. More importantly, and pertinent to this study, government agencies need to share expertise and knowledge in order to adopt a collaborative approach towards problem solving. This need is further emphasised in the light of another government challenge: crime reduction. The crime rate in South Africa has received extensive local and international publicity. It is commonly understood that crime comes in various forms and methods, and the ripple effect of
crime in society has been widely documented. Crime affects an entire nation in terms of a loss of revenue to the fiscus, as will be highlighted later, specifically in the example of the anti-poaching fight by government. Furthermore, high levels of crime create a negative branding for the country, which affects tourism, plus of course, there are the associated socio-economic challenges. Combating crime is seen as a priority in order to ensure that the country can meet its mandate of tourist attraction, increase revenue collections and alleviate poverty. The creation of jobs is also assisted by the excess in revenue collections, as government will have monies to fund unemployment.

The question and focus of this study is the ‘how’. In other words, how will government, via its agencies, deal with collective problem solving in order to improve overall service delivery? This study intends to investigate the current state of knowledge sharing, within and across government organisations, in order to assist the problem-solving challenge experienced by the public sector.

From a South African perspective, it is accepted that the country is an emerging democracy when compared to the global village. As a developing country, it has many challenges, including poverty eradication, skills shortages and high levels of crime. These challenges will require collective resolution by leaders within the various government agencies. However, it has been found that, more often than not, knowledge is not effectively shared because organisations and business units tend to operate in silos. Ultimately, mandates of organisations or business units are seldom achieved, resulting in non-service delivery to the citizens.

In this study, the literature will show that in attempting to resolve problems, and if used effectively, the discipline of knowledge management (KM) can be a critical tool in assisting government agencies to inculcate a knowledge sharing culture and, ultimately, achieve their mandates. In 2007, Guy Rogers (a reporter at The Herald newspaper) interviewed renowned ichthyologist and environmental activist Professor Peter Britz on the subject of abalone poaching. In this headline article, Professor Britz stated categorically that government agencies were not effectively working together towards resolving the anti-poaching (abalone) problem (Rogers, 2007). Britz’s comment highlighted the lack of co-operation and inefficiency between
relevant government agencies. It is against this backdrop that the researcher proposed investigating the state of knowledge management in selected government agencies and thereby assisting to establish knowledge sharing practices within and between various government agencies.

1.2 PROBLEM STATEMENT AND EXPLANATION

Indications are that knowledge sharing amongst South African agencies is limited. In his address at the Knowledge Management conference at Stellenbosch Business School, ex-presidential Mbeki (2012: 4) pointed out the purpose of the conference in discussing “the role of knowledge in the betterment of society.” This may be linked to the ‘Batho Pele’1 principles which aim to achieve overall service delivery. To improve service delivery, we need to solve problems across government departments – hence to increase knowledge sharing. The problem may be stated succinctly as follows: There is insufficient and ineffective knowledge sharing between government agencies towards ensuring problem solving. Previous research by McDermott and O’Dell (2005: 84) and Yao, Kam and Chan (2007: 65) highlighted numerous barriers towards knowledge sharing, including aspects such as organisational culture and leadership. Other factors and barriers, as will be identified in the literature in Chapter 2, may also be prevalent, such as a lack of effective policies and procedures, resistance to continuous learning within the agencies, lack of an appropriate ICT (Information and Communication Technology) infrastructure, no knowledge sharing practices such as communities of practice and a lack of trust within organisations and even in government itself. This research aims to confirm and understand these root causes (barriers) which inhibit knowledge sharing, such that collaborative problem solving may be enabled.

According to Schonteich (1999: 1), much publicity has been given to organised crime in SA, which tends to grow rapidly during periods of political transition. In earlier work, Schonteich (1999: 5) clearly highlighted the importance of effective legislation and policies, which, as will be highlighted later in this study, are also key factors for

effective knowledge management to take place. The researcher will argue that, although Schonteich’s point is valid, insufficient research has been done in order to ascertain the holistic effectiveness of legislation by various government agencies. According to Wannenburg (2008: 18), “financial crime and corruption, the International Monetary Fund estimates, may strip the economy of 0.5 - 1 % of economic growth per annum. In 2007, 72 % of South African businesses had fallen victim to economic crime”. Pertinent to this study, a report in the Mail and Guardian (2008) stated that about 2000 tons of poached wild South African abalone, with a market value of R1,2 billion, was smuggled out of the country to Hong Kong during 2007. This highlights the economic loss to the fiscus and the significance of this study in contributing towards possible changes in legislation and improved knowledge sharing practices.

This study could be used as a framework how to enable knowledge sharing in government departments, and where inter-organisational or inter-departmental knowledge sharing would be beneficial in problem solving. The research is thus ideal in understanding how government agencies currently share knowledge, as well as what barriers currently prevent knowledge sharing from taking place. The conclusions and findings of the study may offer a solution-oriented framework for government agencies (public sector organisations) on how to manage and share knowledge and thereby facilitate problem solving and ultimate service delivery to the citizens of the country. The researcher acknowledges the independent efforts of agencies like SARS, and the successes of the National Prosecuting Authority (NPA), however, these ‘pockets’ of individual excellence may not have been combined in such a way that a collective knowledge sharing effort ensued. Again, this study could offer an appropriate framework that enables knowledge to be shared between agencies towards a common objective.

The researcher will focus on the discipline of knowledge management as understood in the global literature. The recent topic of netcentricity, which incorporates the effective use of advancing information and communication technologies, will also be viewed from a knowledge management perspective. More importantly, the study will focus on the enablers for knowledge sharing according to the literature. This will include:
• examining the state of leadership skills to drive the knowledge management discipline;
• attempting to understand organisational culture;
• analysing the effectiveness of ICT (Information and Communication Technology) support;
• assessing the impact of legislation, policies and procedures on knowledge sharing;
• examining the element of trust embedded in the relevant government agencies;
• enquiring into the presence of communities of practice (in other words, are effective knowledge networks in place, and is the right subject matter expert involved);
• establishing whether or not the characteristics of a learning organisation are instilled within the relevant government agencies.

1.2.1 Hypotheses

The objective of the study is primarily to investigate and test the impact of independent variables (identified in the literature) on the perceived effectiveness of knowledge management in government agencies. Furthermore, the study intends investigating barriers influencing knowledge sharing, based on the enablers mentioned above. As such, a number of hypotheses will be formulated to test these barriers, for example:

H^1: There is a positive relationship between effective leadership and the perceived effectiveness of knowledge sharing.
H^2: There is a positive relationship between a collaborative organisational culture and the perceived effectiveness of knowledge sharing.
H^3: There is a positive relationship between Information and Communication Technology (ICT) application and the perceived effectiveness of knowledge sharing.
H^4: There is a positive relationship between a continuously learning organisation and the perceived effectiveness of knowledge sharing.
H⁵: There is a positive relationship between communities of practice and the perceived effectiveness of knowledge sharing.
H⁶: There is a positive relationship between policy and legislation support and the perceived effectiveness of knowledge sharing.
H⁷: There is a positive relationship between the high levels of trust embedded in an organisation and the perceived effectiveness of knowledge sharing.

These hypotheses are only preliminary examples and the comprehensive list of hypotheses will only be finalised once the literature review and exploratory study have been completed.

1.3 THE SOUTH AFRICAN LEADERSHIP LANDSCAPE AND BATHO PELE

Since the focus of this study is within the public sector, it is appropriate to discuss the current political climate, as this has a central relevance from a leadership and organisational culture perspective. The importance of leadership has been posed in many a boardroom. In fact, as will be highlighted in Chapter 2, the presence of strong and collaborative leadership is a key element for effective knowledge management, especially for organisations striving to survive the turbulent global challenges. From a South African perspective, an initiative known as ‘Batho Pele’ was a political initiative first introduced by former President Mandela’s administration in October 1997. The term Batho Pele, according to the Department of Public Service means “People First” and requires that eight service delivery principles be implemented by government. It can be argued that poverty alleviation, skills shortages (education) and crime are high on the government’s current agenda.

The recent divisions or factions, as described in the media have resulted in divisions amongst the leadership of the majority political party which is the African National Congress (ANC). Due to the last South African political elections held, it was merely a matter of time before South Africa found itself with a new President and a new cabinet. The question posed is whether the principles of Batho Pele will be achieved or – whether a discipline like Knowledge management can assist government leaders towards achieving the goals envisioned by government?
Where the media has highlighted the competitive behaviour within government, the literature opposes competition and suggests that a collaborative approach is required by organisations and government. The newly elected President Jacob Zuma was faced with a daunting task in terms of backlogs, for example, insufficient houses built in the Eastern Cape; the crime rate still being high; and the highly contagious global financial crisis naturally impacting negatively on South Africa’s economy. Clearly, the challenges mentioned require a collaborative approach and strong, servant leadership. As the focus of this research will be conducted within the ambit of crime, one of government’s core challenges, this study will ultimately and importantly contribute towards problem solving, by assisting government in understanding whether or not a collaborative approach to knowledge sharing exists. In order to achieve this collaborative approach, the direction and deployment of good leaders is imperative. Effective leadership is a key element for knowledge management, as shall be discussed appropriately in the literature review. With the recent political changes, the question of effective, ethical leaders comes to the fore. The aim of this study, as indicated, is therefore to check the quality and perceptions of leadership within the relevant government agencies. The question is whether or not the political divisions at the top of the government structures have affected other regional government structures. Due to the competitive nature of leaders, a lack of trust may be viewed as a further potential barrier for the sharing of knowledge.

1.4 LOCATION OF STUDY: NATIONAL GOVERNMENT AGENCIES FOCUSING ON COLLECTIVE PROBLEM SOLVING

In order to ensure that the scope of the study is focused on a particular sector of government, one particular challenge of government was selected, namely the issue of crime, as described via the abalone poaching example, i.e. the relevant government agencies normally associated in investigating or dealing with anti-poaching were selected. According to Professor Britz, as reported by Rogers (The Herald, 2007: 1), the economy is losing approximately “R200 000 - million” worth of shellfish every year. This is obviously due to the non-declaration of this illegally gained income. Poachers are rapidly depleting the coastal area between Port Elizabeth and Port Alfred of its abalone, which is fast becoming a scarce natural resource. Furthermore, and relative to this field of study, Britz specifically stated in
the article that the various government agencies associated with combating the illegal industry are not working effectively with each other. Based on that statement, the question arises as to whether or not knowledge is in fact being shared between the agencies. The issue of non-collaboration is relevant, and currently being debated in knowledge management circles, such as at the European Conference on Knowledge Management (2008). According to various news reports, some departments are arresting poachers. But are they sharing their knowledge or information about their operations with other departments? Clearly, Professor Britz, as reported by Rogers (2007) has suggested that there is no knowledge management strategy or effective knowledge sharing occurring between the agencies.

The researcher therefore proposes to research the discipline of knowledge management by investigating the effectiveness of knowledge sharing between various relevant government agencies. The aim of the study would be to identify and investigate the barriers affecting knowledge sharing. Is it merely an assumption that knowledge management principles are not being used? Is it the calibre of leadership? Is it a lack of work ethics? Or is it a lack of skills or a lack of mentoring, so that those in one agency do not understand what those in the other agencies are doing? The list of questions can go on and on. The researcher also intends to investigate how knowledge sharing, like in the example of abalone poaching, is approached by the government agencies mainly recognised to resolve these type of criminal activities. The emerging theme that permeates from the statements and literature thus far appears to be a need for a paradigm shift from “competition towards collaboration”. Ultimately, new theories or models in knowledge management may emerge from this research and result in solutions and collective problem solving.

1.5 OBJECTIVES OF THE STUDY

The primary objective of this study is to investigate the perceived effectiveness of knowledge management in government agencies. This would include identifying the barriers required for knowledge sharing that may exist, within and between the relevant government enforcement agencies where collaborative sharing practices are
required. The objective will be not only to confirm the existence of barriers, but also to measure and highlight each barrier’s relation to knowledge sharing. The aim is to formulate a knowledge management model, which will enable knowledge sharing between the relevant government agencies and which could be extended to other government agencies. Therefore, the findings from this research may also be used by other areas of government to resolve knowledge management challenges where inter-agency collaboration is required in problem resolution.

1.5.1 Scope of the study

Whilst government has many departments overlooking many sectors, this study had to focus on a particular sector. As such, the criminal sector, based on the example of the abalone poaching, was selected primarily due to the recent publicity in the local newspapers which highlighted the problem of government agencies not operating collaboratively with each other. The regional managers of the relevant agencies operating in the Eastern Cape were initially identified due to the researcher being based in the Eastern Cape. However, to ensure national benefit is obtained, the researcher further targeted the national counterparts of the regional managers, in order to adhere to government agency protocols. By gaining national support, the results could assist towards obtaining a strategic and overall view of the state of knowledge management for leaders to take note of. The national consensus would therefore be important for executive managers to heed recommendations in order to assist towards strategic planning and overall resolution towards governmental problems requiring resolution. Through the initial engagement, it became apparent that the relevant agencies required total anonymity due to the nature of criminal investigations. As such, it must be emphasized that the relevant government agencies shall not be named in this document, especially with regards to the analysis and findings. Instead, specific government agencies will be referred to as Agency A and Agency B and so on, in order to respect the anonymity requested. Within Agency A and Agency B in particular, there are various business units involved, like the Investigations and Audit units. As such, specific investigations and or audit divisions were focused upon. As further explained in Chapter 5, due to anonymity being a crucial guarantee, the request to pass the research instrument to all recipients (employees at lower levels) was naturally dependant on the support of the leaders.
who the researcher engaged with. The snow-ball effect was therefore used, in order to ensure that national coverage was obtained within the relevant government agencies.

### 1.6 RESEARCH APPROACH

In an attempt to obtain the most reliable data, the researcher approached the regional and national heads of the above-mentioned agencies. Having specified the scope above, the researcher engaged the relevant managers by indicating the value and contribution of the research to the relevant agency as well as for government as a whole. The issue of anonymity, as highlighted in 1.5.1 above, was assured to the relevant managers of the related government agencies. In terms of supporting the research, the researcher stressed upon the relevant managers to ensure that their employees are also clearly communicated with, in terms of the objective, anonymity and their valuable contribution towards government collectively. For this study, a comprehensive questionnaire, covering the identified independent variables, will be made available electronically and manual copies where required. An appeal to the managers to ensure that employees be given time to complete the survey is also an important aspect of the research approach.

A comprehensive literature research was conducted, specific to knowledge management and the related sub-problems, so as to understand the barriers to knowledge and suggested solutions. Primary sources, such as newspaper articles and other published articles pertaining to the poaching industry shall be sourced through the public and university libraries and the internet.

### 1.7 CONTRIBUTION OF THE STUDY

As will be highlighted in Chapter 2, the topic of knowledge management is relatively new in organisations, particularly in the developing countries. In the public sector, knowledge management is even less familiar, especially from a researched perspective. This was highlighted in Saussois’s written paper for the OECD (Organisation for Economic Co-operation and Development) in 2003. More recent literature, as will be discussed in the literature in Chapter 2 confirms this point. Within
the developing nations, and more especially within the African continent, very limited research has been done on knowledge management in government. In fact, during a workshop (Indaba on the Public Service as a Learning Organisation, 2006), the South African Department of Public Administration admitted that no framework on knowledge management existed. Since then, it must be acknowledged that some government departments have introduced KM and even appointed persons in the field of KM. However due to KM being a wide discipline, as elaborated upon in Chapter 2, more probing is required. One contribution of this study will thus be to identify and to highlight the critical barriers preventing knowledge sharing from taking place in government agencies in South Africa.

Previous research is known to have focused on knowledge within one particular organisation and not at selected agencies within government collectively, as this study will do. This study will also be looking at crucial elements for knowledge management, namely leadership, Information and Communication Technology (ICT) infrastructure, organisation culture, and legislation:

- The issue of ethical and effective leadership in resolving organisation/governmental problems, like the current crime debate, needs no further elaboration. South Africa, as a developing nation, may find it difficult to survive without this type of leadership at national, regional and local levels.
- The Presidential National Commission on Information Society and Development has set in motion the process of narrowing the digital divide. Terrorist attacks have also alerted governments around the world to ensuring that tools like information technology are used in information sharing.
- The rainbow nation of South Africa makes the culture debate a challenging one, especially in the public sector which, after just over 18 years in the new democracy may still be viewed as a ‘learning government’, with a culturally diverse workforce and leadership.
- Legislation (for example, a new constitution, the Promotion of Access to Information Bill to name just two) has changed somewhat since the new dispensation, but how effective has it been?

All the above issues are of strategic importance to ensuring South Africa’s sovereignty. This study therefore seeks to explore and understand these elements in
more detail, and to present scientifically proven results that can provide a model/framework for knowledge sharing to take place within and across government agencies. In Chapter 2, a brief overview of knowledge sharing experiences and challenges in other countries are highlighted.

*NEXUS* and *Dissertation Abstracts International* searches executed by the Nelson Mandela Metropolitan University library confirmed that no similar study of this nature has been or is currently being conducted in South Africa. Furthermore, the netcentric approach is also an area which has only most recently been used in global circles, more specifically within the US military industrial complex.

### 1.8 CHAPTER OUTLINE

This study will be divided into seven chapters:

Chapter 1 has laid out the rationale for the study, focusing on why such research is important and how it can contribute to collective problem solving by government organisations for the welfare of the South African economy. This chapter also provided a background to the research and the specific problem statement was highlighted. The various hypotheses were listed, upon which will be the basis for the testing of the theoretical model presented in Chapter 4. It has briefly been stated that limited research within government on the Knowledge management discipline has taken place, as also confirmed in the literature chapters. The scope and research approach was further indicated. Perhaps more importantly, the need for anonymity during the research approach requires emphasis due to associated policies and legislation which certain agencies need to adhere to. In Chapter 2, a brief overview of knowledge sharing experiences and challenges in other countries are highlighted. The knowledge paradigm, which is further discussed in Chapter 2, basically refers to the humanistic and technology paradigms faced by organisations. As such, Chapter 2 focuses on the humanistic paradigm whilst Chapter 3 on the information and communication technologies paradigm.

Chapter 2 will examine the literature available in order to provide a theoretical framework for the research. The chapter begins with the assertion that knowledge
management is a relatively wide and a relatively new discipline, more so in the public sector. Due to the evolving state of organisations and the wideness of knowledge management, the commonly associated enablers or independent variables for knowledge sharing purposes, as acknowledged in the literature, are identified and discussed per variable. Thereafter, a brief overview of knowledge sharing experiences and barriers are highlighted. The issue of knowledge management in government specifically is also the extended focus, due to the scope of this study being within the public sector.

Chapter 3 focuses on the other knowledge paradigm, which are the information and communication technologies available. Technology is viewed by many experts as a means towards enhancing knowledge sharing practices. The main focus of this chapter is around an emerging concept of netcentricity, which has been primarily introduced and used within the military industrial complex in the United States of America. The defining and primary goals of netcentricity are initially described. Furthermore, the relevant pillars for netcentricity are also discussed, where it becomes obvious that the enablers for knowledge management and netcentricity are very similar. This chapter also closes with a brief synopsis at knowledge management in other countries, so as to understand some of the approaches and challenges experienced by other governments globally.

Chapter 4 presents the theoretical model for the perceived effectiveness of knowledge sharing, after discussing and drawing from the theory as indicated in the literature. The complete list of hypotheses, including those identified earlier in this Chapter is presented. The set of hypotheses specifically focuses on the relationships between the independent, intervening and dependent variables. In chapter 4, each variable and its influence on knowledge sharing shall be discussed and hypothesized.

Chapter 5 discusses the research design and the instruments used to measure the proposed theoretical model. This chapter shall conclude with a detailed description of structural equation modeling (SEM), the statistical technique used in this study to assess hypothesised relationships in the theoretical model generated to understand the state of knowledge sharing in and between government agencies in South Africa.
Chapter 6 will present detailed feedback from the statistical analysis. The process as from the exploratory factor analysis, towards the measurement and best model fit based on the theoretical model will be discussed. Emanating from these results, the possibly new or amended model shall be presented.

In the final Chapter 7, the contributions and limitations of the present study, as well as recommendations for future research, will be elaborated upon. The main focus is based on the model presented in Chapter 6.
CHAPTER 2

KNOWLEDGE MANAGEMENT

2.1 INTRODUCTION

In the previous chapter, the lack of effective knowledge sharing within government agencies as well as between governmental departments was highlighted. This chapter therefore seeks to provide a synopsis of knowledge management, with all the associated terms and enablers, such that the strategic importance of knowledge to organisations is emphasized. The globally accepted enablers for effective knowledge sharing will be discussed, whilst a more specific scope will focus on knowledge management (KM) in the public sector.

The concept of knowledge has been a focus for leaders globally. In fact, the Economist Intelligence Unit Report (2006: 3), which assessed likely changes to the global economy between then and the year 2020, stated that “knowledge management will be the major boardroom challenge”. Furthermore, the report highlighted that “knowledge management was rated the highest as an area which offered the greatest potential for productivity gains”. Given the strategic importance of knowledge management, the literature in this chapter will aim to describe and define the discipline of knowledge management. Before doing so, it is imperative for one to understand that knowledge management is strategic due to the fact that it is a multi-faceted term. Knowledge management may link up and benefit different business units within an organisation. For this reason, knowledge management has no concise definition aligned to a specific area of study. Also, given that knowledge management is a relatively new concept, it can be seen as a constantly evolving subject for researchers, with new theories, studies and models emerging.

Knowledge management has emerged in the last decade as an important organisational concept and whilst definitions still differ on what KM is, consensus is emerging. In a study by Kippenberger (1998: 14) involving nearly 40 respondents, the majority of respondents agreed that KM is defined as “the collection of processes
that govern the creation, dissemination, and utilisation of knowledge to fulfil organisational objectives”. The issue of knowledge management in government and the matter of knowledge sharing within government agencies is an area in which only limited research has been conducted (O’Riordan, 2005; Cong and Pandya, 2003). That said, and as indicated in the literature below, the public sector normally follows the private sector and it is obvious that governments around the world have ‘bought into’ the concept of knowledge management. It is therefore acknowledged that leaders in public departments will pursue the knowledge agenda. While there have been knowledge management studies conducted within large, mostly private sector corporations, this study seeks to focus on investigating knowledge sharing between public sector organisations aiming towards collaborative problem solving.

Given the vastness of knowledge management, many closely associated terms have been adopted, which sometimes create ambiguity around the subject. Before defining the term ‘knowledge management’ through global authors, the researcher shall first highlight the differences between the terms of ‘information’ and ‘knowledge’. Thereafter, other closely associated terms, like ‘business intelligence’ (due to its relevance to this study) shall also be elaborated upon. The aim here is to highlight that these terms are associated and important, but are viewed by the subject matter experts as components of knowledge management.

It is a common view, held by various authors, that ‘knowledge’ as a concept is not new. Indeed, its source, according to most Western authors, is derived from the Greek epistemological era. However, ‘knowledge management’ as a discipline is relatively new (Bebensee, Helms and Spruit, 2011; Cheng, Ho and Lau, 2009; Ibrahim and Reid, 2009; Tiago, Tiago and Couto, 2009; Jakubik, 2007; Cortes, Sa’e Zac and Ortega, 2007). It is therefore important to distinguish between ‘knowledge’ and ‘knowledge management’. As will be highlighted by various authors later in this chapter, knowledge management is viewed as a vast, multi-faceted discipline. This is relevant in understanding that knowledge management is not a ‘stand alone’ topic and, as it is relatively new with a complex and learning nature, is still evolving as a discipline. As this paper seeks to investigate how knowledge is shared between government agencies, the literature on knowledge sharing, as well as the various enablers, which include some knowledge sharing techniques like communities of
practice (CoP), will be discussed. Thereafter, the crucial barriers for knowledge management will also come under scrutiny. The most commonly accepted theories, conceptual models and approaches to knowledge management will ensue and, lastly, a model will be proposed in a subsequent chapter. This will highlight the limitations which emanate from the literature.

In reviewing the literature below, the researcher will draw attention to the emerging facts and align the structure of this chapter accordingly.

2.2 KNOWLEDGE MANAGEMENT – A RELATIVELY NEW AND MULTI-FACETED DISCIPLINE

Dalkir (2005: 12) claimed that the term ‘knowledge management’ became popular in the late 1980s, when conferences in knowledge management began and books on the subject were published. Dalkir reiterated, however, that the concept of knowledge has been around for many decades. According to Dalkir, as early as 1938, H.G. Wells described his vision of the “world brain”, which conceptualised the intellectual organisation absorbing our collective knowledge. Dalkir (2005) went on to mention a number of global management gurus who wrote about knowledge management, without specifically using this term. The management gurus mentioned by Dalkir include the late Sir Peter Drucker, who according to Dalkir, was said to be the first to coin the term ‘knowledge worker’ in the 1960s. In the 1990s, Peter Senge was said to have focused on the ‘learning organisation’, which described how companies could learn from previous experiences and store this knowledge for future organisational benefit. The Japanese duo of Nonaka and Takeuchi (1995), whom are also mentioned by Dalkir (2005), studied how knowledge is produced, applied and shared within organisations. Both Nonaka and Takeuchi were renowned for highlighting the difference between tacit (internalised) and explicit (external) knowledge, and the striving towards innovativeness and creativity.

Thus, the concept of knowledge and the methodology to use and share knowledge have evolved over the years. The technological advances have evolved and changed at such a tremendous pace over recent years that organisations, societies and governments need to evolve and change as well. The netcentric approach towards
knowledge management, as will be elaborated upon in Chapter 3, seeks to highlight an approach which has until recently only been used predominantly within the military industrial complex.

Jakubik (2007: 6) pointed out that, while knowledge management was a relatively new concept in the 1990s, a growing interest in the subject had begun to emerge in a large number and variety of publications. Cortes, et al. (2007: 54) concurred, adding that “knowledge began to be considered the strategic resource for numerous organisations in the 1990s”. Bebensee, et al. (2011: 2) acknowledged that knowledge management is young but relevant in today’s economy. Ibrahim and Reid (2009: 567) noted that knowledge management had come into the limelight in the past decade. More importantly, the authors stipulated that a KPMG survey of 423 leading European and American companies found that 70% of respondents were undertaking some kind of knowledge management initiative. Ibrahim and Reed further point out that another recent UK survey of 1,000 top British companies found that 64% of responding firms had introduced knowledge management, while 24% of them were at the introduction stage. From the above authors, it is clear that there has been an immense and rapidly increasing interest in knowledge management.

In fact, Knight and Howes (2003: 2) highlighted that “knowledge management is certainly less than 10 years old and is therefore not mature enough to be defined from a coherent worldly view”. As this statement was made in 2003, it can be argued that almost a decade has passed since then, but based on the more recent literature exposed above, it is clear that knowledge management is still maturing as a discipline. Goh (2005: 6) stated that knowledge management had emerged as a “hot” discipline. As the term knowledge management has no universal or concise definition, Goh (2005: 6) believed it to be often conceived in the broadest sense. Akoumianakis (2008: 13) described knowledge management as having a broad connotation used for the benefit of enhancing learning and organisational performance. In order to reiterate the strategic vastness of knowledge management, Evangelista, Esposito, Lauro and Raffa (2010: 34) maintained that research on knowledge and knowledge management “spans the disciplines of economics, information systems, organisational behaviour and theory, psychology, strategic management, and sociology”.

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Sagsan (2009: 628) argued that knowledge management as a discipline should be evaluated from an *interdisciplinary* perspective. Sagsan continued and listed disciplines such as “database technologies, collaborative technologies, organisational science, electronic performance support systems, document and information management, decision support systems, library and information sciences, web technologies, artificial intelligence, technical writing, cognitive science and desk help systems”. It is clear that such diversity contributed to the rapid advancement of research in specialised areas that investigated different aspects of organisational learning and knowledge management.

Puusa and Eerikäinen (2010: 307) viewed knowledge as multi-dimensional whilst Reed, Scanlan, Wills and Halliday (2010: 319) suggested that knowledge management, by its very nature, encompasses a wide range of issues and subjects. Consequently, its definition varies depending on the perspective from which it is viewed. Lopez, Peon and Ordas (2004: 93) expressed the same view when they stated that knowledge management is difficult to define due to the fact that it has been studied by several disciplines and from different approaches. From a South African perspective, Lee (2004: ix) also confirmed that “knowledge management is not one single discipline”. Instead, it is an integration of many endeavours and fields of study.

The researcher's objective in highlighting the fact that knowledge management is a multi-faceted and a relatively new discipline is to counter some criticism of the term by various authors, such as Barclay and Murray (2007: 1), who conceded that “knowledge management is hard to define precisely and simply”. They compared the quest to define knowledge management to asking a company chief executive officer to define *management*, or asking a doctor to define *health care*. It is clear from the assertions of these authors that knowledge management is difficult to ‘pin down’ to a single definition, specifically because of its multi-faceted characteristics. The researcher agrees with Goh’s (2005: 6) description of knowledge management as a “hot discipline” in that it is precisely due to its multi-faceted agility that it can fit into many organisational business units, from economics to information systems, strategic management, human resource management, marketing, finance and more.
In other words, and as acknowledged by numerous authors, knowledge management is a strategic tool that may be used for competitive advantage. The fact that knowledge management can fit into many business units, makes it ideal for continuously improving and resolving organisational problems.

Therefore, for the purpose of this study, the working definition of knowledge management is defined as: a strategic management discipline which assures a process in which information is transformed into knowledge, such that a collaborative sharing culture is instilled towards resolving commonly identified problems. The key ingredients in problem solving in this instance are in identifying and knowing from whom to obtain the relevant knowledge and with whom to share it amongst.

2.3. THE KNOWLEDGE HIERARCHY

Frické (2007) referred to the knowledge hierarchy, also referred to as the knowledge pyramid, in which a pyramid depicts levels of transformation from data, to information, to knowledge and ultimately wisdom. Frické pointed out that the knowledge hierarchy is a widely recognised and quoted model in the information and knowledge literature. Frické (2007: 8) viewed data as “akin to evidence’ or “indeed similar to facts”. When viewed from a knowledge pyramid perspective, information was viewed by Frické (2007: 8) as “weak knowledge”. Zins (2007: 479), suggested that the concepts data, information and knowledge have a diverse set of meanings for each but that “evidently, the three key concepts are interrelated, and the nature of the relations among them is debatable, as well as their meanings. Davenport and Prusak (1998) associated data as a record of transactions emphasizing that data on its own has little relevance or purpose. Whilst the concepts differ somewhat slightly per definition by various authors, there is mutual consensus indicating that the concepts are inevitably inter-related. Thus, each concept fulfils a specific purpose towards the process from data to the ultimate achievement of wisdom. The argument and challenge off course is on establishing how the pyramid transforms between each concept towards knowledge and ultimate wisdom level. The figure below depicts the knowledge pyramid as referred to by Frické (2007).
As depicted in Figure 2.1 above, the distinct objective is for organisations to ensure that they both: distinguish between the different concepts and strive towards the attainment of knowledge and ultimately wisdom. In order to gain a better understanding of these concepts, the following discussion will attempt to highlight the distinct differences between information and knowledge, such that the shift from information to knowledge is more easily understood.

**2.3.1 Distinguishing between information and knowledge**

Before attempting to define knowledge management, it would be appropriate to emphasize the difference between the sometimes confusing terms of ‘information’ and ‘knowledge’. According to Hicks, Datterro and Galup (2006: 19), a common theme in the knowledge management literature is that “data is combined to create information, and information is combined to create knowledge”. The authors went on to emphasize that “although there is a consensus that data are discrete facts, thereafter consensus is lacking. The lack of consistent definitions for data, information, and knowledge make rigorous discussions of knowledge management difficult”. 
De Alvarenga Neto and Vieira (2011: 85), who researched the management of knowledge in world class organisations over a decade, stressed four major concerns, one of which is the “longstanding misinterpretation that considers knowledge management and information management (IM) as synonyms”. The authors view information management as one component of knowledge management.

2.3.1.1 What is information?

Duffy and Assad (1980: 13) maintained that “Information is data recorded, classified, organised, related or interpreted within context to give meaning”.

Groff and Jones (2003: 3) indicated that “information is data that has been given meaning by way of context”. Hicks, et al. (2006: 20) cited Drucker who stated that “information has been defined as data with special relevance and purpose”.

It is important to note that the ‘human interactive element’ is absent in these definitions. That said, it is obvious that knowledge ‘kicks in’ once the information is used or acted upon by a user (the human element).

2.3.1.2 What is knowledge?

According to Groff and Jones (2003: 3), “knowledge is information combined with understanding and capability; it lives in the minds of people”. In other words, knowledge is information made actionable in a way that adds value to an organisation or person. Various other reputable authors, as mentioned and compiled by Stenmark (2002), further defined the two terms, as listed in Table 2.1 below. Furthermore, the distinct differences between the two (information and knowledge) cannot be overly emphasized.
Table 2.1  Distinguishing between Information and Knowledge

<table>
<thead>
<tr>
<th>Information</th>
<th>Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facts organised to describe a</td>
<td>Truths and beliefs, perspectives and concepts,</td>
</tr>
<tr>
<td>situation or condition</td>
<td>judgements and expectations, methodologies and</td>
</tr>
<tr>
<td></td>
<td>know-how</td>
</tr>
<tr>
<td>Information is interpreted data</td>
<td>Knowledge is learned information</td>
</tr>
<tr>
<td>A fluid of meaningful messages</td>
<td>Commitments and beliefs created from these</td>
</tr>
<tr>
<td></td>
<td>messages</td>
</tr>
<tr>
<td>Data with meaning</td>
<td>The ability of assigning meaning</td>
</tr>
</tbody>
</table>

Source: Adapted from Stenmark (2002)

Over and above these definitions, the researcher adds that the ‘meaning’ of the information can only be analysed by the recipient. As such, information can only be interpreted and given proper meaning if analysed and applied by the user or recipient of the relevant information. Using Groff and Jones’ (2003) example of a spread-sheet or income statement, the researcher asserts that the true ‘meaning’ of an income statement can only be interpreted if information is applied by an individual – only then is it actually knowledge, as will be described below.

It is publicly acknowledged that a lot of information is found these days, whether in intranets or within people. However, it remains only information until people have interacted used or applied the information for the ultimate resolution of a specific problem. The researcher contends that information and knowledge may be compared to the analogy given by Chase (1938), an expert on the subject of semantics. Chase asserted that a word like ‘apple’ can only truly be known by most because they have seen it and tasted it. For one who has not touched or eaten an apple, or even seen one for that matter, the true meaning of the term ‘apple’ is unknown. Likewise, the researcher contends, information may be viewed in the same way as the uneaten apple; once it has been ‘actioned’ or ‘eaten’ by people, only then it becomes knowledge. In the public sector, the researcher argues that due to vast amounts of
information being received, the transformation from information to knowledge may still be a challenging shift. Having attempted to assert the difference between information and knowledge, the concept of knowledge management is discussed next.

2.4 WHAT IS KNOWLEDGE MANAGEMENT?

The literature above has alerted the researcher to the fact that there are many terms closely associated with knowledge management. Even though experts argue that the sense of knowledge management is wide and therefore difficult to define, it is important to note definitions put forward by various authors on the subject. As mentioned in Section 2.1 above, Kippenberger (1998) defined KM as a collective process in which knowledge is created, disseminated and utilised towards the achievement of organisational goals. Turner and Minnone (2010) asserted that knowledge management is achieved through proactive managers who are able to establish and maintain the knowledge and skill of employees towards ensuring an organisation’s competitive edge. Although Turner and Minnone supported Kippenberger’s view in terms of ensuring that KM is ultimately for the benefit of the organisation, Turner and Minnone strongly pointed out that this can be achieved mainly due to proactive and successful management initiative and commitment. Turner and Minnone (2010: 161) further argued that there exists a “simplistic misconception that KM only involves the capture, or downloading, of the content of employees’ minds”. This may suggest why the distinct difference between the two terms (information and knowledge) exists and is therefore discussed in Section 2.3.1 and 2.3.2. Whilst some authors may view KM as a formal process, Rosenberg (2000:1) viewed KM as a process whereby “organisations need to get knowledge into the hands of the workers when and where they need it”. This may suggest that both formal and informal means for managing knowledge may be applied. Rosenberg (2000) further emphasised the point that learning and training are often thought of as being synonymous, when in fact this is not the case. The focus of learning on KM is supported by Erickson and Rothberg (2011: 28) who suggested that “knowledge management is founded on the belief that the greater development and use of an organisation’s intellectual capital will lead to a competitive advantage”. The emphasis on development suggests that a learning environment is the key towards an
organisation achieving a competitive advantage. Dalkir’s (2005: 18) definition may be more aligned to the reality of information overload experienced by most organisations by stating that “knowledge management represents one response to the challenge of trying to manage this complex, information – overloaded work environment”. It is clear that these authors see knowledge management as essentially a critical tool for management to resolve organisational problems. However, after analysing the above definitions of knowledge management, the researcher poses the following further considerations:

Although Rosenberg (2000) highlighted the need to “get knowledge into the hands of workers”, the question remains: what knowledge? Surely a knowledge management strategy is not effective if one does not know what information is required to trigger the process. Steward (2000) further elaborated that “vast amounts of money” is wasted because “organisations fail to figure out what knowledge they need”. In this, the researcher agrees, along with many others, like Malhotra (2005), Davenport and Prusak (1998) and Wilson (2002) who were critical of knowledge management. Malhotra, in particular, declared that too much money is invested via IT (information technology) projects in the ‘name’ of knowledge management.

Numerous other authors, such as Erickson and Rothberg (2011), Du Plessis (2007), Bebensee et al. (2011) and Boateng (2010), to name a few, have asserted that an organisation’s use of knowledge management will result in its competitive advantage. Here, the researcher strongly argues that the term ‘competitive’ may oppose a collaborative approach towards knowledge sharing. More importantly, a competitive advantage for one organisation may negate knowledge sharing especially when the knowledge sharing is done between various organisations. The researcher therefore posits that a proposed ‘netcentric’ approach (which will be discussed in the following chapter) for knowledge sharing will clarify what information is needed, from whom the information is needed, and to whom the required information should go. Furthermore, the centric approach will attempt to foster a collaborative approach rather than possibly delivering a competitive advantage for only one of the parties involved. Ultimately, the power of information is given to those who need it and who can use it in order to resolve the mutual goal. In keeping with the argument against ‘competitiveness’ the researcher introduces the concept of “knowledge cooperation”
which may be appropriate in government organisations. According to Bettoni, Andenmatten and Mathieu (2007: 1) knowledge cooperation is “the cooperation and collaboration of different domain experts with the aim of stewarding knowledge”. Bettoni et al. further elaborate that the collaborative approach is a constantly changing process and develops through actions and interactions.

Most of the definitions above focus on knowledge that is shared within an organisation. This study, as highlighted in the previous chapter, intends focusing on knowledge sharing between organisations, in this case between government departments. It is critical to note that if information is not acted upon by people, then knowledge management is not in play. The proposed concept of netcentricity (introduced and defined in Chapter 3) therefore opts to synergise information technology and people. It is further designed to empower the end users (people) with the right information.

As can be seen, many different definitions and explanations of knowledge management have been expressed by various authors over time. The following table helps to clarify what knowledge management is and, more importantly, to emphasize what knowledge management is not.

### Table 2.2 Clarification of Knowledge Management

<table>
<thead>
<tr>
<th>KNOWLEDGE MANAGEMENT IS:</th>
<th>KNOWLEDGE MANAGEMENT IS NOT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>... a working environment that impacts on both people and culture</td>
<td>... is merely about information technology (IT)</td>
</tr>
<tr>
<td>... a discipline requiring the belief and participation by people themselves</td>
<td>... something done by a support function for operational staff and people</td>
</tr>
<tr>
<td>... a discipline requiring a comprehensive and organisation-wide approach in order to support organisational objectives</td>
<td>... mere discrete interventions</td>
</tr>
<tr>
<td>... a process requiring the creation, dissemination and use of knowledge</td>
<td>... only about creating knowledge portals or repositories</td>
</tr>
<tr>
<td>... the management of information with meaning (knowledge)</td>
<td>... information management (organising data, files and documents)</td>
</tr>
</tbody>
</table>
In summary, knowledge management has been described as a wide, multi-faceted and relatively new discipline, particularly in the public sector. Both global and South African authors have furthermore agreed that knowledge management is a strategic tool, with which organisations can ensure a competitive advantage. Given these facts, it is important to re-emphasize and conclude with the working definition of KM stated in Section 2.2 above for this study: Knowledge management is indeed a strategic management discipline which assures a process in which information is transformed into knowledge, such that a collaborative sharing culture is instilled towards resolving commonly identified problems. Due to this study focusing on government agencies, the terms business intelligence and KM also need some clarification.

### 2.5 INTEGRATING BUSINESS INTELLIGENCE AND KNOWLEDGE MANAGEMENT

As indicated above, the term knowledge is widely associated with many other terms, which is one of the reasons why confusion and ambiguity abound in broad knowledge management discussions. Herschel and Jones (2005: 45) claimed, for example, that “many in industry confuse knowledge management with business
intelligence”. Within government circles internationally, it is common for those dealing with organised crime or the military to speak of the ‘intelligence community’. The researcher argues and intends to prove through this study that the lack of proper legislation and possible lack of collaboration between agencies might prevent a particular agency from obtaining access to information – which is crucial for knowledge sharing and ultimate problem solving.

The term BI (Business Intelligence), according to Jermol, Lavrac and Urbancic (2003: 5), is defined as “a broad category of applications and technologies for gathering, storing analysing, and providing access to data to help enterprise users make better decisions.” The same authors (Jermol, et al.) highlighted the need for the culture of the enterprise and individuals in traditional organisations (autocratic; top-down structures) to change to a network culture. They concluded by indicating that “solved intellectual property rights issues and mutual trust are amongst the most important conditions for building a knowledge sharing culture, one in which collaborative problem solving across institutional boundaries are achieved”. Again, the researcher posits that legislation and policies, and not necessarily intellectual property rights issues are the main hindrance towards knowledge sharing and ultimate problem solving, especially within the public sector.

Herschel and Jones (2005: 45) reviewed literature between 1986 through 2004 and concluded that “knowledge management and business intelligence, while differing, need to be integrated and are both key factors for management”. The findings of their study highlighted the nature of the integration between business intelligence and knowledge management, and make it clear that the former should be viewed as a subset of the latter.

It is apparent from the above definitions and other literature that business intelligence is a critical component for the greater knowledge agenda. The gathering, analysis and access of information are crucial for agencies to assist one another for better decision making and ultimate problem solving. Like the term ‘information’ above, the subject matter experts view business intelligence as also being a component of knowledge management. Both terms, as stated by varying authors, are so closely associated to knowledge management that it sometimes causes confusion. One of
the aims of this study therefore has been to affirm these distinct differences. The term business intelligence is relevant to the study in terms of interaction with possible business intelligence units within the relevant government agencies in this study.

Furthermore, the concept of netcentricity, which is discussed in detail in Chapter 3, is also applicable to business intelligence, especially when attempting to ensure that intelligence agencies create an environment and infrastructure whereby information is made easily available across agencies. The ultimate aim would be to empower the end users through netcentric means, such that knowledge permeates throughout the relevant agencies.

For KM to be achieved, it is critical that the relevant pillars which enable KM are in place. It is thus important to examine the pillars and enablers for knowledge management.

2.6 THE KNOWLEDGE ENABLING PILLARS

It is widely acknowledged, by authors such as Bechina and Ndlela (2009) and Hsu (2006), that for knowledge management to succeed, certain ‘enablers’ – also known as pillars or crucial drivers – need to be present. The most commonly associated drivers, as identified by Durrant (2001) and reiterated by Girard and McIntyre (2010) and O’Riordan (2005), are strategic organisational aspects, such as: leadership, organisational culture, learning organisations, and information technology. These enablers are the critical gears with which to engage and assist the knowledge management agenda. Thereafter, for knowledge sharing to take place, practical tools and methodologies need to be put into practice. In order to focus on the pillars of KM, the researcher will present the adapted model of Stankosky’s “KM Pillars to Enterprise Learning” by Cranfield and Taylor (2008). The knowledge pillars in Figure 2.2 below are presented as a systemic and holistic framework in which to view the key essential drivers for knowledge management.
The pillars in Figure 2.1 above will now be described in more detail, with the exception of the technology (ICT) pillar. The pillar on ICT will be discussed in the following chapter on netcentricity.
2.6.1 Leadership

In the researcher’s discussion of the South African political landscape in Chapter 1, it was clear that the presidency, which is viewed as the highest office within government, and the leadership succession debate have been highly contentious issues. It is normal for government at lower levels to feel the ripple effects of the power struggles at the top. It is also naturally assumed that the leadership at regional and local levels tend to emulate those at a national level. Similarly, the style of leadership and the cultural dynamics of an organisation are affected or influenced accordingly.

The distinction between managers and leaders has surely been a topic in many a boardroom. Dive (2008: 35) suggested that managers have a short term view, administering and focusing on the bottom line, whilst leaders inspire, develop and focus on longer term commitments. This distinguishing definition is supported by the researcher as it closely connects the need for leaders to have integrity and a proper work ethic, and to not have a conformist style of leadership. The researcher reasons that if leaders at a higher level are known to be corrupt, a true leader at a lower level, according to this definition, will do ‘the right thing’ and not conform to the corrupt example set at the higher levels of office. In South Africa, the issue of corruption regularly makes news headlines. As such, strong and servant leadership is required to resolve such problems. According to Stone, Russell and Patterson (2004: 352) a servant leader is described as leaders who strive to “serve and meet the needs of others”. Stone et al. (2004: 351) who examine the distinct differences and similarities of the concepts transformational leadership and servant leadership, point out that whilst similarities exist, the primary difference between the concepts is the focus of the leader. Whilst the transformational leader focuses on the organisation, the servant leaders’ primary focus is on the “followers” or the people, with the organisation being a secondary focus. The argument may be that Stone et al. do not propose or challenge for servant leaders to find the balance in focus between the people and the organisation. However, Stone et al. do focus on the importance of credibility and trust by servant leaders in influencing others. The importance of trust through servant leadership is supported by Covey (2006), who points out that trust is
often a hidden variable which is difficult to measure and improve. Limited research has been done looking at leadership and trust from a specifically South African perspective. Questions that arise in this regard include whether the leadership in the relevant agencies is able or capable. In other words, do these leaders drive and encourage knowledge sharing; do they have higher levels of internal corruption and are they therefore seen as non-drivers of ethical behaviour? Are the current leaders being servant leaders by listening and focusing on people?

For the scope of this study, it is imperative that the leaders have true integrity and take accountability. Lakshman (2005: 431), who investigated top executive knowledge leaders like Jack Welch, noted a distinguishing factor on the leadership issue, as practiced by Welch, which is for leaders “placing the best and only the right people (with the right knowledge requirements) in positions where they are needed.” The effective resolution of problems via knowledge management or any alternate strategies can only be achieved if leaders are empowered to recruit the best people. Within a South African context, it may be that recruitment policies restrict leaders from recruiting the appropriately skilled staff. Again, this study intends adding to the current body of knowledge, with a distinct South African perspective within government.

Beinecke (2009: 2) asserted that we are in “an era of wickedness, a time of wickedly complex problems such as unanticipated interconnectivity, unforeseen structures, radical innovation and transformation”. In addressing these complex challenges, many articles and books on leadership require leaders to manage dynamic processes which require flexibility, adaptability, speed and experimentation. Beinecke (2009: 3) further emphasizes that organisations require “collaborative leadership” who empower and are able to facilitate processes.

Crane, Downes, Irish, Lachow, McCully, McDaniel and Schulin (2009: 223) emphasized that in the current information age, leadership “requires cross-boundary, inter-agency collaboration with networking as a core strategy.”

Chrislipo and Larson (1994: 146) concurred with the complexities pointed out by Beinecke and highlighted that “leaders with complex issues need to inspire
commitment and action. They need to lead as peer problem solvers, build broad base involvement and sustain hope and participation”.

For purposes of this study, it is imperative that leaders are able to deal with complex issues which may change due to external factors. The ability to adapt and to network with the appropriate stakeholders is also crucial. As such, the leader will have to share the common vision and goal and penetrate cross-boundary ‘territory’ by initiating buy-in through a collaborative approach. The commitment to act on one’s responsibilities is considered as important when attempting to build trust amongst all stakeholders involved. Rowitz (2001: 23) pin-pointed ten leadership abilities he deemed imperative for leaders in the 21st century. According to Rowitz, leaders:

- Must be knowledge synthesizers – this will require leaders to collaboratively ensure that all role-players focus on the main goal;
- Need to be creative – innovative leaders can challenge the status quo and bring about ‘out of the box’ thinking;
- Need to be able to create a vision and get others to share the vision and demonstrate a commitment to the vision and the mission it represents;
- Need to foster and facilitate collaboration;
- Need to possess entrepreneurial ability – such that teams are empowered to drive new methods or ways of doing things;
- Are systems thinkers – clearly leaders must attempt to make teams see the bigger picture;
- Must set priorities – this is critical to ensure that the end is always kept in mind;
- Need to form coalitions and build teams – this is again consistent with ensuring a collaborative approach at all times;
- Must put innovative ideas into practice, must become masters of the latest management techniques; and
- Acts as a colleague, a friend and humanitarian to anyone in the organisation.

None of the points above focuses specifically on technology, although the penultimate point suggests that leaders need to become “masters of the latest management techniques”. By implication, if technology is the latest ‘technique’, then
leaders need to focus on this. The need for fostering and facilitating collaboration is relevant to this study, especially when agencies tend to operate in silos. The perfect example of knowledge leadership was best highlighted by Beinecke (2009) who described the symbiotic relationship between a bird and a hippopotamus. This strange but true analogy of a perfect win-win situation explains how the bird thrives on the supply of food on the hippo whilst the hippo is only too glad to have the bugs and insects removed by the bird.

In a similar way, this study intends to enquire whether the current leaders see the win-win in the anti-poaching scenario. Does each see the benefits only for their own agency or do they see the bigger picture? It is obvious to the researcher that true leaders would see the common benefit. The issue of leadership is thus seen as a critical pillar and an enabler for effective knowledge sharing in this continuously evolving environment.

2.6.2 Learning Organisations

The characteristics of the term ‘learning organisation’ (LO) make this an appropriate term in which to describe a young democracy such as South Africa’s. When compared to India’s democracy, which is more than 50 years old, it may be humbly implied that South Africa’s, at just 18 years after gaining a new democracy, still has much to learn from a governmental perspective. In order to drive a learning culture within any organisation, however, it is important for the leadership to ensure that such a learning culture is inculcated within every relevant area or sphere of government.

Friedman (2006), who suggested that the world is now flat due to the advent of the internet and continuously evolving information and communication technologies, highlighted the need for leaders to adapt to the advancing pace in which technology is changing. It is therefore logical to conclude that if an organisation wants to change, then the organisation has to want to learn in order to adapt to this fast changing environment. The literature that follows will focus on the importance of making organisations (both private and public) ask the question as to whether they are in fact a learning organisation and why it is important to first come to terms with this, before
engaging in a continuous journey towards improving their information technology infrastructures, skills and knowledge bases. Ultimately, organisations seek to increase their knowledge base or intelligence gathering capabilities to ensure that the ‘right’ information goes to the ‘right’ person or persons. For this to happen, employees need to continuously learn from each other. The reality of technological advances by Friedman was supported by Garvin, Edmonson and Gino (2008: 1) who further pointed out that “tougher competition and shifting customer preferences” require companies in becoming learning organisations.

In attempting to provide some origins of the learning organisation concept, Loermans (2002: 286) posited that Peter Senge popularised the concept of the learning organisation when he established the following five disciplines: systems thinking, personal mastery, mental models, building shared vision and team learning. With the concept gathering acceptance and being closely linked to knowledge management, Aggestam (2006) asked the poignant question of which came first - learning organisation or knowledge management? In responding to the question, Aggestam proposes a conceptual model of LO and KM, in which both LO and KM are seen as dependent on each other.

Loermans (2002: 286) distinguished between organisational learning and a learning organisation when indicating that the process of organisational learning involves the capability of an organisation to increasingly “take effective action”, whilst a learning organisation, is one that “embraces (either consciously or unconsciously) the principles of organisational learning and supports an environment where organisational learning can flourish”. Batool and Riaz (2011) supported the view by Loermans and confirm that organisational learning is a tool that organisations use towards becoming a learning organisation. Garvin et al. view a learning organisation as one in which employees continually create, acquire, and transfer knowledge – helping their company adapt to the unpredictable faster than rivals can”.

Whilst the definitions above are noted, Batool and Riaz (2011: 912) affirmed that LO is a “relatively new phenomenon” with little research being conducted to assist organisations in establishing what specific factors exist for a learning organisation to exist. Some authors like Joon (2007) may have disagreed with Batool and Riaz by
arguing that knowledge and learning are ancient concepts which are merely called by some other name over time. The definition of a learning organisation, according to Batool and Riaz (2011) refers to “a firm that works for the learning and development of its employees individually, team wise and learning for the whole organisation. This definition is supported by the researcher in that the importance of learning considers both the employees and the entire organisation.

In addressing the question of what factors are relevant for making a learning organisation, Batool and Riaz (2011) through their study concluded the following:

- Human resource practices contributes positively in making an organisation a learning organisation – for learning to occur, it is important that training interventions are conducted for employees to learn on behalf of the organisation.
- Team learning – it is important for collective or group learning in this instance for the ultimate success of the organisation.
- Leadership style – the move from a traditional command and control towards a more servant leadership is strongly suggested.

From the factors pointed out by Batool and Riaz (2011), the latter factor of leadership supports the literature on servant leadership discussed in 2.6.1 above. Whilst Stone et al. (2004) indicated the importance of learning towards employees, Batool and Riaz emphasized the importance of leadership that creates an environment conducive for learning for the benefit of the entire organisation.

The importance of leadership was confirmed by Akgün, Byrne, Lynn and Keskin (2007: 139), whose study additionally concluded with the significant relationship between trust, culture and knowledge sharing activities. It is thus imperative that leaders realise this, so that they can challenge the problems that they are faced with. Garvin et al. (2008: 1) supported the importance of leaders but point out learning interventions fail because managers “don’t know the precise steps for building a learning organisation”. Whilst Garvin et al. (2008) supported the central theme of leadership and learning by Batool and Riaz (2011) and Berce, Lanfranco and Vehovar (2008), Garvin et al. who contended that managers don’t know what steps
to take in building a learning organisation suggest that managers need to understand three building blocks of a learning organisation namely:

- A supportive learning environment – in this environment, employees should feel safe in disagreeing with each other; ask naive questions; accept constructive criticism and own up to errors.
- Concrete learning processes – company should ensure formal process in ensuring that information collation and dissemination is in place.
- Leadership that reinforces training.

Berce et al. (2008: 192) distinguished between two different processes of organisational change that are associated with learning organisations, namely:

- adaptive learning – changes that are made within an organisation (internally), in response to external environmental changes; and
- proactive learning – organisational changes that have been made on a more determined basis. This is learning in action which goes beyond simply reacting to external environmental changes.

A further process of change is highlighted by Goh (2002: 23) who viewed ‘knowledge transfer’ as a key dimension of a learning organisation and hence as a critical factor for knowledge management. In this way, the author views learning as a process whereby knowledge from one area of an organisation is passed effectively to other areas in order to resolve problems or introduce innovative alternatives. In other words, if knowledge were to merely lie in a database or company intranet, then learning would not take place. Similarly, if errors or failures are recorded but not shared with all relevant workers, then the learning process has not taken place and this valuable knowledge, which could prevent a repetition of such errors, is worthless. Goh also described international companies Hewlett – Packard and 3M as learning organisations because they encourage employees to share and transfer knowledge. More importantly, they reward those who do share knowledge that is used by another employee or team to improve a product or a work process. Clearly Hewlett – Packard and 3M have created the necessary conditions for effective organisational learning,
and are proof that effective knowledge transfer in an organisation is possible. It is now the intention of this researcher to identify and understand more clearly some of the key activities that make such organisational knowledge sharing possible.

Earlier research into the learning organisation, conducted in 1997 by Goh and Richards, identified some of these activities, and posed them as questions in a survey of approximately 1,500 employees from 12 organisations. Their aim was to assess the presence of five key attributes of a learning organisation, one of which was the ability to transfer knowledge. Ultimately, the research established that in each of these 12 organisations, the attribute that scored lowest was the ability to transfer knowledge. Indeed, many of the executives surveyed in Goh’s and Richard’s study cited the inability to transfer knowledge within their organisations as a key problem. This was not seen as a shock to Goh and Richards as the literature on organisational behaviour is replete with studies of communication failures, conflicts, power and politics – studies that describe the boundaries and silos created by organisational groups and departments. It is apparent that there needs to be a better understanding about knowledge transfer and how it works, which brings us again to the debate about whether to use people-based or technology-based tools for knowledge transfer.

Pertinent to the public sector, Barrados and Mayne (2003) stated that there are many challenges for the public sector in moving towards a learning organisation. The authors view strong hierarchies and risk-aversion behaviour as two characteristics prevalent in the government sector which is not conducive in a learning culture.

Still within the public sector, Hall (2001) explained that tertiary institutions are traditionally seen to be the learning institutions and that people may be seen as ‘learned’ once they hold a tertiary qualification. However, the author argued that organisations have an equal responsibility in continuing the learning process in order to further equip workers.

In other words, learning does not stop at a tertiary level. In South Africa, the recent Skills Development Act No 97 (1998) and The Skills Development Levies Act (1999) warrants the payment of levies through employers as a means to ensure that skills
analysis is done by all employers and that the funds paid are utilized for training and ultimate learning (up skilling) purposes. The effectiveness of skill development through the legislation mentioned and whether appropriate skill levels are being achieved is a crucial question that the public sector needs to enquire upon.

Most of the literature quoted above is from research done in the private sector. The challenge and gap in the literature for this researcher is to identify how government departments learn. How do they overcome knowledge transfer problems as witnessed in the private sector? The main issues of trust and rewarding employees also need more research within the public sector, in order for public departments to improve and enhance their learning and knowledge capabilities. The researcher puts forth that a learning organisation promotes the exchange of information between employees and creates a more knowledgeable workforce. It requires a particularly flexible organisational structure, where people will accept and adapt to new ideas and changes through a shared vision. This brings a new perspective and growing importance to organisational knowledge, which can be regarded by the learning organisation as the challenge of creating a culture of managing knowledge.

2.6.3 Organisational Culture

The culture of an organisation dictates the way that organisation operates, due to the inherited mind-sets of its employees. The young democracy in South Africa is similarly unique due to the fact that we have various cultures within our workplaces. These differences dictate the way we operate. The government departments have also inherited a negative perception by the public, in terms of being inefficient and bureaucratic, and, indeed, as highlighted in Chapter 1, there are many challenges, such as inefficient service delivery and an overall lack of effective problem solving. In order for government agencies and departments to change these perceptions, however, their culture first needs to analysed and brought in line with organisational strategies and objectives. The culture of knowledge sharing amongst employees within and between government institutions needs to be investigated and perhaps installed by leaders. In order to achieve this, the cultural mindset has to change from an individualistic one to that of a collective or team based one.
2.6.3.1 Defining an organisational culture

Hofstede (1991: 180) defined culture as a collective programming of the mind, which distinguishes the members of one group or category of people from another. Hofstede stressed upon the significance of culture in our lives when he points out that "culture affects not only our daily practices but also the theories we are able to develop to explain our practices. No part of our lives is exempt from culture's influence" (Hofstede, 1991: 170).

Viriyakul and Rajanagarinda (2011: 101) considered organisational culture as a “key element of managing organisational change and renewal”. The authors further view culture as “a sort of glue that bonds the social structure of an organisation together”. The authors (Hofstede, Viriyakul and Rajanagarinda) highlight the significant role which culture plays in an organisation. More pertinent to the factors discussed in this study, Viriyakul and Rajanagarinda (2011) emphasized the influence that organisational culture has on knowledge management and the imminent role of senior leaders in enabling a collaborative working culture.

Thus, both authors mentioned support the view that “culture is central” and therefore helps to determine the structure, compensation system, human resources policies, market strategy, client relations, accounting procedures and individual behaviour of employees in an organisation. From a global perspective, Kreitner, Kinicki and Buelens (1999: 87), indicated that the globalised economy challenges virtually all employees to be more “internationally and cross-culturally aware”. They argued that culture is “complex and multi-layered”; that it is also a “subtle but pervasive force”. It is clear that whilst authors focus on the importance of culture on an organisation, it is equally important in acknowledging both internal and external factors which impact on the culture of an organisation.

2.6.3.2 Functions and elements of organisational culture

Kreitner et al. (1999: 58) identified four functions of organisational culture, namely that “it gives members an organisational identity; it facilitates collective commitment;
it promotes a social system stability; and it shapes behaviour by assisting members to make sense of their surroundings”.

In addition to this, Hellriegel, Jackson and Slocum (1999: 615-618) identified elements of culture as broadly constituting “assumptions, values, socialisation, symbols, language, stories and practices”.

Organisational culture includes the perception of ‘the way we do things around here’. It is thus important for organisations to analyse and assess the culture within the organisation in order to determine whether the culture is perceived positively or negatively by internal and external stakeholders.

2.6.3.3 The subcultures that exist within a culture

According to Schein (1996: 11), “a culture is a set of basic tacit assumptions about how the world is and ought to be that is shared by a set of people and determines their perceptions, thoughts, feelings and, to some degree, their overt behaviour”.

Schein (1996) further stated that organisations typically fail to be innovative and fail to learn how to learn due to vague concepts like “resistance to change”, “human nature”, or “failures of leadership”. However, he put forward a more fundamental reason for failure. Schein suggested that within an organisation’s subculture, there exist three particular cultures. These are described as follows:

The Operator Culture

According to Schein (1996), this culture is present within organisations, especially in operational units and on shop floors, and is therefore difficult to describe. This culture is relative to the type of industry and the core technologies around which that industry evolves. Schein pointed out that information technology has made manual labour obsolete in many industries. The operator culture is therefore based on human interaction, with the understanding that effective communication, trust and teamwork are essential to getting the job done.
The Engineering Culture (Global Community)

This is the group, according to Schein (1996), which represents the technological and design elements of organisations. They have the knowledge to understand how technology works and how it is to be utilised. Although the engineering culture recognises the human factor, they prefer to make things as automatic as possible. They focus on the safety and design aspects of the job, and prefer to design humans out of the systems rather than into them.

The Executive Culture (Global Community)

These, according to Schein (1996: 15) are fundamentally Chief Executive Officers (CEOs) and other top management employees “who have risen through the ranks and have been promoted” to their present positions. Schein proposed that this group exhibits different kinds of assumptions and often maintains a broader focus, although an appointed CEO often adopts an exclusively financial focus due to the nature of the executive career. As managers move higher up in the organisation hierarchy, their levels of responsibility and accountability grow. As a result, they become more preoccupied with financial matters and less focused on observing and influencing the basic functions of the organisation. As executives work less with people, they tend to develop elaborate information systems in order to gain control. This also results in them feeling increasingly lonely at the top.

The executive culture, like the engineering culture, tends to view people as impersonal resources that generate problems rather than solutions. People are therefore treated as a cost rather than a capital investment. It is this mindset that inhibits innovation and creativity in people.

2.6.3.5 The dilemma of 21st century learning

Schein (1996) believed that organisations will not learn effectively until they grasp and face up to the three occupational cultures described above. The “executives”, “engineers” and “operators” must understand that they all have different languages
and assumptions about what is important. They need to understand and treat the other cultures as normal and valid in order to ensure effective learning efforts.

The researcher strongly supports Schein’s (1996: 19) suggestion that one should firstly “take the concept of culture more seriously” by realising that “deeply embedded tacit assumptions” exist between the three cultures. Secondly, we must acknowledge that the old assumptions no longer work. The days of operating in isolation in order to resolve global issues are not possible. Instead, we need to initiate collaborative ways of communicating and working together, by means of stimulating mutual understanding instead of mutual blame. Thirdly, we need to create communication by learning how to introduce and implement cross-cultural ‘dialogues’. A cross-pollination of ideas will assist different parties to reflectively listen to each other in order to initiate and sustain creative dialogue. Lastly, but not least, the cultures of departments within government need to embrace the use of science and technology towards problem solving.

Lopez et al. (2004: 96) posited a link between culture and organisation learning. They took the views of various authors into consideration before deriving the following values for enhancing organisation culture, which they believed to be conducive for encouraging a learning organisation:

- A long term vision and advance management of the change;
- Communication and dialogue;
- Trust and respect for all individuals;
- Teamwork;
- Empowerment;
- Ambiguity tolerance;
- Risk assumptions; and
- Respect and diversity encouragement.

These authors, in essence, stressed that a collaborative culture influences organisational learning. It is apparent from the literature above, that the culture of an organisation is important in creating an enabling environment for knowledge sharing. If the culture is not right, then this will inhibit sharing. Schein (1996), who is cited by
many reputable authors, clearly highlights the different layers or levels of subcultures present in organisations. These levels may simply be described as the people; the technical and other related support staff and the management or leadership level. The challenge is for these levels within an organisation to come together so as to exhibit and endorse a collaborative and unifying culture. The further challenge, pertinent to this study, is to compare one government agency’s culture to another, for if they are not aligned, then barriers are created which will inhibit learning and ultimate knowledge sharing between the relevant public agencies. It is apparent from the literature that culture involves many latent factors that require a deeper understanding and analysis by leaders and organisations as a whole.

2.7 KNOWLEDGE SHARING

Cheng et al. (2009: 314) suggested that the sharing of knowledge is about “communicating knowledge within a group of people”. Furthermore, the group may comprise of members engaging formally (work colleagues) or informally (amongst friends). This interaction may occur between just two individuals or a multiple of individuals. The objective, essentially, is to contribute individual knowledge to improve that of the collective and eventually the organisation’s knowledge. Alavi and Leidner (1999) concurred in this regard. Individuals share what they know with those who seek their knowledge. Cheng et al. (2009: 314) further add that the knowledge sharing process consists of “collecting, organising and conversing knowledge from one to another”. The value of the knowledge expands when it is shared, due to the fact that the sharing process is more than just the collation of data and information. In other words, knowledge sharing, if managed adequately, can vastly enhance quality, decision-making and problem-solving for an organisation (Syed-Ikhsan and Rowland, 2004; Yang, 2007).

There are two informal ways to action knowledge sharing: closed network sharing (person to person sharing) and open network sharing (sharing through a central open repository). In the former (closed sharing model), an individual has the liberty of deciding the mode of sharing and his or her choice of partners with which to share knowledge. This interactive approach caters for a more personal touch, and more directed sharing is expected. Personal relationships and trust are but some of many
factors which would explain the success of the sharing activity in this model (Cheng et al., 2009).

On the other hand, open network sharing refers to the sharing of knowledge among members of a group through a knowledge management system, usually via a central database. This invariably involves many individuals sharing multiple knowledge assets within the system. This form of sharing is important for the good of the public (Cheng et al., 2009). Open network sharing is widely adopted in organisations to share organisational knowledge. As this study is focused on the public sector, the following sections will elaborate on the open network sharing method.

2.7.1 Factors influencing knowledge sharing

According to Cheng et al. (2009), the efficiency and effectiveness of knowledge sharing through the open network will depend mainly on the openness or friendliness of the information technology system, the incentives laid out and also the culture of the organisation.

Hsu (2006) summarised three approaches for knowledge sharing, after classifying the different approaches used in literature. The first approach in knowledge sharing is called “tool-based” and focuses on building sophisticated information technology systems. The second approach is an “incentive-based” approach as it emphasizes the importance of incentives to facilitate knowledge sharing. The third approach is the “integrative approach” which considers not only management values and organisational culture, but also processes and structures to encourage knowledge sharing. In essence, these approaches are similar to those used by many authors, like Bechina and Ndlela (2009) who also focused essentially on technology, people and processes.

Cheng et al. (2009) particularly stressed that the enthusiasm for knowledge sharing in an open network environment is “affected by interacted factors socially, economically and technically”. In the literature, when it comes to the decision whether to share or not to share, Cheng et al. named monetary incentives and rewards as the key factors cited most frequently by numerous authors. Sharing of knowledge is thus
deemed as a costly business. If the costs of sharing are lesser than the perceived benefits, then knowledge sharing is considered to occur more easily. If not, then it would appear more difficult for the sharing process to materialise. Over and above incentives and rewards as key factors in knowledge sharing, the authors emphasised the importance of organisation culture, leadership, bureaucracy and hierarchical level, diversity, and the fear of employees losing their intellectual capital. They cite many subject matter experts in support of this statement.

Individual factors, like acknowledgement as an expert in a specialised field of study, group identity, and self-esteem are other important considerations in determining the passion to share knowledge (Syed-Ikhsan and Rowland, 2004; Sondergaard, Kerr and Clegg, 2007). Conversely, the fear that one might receive unfair recognition and accreditation, plus the risks of one’s intellectual property being stolen, are some of the key factors that discourage knowledge sharing activities (Riege, 2005).

Knowledge transfer or the means thereof is an integral process for enabling knowledge sharing. Transfer occurs at various levels: transfer of knowledge between individuals, from individuals to explicit sources, from individuals to groups, between groups, across groups, and from the group to the organisation. Considering the distributed nature of organisational cognition, an important process of knowledge management in organisational settings is the transfer of knowledge to locations where it is needed and can be used. However, this is not a simple process, in that organisations often do not know what they know and have weak systems for locating and retrieving knowledge that resides within (Alavi and Leidner 2001). Communication processes and information flows drive knowledge transfer in organisations. Gupta and Govindarajan (2000) conceptualised knowledge transfer ("knowledge flows" in their terminology) in terms of five elements:

- Perceived value of the source unit's knowledge;
- Motivational disposition of the source (in other words, their willingness to share knowledge);
- Existence and richness of transmission channels;
- Motivational disposition of the receiving unit (in other words, their willingness to acquire knowledge from the source);
The absorptive capacity of the receiving unit, defined as the ability not only to acquire and assimilate, but also to use knowledge. This is the least controllable element; knowledge must go through a recreation process in the mind of the receiver. This recreation depends on the recipient's cognitive capacity to process the incoming stimuli.

One of the descriptions for knowledge transfer or conversion, often cited by authors, is that of Nonaka and Konno (1998), which is shown below:

**Figure 2.3 Knowledge Conversion**

![Knowledge Conversion Diagram]

**Source: Adapted from Nonaka and Konno (1998)**

Nonaka and Konno (1998) pointed out that there are essentially two kinds of knowledge. The first is explicit knowledge, which is ‘externalised’ and may be expressed in words or numbers. This type of knowledge was seen by the authors to be the view adopted in most Western countries. The Japanese, however, consider the second kind of knowledge, known as tacit knowledge, to be more important as it is ‘internalised’ and more personal in nature. The authors identified four interrelated processes by which knowledge flows around an organisation and transmutes into different forms. This view, based on the infamous SECI model introduced by Nonaka and Takeuchi (1995) – which is an acronym for the four modes of socialisation, externalisation, combination and internalisation (SECI), sees organisational knowledge creation as a continual interplay between the tacit and explicit dimensions of knowledge and a growing spiral flow as knowledge moves through individual,
group, and organisational levels. The four modes of knowledge creation they identified are: socialisation, externalisation, internalisation, and combination.

- The **socialisation** mode refers to the conversion of tacit knowledge to new tacit knowledge through social interactions and shared experience among organisational members (e.g. apprenticeship, mentorship, communities of practice).
- The **combination** mode refers to the creation of new explicit knowledge by merging, categorizing, reclassifying, and synthesizing existing explicit knowledge (for example, literature survey reports).
- **Externalisation** refers to converting tacit knowledge to new explicit knowledge (for example, articulation of best practices or lessons learned).
- **Internalisation** refers to creation of new tacit knowledge from explicit knowledge (for example, the learning and understanding that results from reading or discussion).

The above literature exposes different factors that influence people in their decision to involve themselves in knowledge sharing activity. Cheng *et al.* (2009) suggested that these factors can be grouped into three subgroups, namely organisational factors, individual factors and technical factors. Organisational factors are factors not derived from the individual personally. They may be environmental or caused by another individual to stimulate the knowledge sharing attitude. Incentive systems, organisational culture and management systems are classified as external factors. Individual factors are factors derived from individually driven considerations. That means that they stem from the person’s internal being. Examples of internal factors are beliefs, perceptions, expectations, attitudes and feelings. Technical factors encompass knowledge management technology, such as software and hardware used in the sharing activity.

Whilst most of the above literature and its findings on knowledge sharing are applicable to the private sector, the researcher posits that the above-mentioned factors may also be pertinent to the public sector. If one were to take factors such as incentives and rewards, and the fact that some government departments in South
Africa focus sharply on performance management and individual performance bonuses, then the findings in the private sector are surely pertinent to the public sector as well. While the issue of performance bonuses is not the focus of this study, a pertinent question to ask here is: will employees share their knowledge if it might minimise their chances of getting a higher bonus?

As this study focuses on the public sector and specifically on knowledge sharing within the government sector – it is also worth noting that policy and legislative issues like the Promotion of Access to Information Act, 2000, or the ‘Oath of Secrecy’ which falls under Section 4 of the Income Tax Act, 58 of 1962, might be potentially under-researched areas and possible barriers for enabling knowledge sharing.

Knowledge providers and seekers, who share common interest areas, will often look for a common community to share their ideas and experiences. This can be done via either an informal or formal network. These knowledge contributors and seekers forge a relationship of togetherness through their personal connections and form what is generally called ‘communities of practice’ (CoP). As the critical success factor of virtual communities of practice depends on perpetual knowledge generation and sharing, cultivating communities of practices is considered as an extremely effective mechanism to promote the sharing culture (Cheng et al. 2009). The literature on communities of practice will therefore be examined next.

2.7.2 Communities of Practice (CoP)

In order for a learning organisation to change the way it operates (change in organisational culture), it has to ensure that the knowledge workers (employees) have a forum in which to communicate and share knowledge with one another, in order to realise the organisation’s goals.

Cox (2005: 2) points out that “the concept of communities of practice has become popular in several academic fields including organisational studies (particularly the topics of knowledge management and organisational learning) and education. Cox does however point out that the term CoP is very diverse.
According to Wenger, McDermott, and Snyder (2002) communities of practice are appropriate social structures that are ideal for developing and sharing knowledge in an organisation. Wenger et al. highlighted that the true value of CoP depends on the ability to connect personal development with the strategic goals of the organisation. The authors also point out that CoP may differ in attributes such as size, life span and how it is recognised in organisations. The authors offer a structural model of CoP comprising of three elements – namely domain (specialised area), community (environment) and practice (tools and documents). The researcher argues that the authors do not focus on the identification of subject matter experts (SME’s), who are primarily experts with specialised knowledge and key towards supporting CoP.

For purposes of this study, a further focus will be on ‘virtual’ communities of practice, as knowledge sharing takes place within government whereby agencies are not necessarily in one single location.

Kimble and Hildreth (2005: 103) considered communities of practice as groups of people whom are joined together, both “with an internal motivation and common purpose”. The key aspect is the relationship that is built between the members in the group. Furthermore, it is important to note the softer aspects of knowledge. More importantly, the authors stressed that, due to globalization, there had been an increasing interest as to how communities of practice might function in an internationally technological environment – hence the introduction of ‘virtual’ communities of practice. The authors concluded that, instead of merely attempting to introduce and implement technological solutions, a key part of any knowledge management initiative must be focused on facilitating communication and interaction between people. Critically, the right balance needs to be struck between harder and softer aspects of knowledge.

Whilst Ardichvili, Page and Wentling (2003: 64) supported Kimble and Hildreth’s view on considering technology, they argued that although virtual communities of practice have sprung up in organisations globally, “very little is known about factors leading to their success or failure”. One critical suggestion was that failure or success depends on the active participation of members in the virtual community of practice. Ardichvili et al. also indicated that there are numerous reasons why members of a community
of practice would want to share their knowledge. They further suggested that intrinsic motives for sharing tend to be more influential than extrinsic motives such as those that are monetary or administrative.

Cross, Bogatti and Parker (2001) further argued that the supply of new knowledge, by the ‘input’ or active contributions of members, represents only one side of the knowledge sharing equation. They asserted that it is equally important for communities of practice members to interact actively with the information on the output or demand side in order to show the willingness to share (Cross et al., 2001: 165-235). A requirement for a successful virtual community of practice, they further asserted, is the willingness to use it as a new source of knowledge. Thus, the willingness to share and the willingness to use a community of practice as a source of knowledge are seen as two major requirements that apply to any community of practice, whether virtual or face to face. Ardichvili et al. (2003) reported a further requirement for virtual communities of practice as the need for members to be comfortable participating in a computer-mediated, internet-based environment, which would involve very little or no face to face communication. The importance and relevance of culture is prevalent here.

As this research will also examine knowledge sharing barriers as per the literature, it is appropriate to look at the findings of Ardichvili et al. (2003) during their investigation of the barriers to virtual communities of practice. The study by Ardichvili et al. was guided by the following four research questions:

- What are the reasons for employees’ willingness to contribute their knowledge to virtual knowledge-sharing communities of practice?
- What are the barriers to employees’ contributing their knowledge to virtual, knowledge-sharing communities?
- What are the reasons for employees’ willingness to use virtual knowledge-sharing communities of practice as a source of new knowledge?
- What are the barriers preventing employees from using virtual knowledge-sharing communities as a source of new knowledge?
Ardichvili et al.’s finding (2003) highlighted information hoarding, in other words situations where employees are reluctant to share because they feel that they are ‘giving away’ their intellectual capital and thus eroding their competitive edge. It must be noted, however, that this was only pertinent to a small minority. The major barrier revealed by Ardichvili et al. was not because of hoarding due to any selfish agenda, but mainly because many members perceived or assumed that their input on the relevant portal was not important, not deserved, not accurate or perhaps not relevant to the discussion. Furthermore, people were not clear on what information to post. New members feared that they had not ‘earned the right’ or felt that what they said ‘might not be important’ or that they ‘might belittle themselves’.

Ardichvili et al. (2003) further highlighted another important set of barriers, which involves the way in which the knowledge network is organised and managed. First, the process of getting knowledge entries approved by managers is considered a time consuming exercise. Secondly, security and confidentiality considerations lead to self-imposed censorship. This, in turn, leads to employees reverting to ‘old tactics’, which involve sharing via mail, telephone and so on, instead of the knowledge network. Ardichvili et al. concluded by stressing that a critical factor in overcoming barriers for sharing via virtual and even face to face communities of practice is the issue of trust.

From the literature reviewed, it appears that the concept has its origins in the private sector, and in the recent literature on knowledge management. Groups of employees started meeting regularly to share stories and learn from each other. Corporations as diverse as Xerox, Boeing, and Best Buy are but a few examples of those who have existing groups of employees sharing knowledge. The communities of practice have assisted organisations to increase innovation and responsiveness amongst employees by providing them with a forum in which to brainstorm, exchange ideas and encourage solution-oriented responses. One of the best known examples of communities of practice was formed by the copy machine repair technicians at the Xerox Corporation. Through networking and sharing their experiences, particularly the problems they encountered and the solutions they devised, a core group of these technicians proved extremely effective in improving the efficiency and effectiveness of efforts to diagnose and repair Xerox customers’ copy machines. The impact on
customer satisfaction and the business value to Xerox was invaluable. Yet, for the most part, this was a voluntary, informal gathering and sharing of expertise, not a ‘corporate programme’ (although, once the company realised the value of the knowledge being created by this community of practice, steps were taken to support and enhance the efforts of the group).

One of the shortcomings in the literature, as concurred by Juriado and Gustafsson (2007) is that existing communities of practice analyse community management in single organisations, either public or private. According to Dewhurst and Cegarra Navarro (2004), the more demanding problem of community formation across organisation boundaries – either through inter-organisational partnerships or external communities of practice – is seldom addressed.

It is evident that communities of practice are one of the means by which to effect knowledge sharing. Whether it is done virtually or otherwise will depend on the circumstances of the relevant organisation. The uniqueness of this study is in determining the appropriate method or system in the rare cases where knowledge sharing is amongst agencies within government. Once this has been explored via the research to be conducted, it is hoped that this would then add to the existing body of knowledge.

2.7.3 Barriers to Knowledge Sharing

It is logical to assume that, as with any strategic discipline, knowledge management has its challenges. Recent literature has acknowledged that a lot of organisations and even governments have incorporated some form of knowledge management. However, criticism has come from authors who claimed that, although knowledge management has been implemented in companies, certain fundamental issues were neglected, such as: what knowledge to manage and to what end (Malhotra, 2005: 7); how knowledge management is linked to the strategic goal (Riege, 2005: 18); and also, that knowledge management fails to deliver the competitive advantage expected from a strategic resource (Cruywagen, Swart and Gevers 2008: 101). Again, as highlighted above, the vastness of knowledge management does bring
about its own challenges. As such, it is critically important to highlight the barriers for knowledge sharing as acknowledged by the relevant subject matter experts.

Hicks, et al. (2006: 28) pointed out that, from a human perspective, knowledge sharing is essentially done on a person to person basis. The challenge is therefore how to locate the person with the relevant knowledge. The authors proposed a knowledge dictionary, which would lead an individual to relevant subject matter experts.

Riege (2005) underscored the fact that, due to the vastness of knowledge management, insufficient studies have been done differentiating such initiatives in large companies versus small and medium-sized enterprises, as well as on non-profit versus public sector organisations. Riege (2005) extensively identified knowledge barriers and categorised them according to individual, organisational and technological barriers, as listed in Table 2.3 below.

<table>
<thead>
<tr>
<th>Table 2.3 Knowledge Barriers</th>
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<tbody>
<tr>
<td><strong>INDIVIDUAL</strong></td>
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<tr>
<td>Lack of time to share/identify</td>
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<tr>
<td>Fear for one’s job security</td>
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<td>Low awareness of</td>
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<tr>
<th>and value in sharing</th>
<th>informal spaces to share, reflect and generate (new) knowledge</th>
<th>of employees as to what technology can and cannot do</th>
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<tbody>
<tr>
<td>Dominance in sharing explicit over tacit knowledge</td>
<td>Lack of a transparent rewards and recognition system that would motivate people to share more of their knowledge</td>
<td>Lack of compatibility between diverse IT systems and processes</td>
</tr>
<tr>
<td>Use of top down ‘pull rank’ means</td>
<td>Existing corporate culture does not provide sufficient support for sharing practices</td>
<td>Mismatch between individuals’ requirements; integrated IT systems and processes restricts sharing practices</td>
</tr>
<tr>
<td>Insufficient capture, evaluation, feedback, communication, and tolerance of past mistakes that would enhance individual and organisational learning effects</td>
<td>Knowledge retention of highly skilled and experienced staff is not a high priority</td>
<td>Reluctance to use IT systems due to lack of familiarity and experience with them</td>
</tr>
<tr>
<td>Differences in experience levels</td>
<td>Shortage of appropriate infrastructure supporting sharing practices</td>
<td>Lack of training regarding employee familiarisation of new IT systems and processes</td>
</tr>
<tr>
<td>Lack of contact time and interaction between knowledge sources and recipients</td>
<td>Deficiency of company resources that would provide adequate sharing opportunities</td>
<td>Lack of communication and demonstration of all advantages of any new systems over existing ones</td>
</tr>
<tr>
<td>Poor verbal/written</td>
<td>External competitiveness</td>
<td></td>
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Differences in experience levels

Lack of training regarding employee familiarisation of new IT systems and processes

Lack of communication and demonstration of all advantages of any new systems over existing ones
<table>
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<th>Factor</th>
<th>Impact</th>
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<tbody>
<tr>
<td>Communication and interpersonal skills</td>
<td>Within business units or functional areas and between subsidiaries can be high (e.g. not invented here syndrome)</td>
</tr>
<tr>
<td>Age differences</td>
<td>Communication and knowledge flows are restricted into certain directions (e.g. top-down)</td>
</tr>
<tr>
<td>Gender differences</td>
<td>Physical work environment and layout of work areas restrict effective sharing practices</td>
</tr>
<tr>
<td>Lack of social network</td>
<td>Internal competitiveness within business units, functional areas, and subsidiaries can be high</td>
</tr>
<tr>
<td>Differences in education levels</td>
<td>Hierarchical organisation structure inhibits or slows down most sharing practices</td>
</tr>
<tr>
<td>Taking ownership of intellectual property due to fear of not receiving just recognition and accreditation from managers and colleagues</td>
<td>Size of business units often is not small enough and unmanageable to enhance contact and facilitate ease of sharing</td>
</tr>
<tr>
<td>Lack of trust in people because they may misuse</td>
<td></td>
</tr>
</tbody>
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knowledge or take unjust credit for it

Lack of trust in the accuracy and credibility of knowledge due to the source

Differences in national culture or ethnic background; and values and beliefs associated with it (language is part of this which is pertinent to SA)

Source: Riege (2005)

Riege acknowledged that the categorized barriers should not be looked at in isolation as organisations may exhibit a combination of the above-mentioned barriers. Bollinger and Smith (2001: 11) concurred with Riege (2005) that although most challenges for knowledge management involve people, the added introduction of a reward system in a team or group perspective would assist towards encouraging of knowledge sharing.

Fei, Chen and Chen (2009: 332) echoed the authors above, especially with culture being crucial. However they also emphasized other characteristics, such as highly mobile employees and their unique working environment. This is especially relevant to this study, in that relevant agencies perceive information to be ‘exclusive’ or confidential.

Riege (2005) has been quoted and cited by various subject matter experts on the issue of knowledge barriers. It is clear that Riege’s categorization of knowledge barriers was influenced from three angles: individual, organisational and technological. At this point the researcher can clearly appreciate the importance of
the pillars of knowledge management. Firstly, the calibre of leadership can influence the individual behaviour (barriers), then the culture would definitely influence the organisational barriers, and lastly the information and communication technology (ICT) lever would influence the technology barriers identified by Riege.

2.8 KNOWLEDGE MANAGEMENT IN GOVERNMENT

Numerous authors have acknowledged that knowledge management is relatively new in the private or corporate sector organisations, however little probing has been done into the subject as it occurs in the public (government) sector, developing countries, or even in small and medium enterprises. This study will attempt to gain insight into the state of knowledge management in the public sector in South Africa.

Riege (2005: 21) suggested that only few studies in the knowledge management literature differentiate between knowledge management initiatives in large companies and SMEs. Furthermore, Riege emphasized that no concise and conclusive empirical evidence existed which explicitly distinguishes knowledge-sharing barriers in large companies and small and medium enterprises, as well as commercial, non-profit, and public sector organisations. Cong and Pandya (2003: 8) stipulated that “knowledge management as a discipline is still in its infancy, especially in the public sector, evidenced by little discussion in the current literature”. Furthermore, the authors pointed out that history has proven that most management philosophies begin in the private sector, which the public sector pursues thereafter. Consequently, many issues are unknown. However, Cong and Pandya (2003) acknowledged that governments are beginning to realise the importance of knowledge management and are starting to practice it in the public sector. Congo and Pandya confessed that there would be challenges, but encouraged the public sector to adopt a proactive attitude in order to ensure that knowledge management is ‘sold’ in order to achieve the strategic goals of government. The authors suggested that, in order to succeed, a generic framework and an increasing awareness of knowledge management was required.

Wiig (2000: 13) stated that knowledge management practices need to be broad and comprehensive. Saussois (2003: 106) emphasized that the public sector government
“cannot afford to overlook a ground swell that is currently transforming companies and more especially big companies”. Saussois further stressed that it is equally important that the public sector not copy the private sector. Instead, it should innovatively establish and identify its own means to use its human resources.

O’Riordan (2005: 1) echoed the views above in her review of knowledge management in the Irish Civil Service. The author emphasized the importance of overcoming resistance by engaging senior managers (leaders), overcoming technology interventions, and ensuring that people have a paradigm shift from assuming that sharing knowledge means diminishing their intellectual worth or giving up their power. In this way, ownership is given to all parties involved towards ensuring that knowledge management is a success. Butler and Murphy (2007: 616) pointed out that knowledge management was “not even on the radar” in government departments in Ireland.

Yuen (2007: 12), whose paper presented an overview of trends in the public sector from primarily developing countries, emphasized the statements of the authors above, by asserting the importance of knowledge management in government. Furthermore, Yuen found the issue of ‘trust’ to be crucial in the government sector. Numerous barriers for knowledge management were highlighted by Yuen, which support those described by Riege (2005). Cheng et al. (2009: 316) concurred with Cong and Pandya (2003) by also stating that knowledge management initiatives were first adopted and rapidly increased in profit-oriented organisations. As such, studies on knowledge management, including knowledge sharing, were concentrated largely on large organisations, like Hewlett-Packard, Daimler Chrysler, British Petroleum, Chevron, Ford, Xerox, Raytheon, IBM, Siemens, Shell, Caterpillar and Toyota. Recently, knowledge management practices have also extended to universities and other knowledge-based institutions, making knowledge sharing in academic institutions a popular debate.

Cheng et al. (2009) emphasized that although governments may place knowledge management high on their agenda, especially since realising its importance policy-making and service delivery, it is not as easy to implement as it seems. The benefits from implementing knowledge management, they pointed out, will not be handed to
governments easily, nor will the challenges be met without having to rethink and readjust the status quo. Strategies and plans for implementing knowledge management must be carefully thought through if the effort is to reap success.

In noting that various global authors have conceded that research into knowledge management has been conducted mostly in large corporations of developed countries, the literature consequently also supports the view that research into knowledge management within developing nations, and more specifically in African governments, has been limited.

From a South African perspective, Gaffoor and Cloete (2010) emphasized that most literature on knowledge management is pertinent to the corporate world, thus echoing the claims by global and other South African authors that limited research indeed has been done in the public sector. In fact, the Department of Public Administration of South Africa admitted (Indaba on the Public Service as a Learning Organisation, 2006) that no framework for knowledge management exists. Cloete (2007: 1) indicated that citizens in South Africa require trust in government. Even though knowledge management is institutionalised in government spheres, technical and implementation-related constraints have been identified. Service delivery must be achieved, however, and knowledge management can be seen as a critical means by which to achieve this goal.

Durrant (2001: 9) acknowledged that most governments globally have implemented dedicated websites through which to communicate, but reiterated that more needs to be done to meet knowledge management challenges and citizen demands. Du Plessis (2007: 28) reiterated that knowledge management plays a significant role in innovation, especially where new ideas and means to compete in the global economy become relevant.

Lee (2004: 1) highlighted knowledge management as a critical factor for South Africa, particularly in light of the fact that, at the time of his statement, one-and-a-half million South Africans had left the country since 1945. As such, the author was emphasising the loss of skills and the need to up-skill the current workforce. Van Niekerk (2005: 5) concurred with the statements made by both Saussois (2003) and Durrant (2001),
and highlighted attempts made both internationally and in South Africa to develop knowledge management at various levels. Furthermore, Van Niekerk (2005) maintained that if knowledge management interventions were not effectively actioned, the result, especially for developing countries, could be a reduced level of competitiveness in the global economy. More relevant to this study, Girard and McIntyre (2010) demanded that the enablers of knowledge management, such as technology and information overload, be an area of focus for government leaders. The authors also maintained the knowledge challenges presented by countering terrorism.

With the influx of information coming from varying sources, Girard and McIntyre imply that the sorting of ‘real’ information sources from the huge amounts of information received is paramount for governments in identifying ‘real’ terrorist threats. Crane et al. (2009: 221) alluded to the fact that two weeks subsequent to the September 11th World Trade Centre attacks in the United States and after a request from the U.S. Federal Bureau of Investigation (FBI) on the “nation to provide potential leads to the case; the response was an avalanche of information. Over 260,000 tips were received from concerned citizens via the internet and phone calls in the first 21 days”. It is thus imperative that the numerous amounts of information require sorting such that the appropriate information is used to assist governments in resolving relevant problems.

2.8.1 Knowledge management in government – an international perspective

While the literature above described a broad overview of knowledge management in the public sector, the focus of this study requires further examination of the ways in which governments of other developing countries are dealing with the knowledge management agenda.

In their study of Malaysia, Quin, Hamdan and Yusoff (2007: 1) asserted that knowledge management is identified as a strategic discipline in transforming governments. After posing the question, “how ready is government for embracing the topic of knowledge management?” the authors found no model available with which to measure the state of readiness in implementing knowledge management in the
public sector. They therefore developed the Knowledge Management Readiness Model, incorporating four readiness factors, namely organisational, practice and approach, driver and technological factors. The model served to assist government agencies to assess their state of readiness, to create awareness, as well as to ensure progression towards ultimate implementation of knowledge management.

In Austria, Traunmuller and Wimmer (2003) proposed that knowledge management be used as a discipline in enhancing the quality of public service. They also identified knowledge as being a key factor in government and governance. One of the emerging factors in their presentation was the acknowledgement and focus of an electronic government or ‘e-government’ as is commonly termed, which the authors viewed as “an advanced instrument of the organisation of public governance” towards better serving the citizens. E-government, in this instance, is the focus on the use of information communication technology as an enabling factor. Traunmuller and Wimmer went on to suggest that governments are “not mentally prepared for knowledge management; that not many administrations evaluate ‘their knowledge’ in financial terms; whilst some government administrations see themselves as not being responsible for sharing knowledge”. They proposed the following:

- A clear knowledge map for the public sector;
- clear strategic goals to support knowledge management;
- appropriate concepts and technologies;
- creating an awareness of governmental work as knowledge per excellence;
- to think big and start small and ultimately, to adopt a state of readiness whereby knowledge is shared and learnt from each other (cultural change asset).

(Traunmuller and Wimmer, 2003).

The study by Salavati, Shafei and Shaghayegh (2010) examined knowledge management in public organisations in Iran. Like other experts on the subject, Salavati, et al. (2010: 109) asserted that their study reflected an increasing trend for knowledge management implementation in organisations, although “knowledge management in public organisations is a toddler and little has been done to bring the
subject to use in the public sector”. The authors, through their study findings, further reiterated that a knowledge management framework for public organisations differs from those of the private sector, due to one fundamental difference: the public sector is stake-holder dependent whilst the private sector is shareholder-dependant. Based on their research, the authors provided a conceptual model which involves three factors: organisational (knowledge creating culture, knowledge leadership, knowledge resources, knowledge portal, and knowledge based structure, and knowledge based process), knowledge citizens, and contextual factors such as political factors, cultural factors and technological factors. Significantly, Salavati et al. (2010: 114) pointed out that most previous research had been done in “private sectors, not in public organisations, and this is an important point. Most of the models formed with the principles of private sectors”. The question thus posed by the authors was whether or not it is possible to use private sector models of knowledge management in public sector organisations. Salavati et al. (2010) went on to present a model that combines both internal and external organisational attitudes. Furthermore, based on their studies of knowledge management models and the subject matter of experts, political factors were added to their conceptual framework. In their study, “political factors” pertain to the distribution of power of decision making in organisations, thus establishing a transparent political atmosphere in order to present differing ideas.

In the Republic of Korea, the need to enhance public trust due to increasing administrative demands and complicated social problems resulted in the Korean government placing knowledge management at the forefront of its efforts. According to Joon (2007), “the concept of knowledge management is not new”. Joon stated that in Korean history the discipline of knowledge management may be found as early as the seventeenth century, in the beliefs of ‘Silhak’, a school of practical learning. According to the author, the common principle, then and now, involves “collecting and arranging dispersed pieces of information for transformation into systematically useful knowledge”. The only added difference is the advancement of technology and the generation of vast amounts of information through the internet.

Joon (2007: 2) stated that the Korean government began introducing a knowledge management agenda in 1998, and had made numerous efforts to develop a
standardised knowledge management system. However, Joon added, “knowledge management was not treated as essential during this initial period and was therefore only implemented from a systems perspective”. In the Korean experience, the defining moment for knowledge management came about after the inauguration of the Roh Moo-Hyun administration. In August 2005, and after acknowledging that the failure to implement knowledge management would lead to poor administration and service delivery, President Roh “issued an order to develop and roll out information and data gathering and sharing system throughout government”. Joon clearly highlighted the importance of leadership towards the actionable rolling out of knowledge management. If the leadership of Korea had not initiated such roll out by stating the strategic intent for knowledge management and demanding the use of knowledge sharing practices, then it is safe to deduce that knowledge management would not have received the attention it deserves.

Joon (2007) went on to state that, due to the Korean president’s strong leadership, a shift occurred from a system-oriented to a knowledge-based administration. The knowledge-based administration approach, according to Joon (2007: 2), is a “creative and systematic undertaking by the government to enhance policy, quality and administrative services throughout knowledge activities”. Furthermore, the Roh administration selected government innovation as a top priority on the government agenda, and identified the two pillars of ‘efficiency’ and ‘transparency’ within the knowledge-based framework. This in turn enabled better policies and services in a quicker period of time. For example, the Ministry of Justice managed to reduce the time it took for groups of tourists to go through immigration by 90%, due to service improvements in the Incheon international airport. The airport received recognition as the ‘Best Airport Worldwide’ in 2005 and 2006. The interactive communication established between the government and its people through knowledge networks has enhanced transparency, commitment and ultimate trust in the Korean government. The future challenge, as described by Joon (2007: 12), is for knowledge to reside not only within the “confines of government” or only within private sector corporations. In essence, the author suggested that knowledge should transcend the boundaries of such groups and that a more diversified exchange of knowledge and communication is the ideal.
In a review of the *Irish Civil Service*, O’Riordan (2005) explained that knowledge management is nothing new but merely establishing methods to improve the codification and sharing of knowledge. However, O’Riordan (2005: 52) asserted that a tremendous effort is required to change the organisational culture. Furthermore, “a comprehensive approach to the management of organisation knowledge” also needs to be adopted, rather than mere discreet efforts which may only focus on technology. O’Riordan highlighted the strategic benefits of knowledge management, whilst pointing out how to overcome resistance to its implementation from colleagues who see knowledge management as “a time consuming fad”. More importantly, O’Riordan identified the convincing of senior managers (leaders) as the biggest challenge. The issue of ‘knowledge equalling power’ is a further obstacle to the knowledge agenda. O’Riordan (2005) outlined examples and recommendations on how to overcome such resistance, as practiced in the private sector, including:

- Training all staff on knowledge management practices and applications;
- Including knowledge management in performance reviews to determine why staff do not share knowledge during the appraisals;
- Develop incentives and reward systems to support knowledge management initiatives.

O’Riordan (2005) further highlighted learning points in relation to knowledge management, such as:

- Making knowledge management a part of the organisation culture, by including staff on all initiatives;
- Ensuring senior/top management (leadership) support;
- Establishing a knowledge management team;
- Conducting a knowledge audit as a starting point;
- Developing a comprehensive approach;
- Establishing knowledge management milestones;
- Showing the benefits of knowledge management;
- Not underestimating the cultural/behavioural challenge.
O’Riordan concluded by stating that the challenge was “for government departments to cease individual interventions and so to adopt a comprehensive strategy and approach in relation to knowledge management”.

In Finland, Puonti (2003) did a study on constructing a common understanding between police officers and tax inspectors. Puonti’s study concluded that the collaboration between these two agencies (police and revenue departments) posed a learning challenge. Puonti discovered that there were huge organisational boundaries which challenged the objectives of learning and collaboration. The transmission of information in this instance was mostly verbal in nature and the lack of a joint focus was prevalent. Puonti pointed out that substantial learning occurs when actually working on a case and not merely in a classroom situation (training course) or mere reading. The author suggested that if joint task teams worked on a case, then more learning and collaboration would take place. However, due to organisational boundaries, joint teams with a common purpose were not common practice in Finland. The potential for learning is great and one has to acknowledge that change takes time and is realised in making small steps. Puonti (2003: 146) suggested that “multi-organisational collaboration practiced in economic-crime investigation provides a great opportunity for learning and development.” In fact, Puonti highlighted, by conversing with each other police officers and tax officials do not only learn from each other, but also initiate an innovative process where new learning is created. Puonti (2003: 146) pointed out that the transformation from an “individual-based working model” towards an “intensive real time collaboration” working model is a challenging task. However, as crimes are “constantly changing and finding new forms”, collaborative investigations need to do the same. As such, Puonti concluded, learning through collaborative means is advantageous in affecting crime control.

Yao et al. (2007) sought to investigate how culture, attitudes and barriers affect knowledge sharing in a Hong Kong government department. Yao et al. found that knowledge management and knowledge sharing were both welcome ideas, but that, although informal and tacit knowledge sharing practices were prevalent, Chinese culture remained a barrier for knowledge sharing. On the issue of knowledge management in the public administration sector, Yao et al. asserted that tapping into
formal and informal knowledge networks should be ‘second nature’ across all government sectors. Chiem (2001), who compared the different incentives for private and public sectors in knowledge sharing, pointed out that whilst sharing and incentives can always be encouraged and rewarded in the private sector, this may not be viable in the public sector due to resource limitations. Furthermore, Chiem highlighted bureaucracy as a burden for public sector organisations. According to Chiem, government workers have to complete ‘paperwork’ for minor tasks, unlike their private sector counterparts. This additional administrative burden disrupts workers’ productivity, increases frustration levels and creates an organisational culture whereby workers tend to perform the minimum in terms of their job requirements. As such, they may perceive knowledge management initiatives as an extra administrative burden and thus resist a knowledge sharing culture.

In the Caribbean (West Indies), Durrant (2001:9) stated that “knowledge management in the context of government requires technical, content and policy initiatives”. The author acknowledged that Caribbean governments have adopted the internet, which is the initial step for people to connect and share information. “Policy making at various levels” is highlighted by Durrant as being critical, especially in the changing environment in which knowledge management operates. Although some work has been done, Durrant stated that much further work needs to be done in meeting knowledge management challenges and the increasing demands of citizens. For example, a vision of an integrated communications network, which interconnects various databases, thus offering on-line services to citizens, is important. More importantly, the author asserted, leadership needs to ensure that knowledge management is the “vehicle to promote the accomplishment of an organisation’s strategy”. Durrant mentioned Caldow, director of the IBM Institute for Electronic Government, who is quoted as stating that “leaders who define e-government in a narrow sense – simply moving services online – miss larger opportunities which will determine competitive advantage in the long run”. Seven leadership milestones pivotal for the running and becoming of an e–government were identified by Durrant (2001: 10) as follows:

- Integration of the content and infrastructure;
- Economic development;
E-democracy;
E-communities;
Intergovernmental operations;
Policy environment’
The next generation of the internet.

Durrant (2001) further reiterated that knowledge takes time to acquire whilst employees have less time on their hands. He noted that employees who are nearing retirement or who voluntarily retire or leave an organisation early, are a potential loss of organisational knowledge. Leaders need to manage these complexities as changes in strategic direction may also result in knowledge loss. Policies need to be updated, before organisations find that they no longer have the employees with the relevant knowledge (the knowledge workers) in their employ. Durrant concluded by describing the challenge experienced in Caribbean governments, mainly in defining and implementing strategies. In order to be successful, Durrant suggested the discovery of successful re-engineering methods towards the distribution of data, information and knowledge. The challenge of how to distribute becomes a critical question, although it is acknowledged that knowledge management is an important enabler to define, implement, manage and evaluate e-government programmes in the Caribbean.

Although the above-mentioned countries fall within the definition of developing or partially developed nations, the researcher deemed it inappropriate not to focus on at least one developed country. In this regard, the United States of America (USA) was selected, on the basis of a publication which became available. The article focused on knowledge sharing in the Intelligence community after the 9/11 terrorist attacks in New York. Using the case of the United States Intelligence Community (IC), Lahneman (2004) highlighted three major factors which affect or hinder intelligence efforts, namely international terrorist groups (whose aim is to prevent the IC from obtaining important pieces of data and information); the “information revolution” (the flooding of information which makes it a tedious task for the IC to separate the relevant or useful from the irrelevant information received) and lastly, the issue of stove piping or knowledge “siloi-ing”, whereby each agency is reluctant to share its
information with other IC members. This latter factor of reluctance is sometimes seen as a culture of non-cooperativeness within government, as also indicated by the authors and examples above. In view of this latter factor of ‘reluctance to share’, it may be argued that Lahneman critically did not mention or suggest changes in policy to encourage knowledge sharing instead of knowledge hoarding.

Lahneman (2004) did however criticize the information overload brought about by information technology (IT) and suggests the move from a technology-centric to a learning-centric model. Of course, Lahneman reiterated that IT is not to be ignored but must be seen as an important tool. The issue of the organisation culture needs to be addressed and, according to Lahneman, an atmosphere of trust must exist for knowledge transfer to take place. On the issue of leadership, finding executives to head knowledge management programmes is challenging due to knowledge management emerging at the time as a separate field.

On analysing the experiences of knowledge management in the relevant countries mentioned above, it is important to note that enablers such as information and communication technology (ICT), leadership, organisation culture, policy and learning are the salient points highlighted by the various authors globally. Furthermore, these are in line with the knowledge enabling pillars mentioned in Section 2.6 and applicable to this study in a developing country like South Africa.

2.9 THE KNOWLEDGE MANAGEMENT PARADIGMS

Gloet and Berrell (2003) stated that two main paradigms should be considered for managing organisations, namely the information technology paradigm and the humanist paradigm. The former emphasizes technology, systems and applications whilst the latter focuses on people and processes. It is common knowledge, and is alluded to by knowledge management subject matter experts (Malhotra, 2005; Davenport and Prusak, 1998; Wilson, 2002) that the concept of information technology (IT) initially ‘hijacked’ the concept of knowledge management. As such, initial knowledge management roll-outs invariably focused on IT, and were therefore criticized by various authors who stated that the ‘people’ aspects like culture, leadership, rewards and trust were being ignored. The IT evangelists seemed to
have lost some popularity, and instead there has more recently been a ‘people’s focus’ on knowledge management with various authors focusing on aspects such as intellectual capital and communities of practice. The question is whether the pendulum will swing to IT again? This is deemed possible due to newer technological innovations and globalisation which has ‘flattened’ the world, thus making IT a bigger focus once again. On the other hand, some authors like Malhotra (2005) have suggested a synergistic approach of knowledge management, where organisations seek to combine people and IT. The following chapter, which focuses on netcentricity, might appear to have a strong ‘sway’ of the pendulum towards IT. In terms of the KM paradigms and through this study, it might appear that government agencies might focus on IT or people or - like Malhotra suggested, perhaps focus on a synergy of both these paradigms.

2.10 SUMMARY

The objective of this chapter was to highlight the discipline of knowledge management as a pivotal, strategic resource (Cortes et al., 2007; Ibrahim and Reid, 2009) necessary for organisations, whether applied in the private or public sector. However, around the knowledge nucleus are closely associated terms and enablers, which needed clarification in order to remove ambiguity, as the term knowledge management is relatively new and multi-faceted.

As such, the researcher intended to distinctly distinguish these terms, like information and business intelligence so as to remove the ambiguity and declaration by many authors who claimed that knowledge management was difficult to define. It is also confirmed, by citing from many authors, that knowledge management was primarily ‘auctioned’ in large corporations, in other words in the private sector, whereas the public sector became the follower. Furthermore, it has been seen that few studies investigated knowledge sharing within government and between companies or organisations. Instead, large corporations conducted studies within their own corporation, or even between departments within the same organisation. This study will attempt to focus on knowledge sharing within government across departmental organisation boundaries. The literature indicates that the public sector has embraced knowledge management more recently than its private sector counterparts. The
literature further revealed that governments have taken to knowledge management and, even in South Africa, initiatives to engage knowledge management, albeit mostly from an IT perspective have been pursued. Due to its multi-faceted compatibility, it is possible that not all areas of government have been covered by the knowledge management agenda.

The following chapter will focus on a relatively new term, namely that of netcentricity, which originated and has been applied in the military industrial complex. The netcentric approach, due to its strategic nature, is considered to be a new concept in knowledge management circles. The literature on netcentricity will thus be looked at in order to apply this approach for knowledge sharing within the ambit of this study.
CHAPTER 3

NETCENTRICITY AND ITS RELEVANCE FOR KNOWLEDGE MANAGEMENT

3.1 INTRODUCTION

The previous chapter explored knowledge management, with an added focus on knowledge sharing within the public sector. The various pillars of knowledge management were elaborated upon, with the exception of Information Communication Technology (ICT), which warrants its own chapter because of the crucial roles that technology and netcentricity play in knowledge management. It is paramount to acknowledge that netcentricity, like knowledge management, is not a ‘stand alone’ topic. Its relation to the ever-evolving external environment, brought about by the ever-changing face of technology, needs to be understood. In this chapter, the concept of netcentricity will be defined and its origin explained. Importantly, the key pillars that drive the netcentric concept will be highlighted, and various models of netcentricity will be discussed.

In today’s global economy, characterised by intense competition and ever-advancing technological change, organisations need to be agile, quick and highly efficient in order to survive (Gurbaxani and Plice, 2004: 3). According to Thompson and Jones (2008: 148), the World Wide Web, “together with the tenet that ‘two heads are better than one’, has created something immensely interesting and potentially transformative”. Cong and Pandya (2003: 25) highlighted the fact that we are living in a rapidly changing world “driven by globalisation”, coupled by the ever-fast development of information technology. Alberts and Hayes (2003: 79) accurately stated that in most organisations today, the internet and e-mail are the new modus operandi for communicating. Friedman (2006) commented that the world is now “flat”, because previous obstacles for receiving and sending information have been demolished. Friedman compared such obstacles to the infamous Berlin Wall which divided East and West Germany. When the wall was demolished, this unified and ‘flattened’ both East and West, and enabled a more potently economical and unified
Germany. The ‘flattening’ thus opened up a whole new world of possibilities for the ‘new’ German populace. In a similar fashion, Friedman implied, information and communication technology via the internet, has ‘flattened’ the corporate and public sectors of the world. With global communications made possible through the World Wide Web, corporations can send and receive information and communicate in real time. Phillips, Picavet and Reiners (2008: 1) pointed out that the volume of information available to support operations has increased substantially. This information needs to be shared across a vast network of stakeholders and today there are readily available technologies that can enable this task with ease.

The concluding fact that needs to be emphasized is that information and communication technology have emphatically changed the world. More specifically, the ways and means with which we communicate have changed and, given current trends, will be a continuous ‘work in progress’. The key point for business leaders to heed is that they require their organisations to change along with this phenomenon. They need to, as the old saying goes, adapt or die. Thus, a netcentric approach offers important guidance and a solution for these organisational challenges and will be explored in depth in the following sections.

3.2 NETCENTRICITY: A SYNOPSIS

3.2.1 The Roots of Netcentricity

The previous chapter highlighted the close association between the concept of knowledge and terms like ‘information’ and ‘intelligence’. Similarly, Walker (2006) pointed out the popularity of the term ‘netcentricity’ but asked: “what do we really mean when we attach netcentricity to other terms such as netcentric architecture, netcentric, netcentric engineering, netcentric operations, netcentric transformation, or netcentric warfare?” Walker acknowledged that the term ‘network centric’ was similarly used, and suggested that the various associated terms may be obvious to the authors who use them, but for many others may not be as comprehensible. Moon (2006: 2) also stated that there are a number of terms currently used for netcentric operations and suggested that the term ‘netcentric operation’ was gaining acceptance. It is important to note that these terms (netcentric and netcentricity) may
be used synonymously throughout this chapter. According to a paper titled “System of Systems”, published in 1996 by the Institute of National Security Studies, network centric warfare can trace its origins to Admiral William Owens of the United States Army who introduced the concept of a ‘system of systems’ in 1996. This claim was confirmed by Phillips, Picavet and Reiners (2008: 3) who indicated that network-centric operations had emerged as a concept approximately a decade previously. In a June 2011 scan by the researcher of scholarly articles on the EBSCO online research database, approximately 70% of all articles containing the term ‘netcentricity’ were closely associated to the military. In military circles, the term ‘netcentricity’ is commonly referred to as network centric warfare (NCW). Based on the above, it may be deduced that the term of netcentricity has its origins within the military-industrial complex.

Stenbit (2003: 1) claimed that the foundation for netcentricity is the United States Department of Defence’s Global Information Grid, commonly referred to as the ‘GIG’. The GIG is essentially a globally interconnected ‘system of systems’ which is able to collect, process, store, disseminate and manage information on demand to relevant seekers of information. Stenbit highlighted that end users are empowered to protect assets and to exploit information in a vastly efficient manner. Stenbit is supported in his claim by subject matter experts like Alberts and Hayes (2003) and Phillips et al. (2008). Moon (2006: 3), however, maintained that the netcentric term was borrowed from the field of computer technology. Moon’s view stems from the fact that computers have replaced tasks previously undertaken by people by exploiting the information and communication technologies currently available.

It is clear from the literature above that netcentricity has its roots in the military-industrial complex and also that the continuing advancement in information and communication technologies has enabled the netcentric concept.
3.2.2 Defining Netcentricity

One definition by Walker (2006) described netcentricity as an organisation which has a communications and computer networked group of people with mutual interests, at its core or epicentre of operations. Walker asserted that, although the above definition suggests technology as an essential element, there is also a strong emphasis on the human element (people). Technology, in this instance, is a mere enabler of netcentricity. Walker’s view, which asserted that technology is a mere tool, was supported by Stenbit (2003) and Moon (2006) who also viewed technology as an enabling tool and considered people, or the human factor, as being equally important when discussing the netcentric definition. This approach is closely aligned with views on successful knowledge management as discussed in the previous chapter.

Anderson and Shane (2002: 5) defined netcentricity as the “power of digital networks to connect a global wealth of people, information assets and services”. Within this context, Anderson and Shane claimed that the traditional gathering of team members in face to face meetings should be viewed as a past practice. Today, where individual employees of a team are geographically dispersed, they can attend and participate in meetings without being physically present. In this way, Anderson and Shane asserted, netcentricity enables the ‘connecting’ or networking of members of a geographically dispersed team. This type of collaboration is referred to as a virtual team or virtual community of practice. By enabling all the members of a team to share data, information and knowledge in real time, netcentricity has thus significantly impacted on team collaboration and performance.

According to Stenbit (2003: 1), “netcentricity is the realization of a networked environment, including infrastructure, systems, processes, and people, that enables a completely different approach to war fighting and business operations”. Orbst, McCandless, Stoutenburg, Fox, Nichols, Prausa and Sward (2007) described netcentricity as “an information superiority - enabled concept of operations, which is enhanced by networking sensors and decision-makers to achieve an objective”. Orbst et al. argued that a more ‘intelligent’ means of dealing with the extremely vast amounts of data found within the United States Department of Defence is required for rapid and effective decision-making. In opposing traditional means to intelligent
means, Orbst et al. suggested that data be semantically interpreted by technology, allowing for automated reasoning to assist human decision makers. In essence, data is discovered and shared across a wide variety of users. The authors (Orbst et al.) suggested that the work of defining the structure of this data falls to what they termed “communities of interest”.

McDaniel, McCully and Childs (2007: 215) referred to netcentricity as “people, processes and technology working together to enable timely access to information, sharing of information and collaboration among those who need it the most”. McDaniel et al. viewed netcentricity as the ultimate set of capabilities for organisations, especially government, in which to “sense and respond” to people and societal needs. Grimes (2006: 4) supports McDaniel et al. and emphasized that “information is one of our greatest sources of power”, suggesting that the ability to access and share information, and to collaborate with others, is at the heart of netcentric operations.

Moon (2006: 5) used the simple human cognitive model in characterising netcentricity as the “handling of information to achieve desired results through self-synchronisation”. Moon stressed that a network of nodes and links is used where information is the “key currency of exchange”. Moon (2006: 1) asked a pertinent question: “Are ‘networked’ and ‘netcentric’ the same?” Moon suggested that they are not the same and pointed out that organisations need to move from networked to netcentric. The transformation from networked to netcentric, according to Moon, is based on a paradigm shift in which basic actions previously performed by humans need now be done by information and communication technologies (ICT). This view is supported by futurist authors like Keyes and Fresco (1969), who proposed the use of ICT over humans. Their basic premise was that technology can do the work quicker and that humans are prone to making errors. Moon, in using the human cognitive model of “sense, act and decide”, claimed that the storage, retrieval and distribution of information, which was previously done by humans, could be done more efficiently by information technology. Zmud and Price (2001) also supported the use of ICT, due to the ever-increasing reach and power of digital networks, which Zmud and Price described as “netcentricity”. They stressed that information and communication technology needs to be exploited by people and organisations.
Furthermore, they suggested that, with faster analysis and sorting of information, decision makers would be able to obtain reliable and important information sooner, which in turn would enable decisions and organisational problems to be resolved more rapidly.

A combination of the collective understanding of other reputable authors on netcentricity such as Alberts, Garska and Stein (2000), McDaniel et al. (2007) and Grimes (2006) suggests that the term netcentricity may best be described as: organisations participating as a part of a continuously evolving community of people, devices, information and services, interconnected by a communications network in order to optimise resources and provide superior information needed to empower decision makers.

Therefore, a netcentric approach fuses technology and end user behaviour to provide a powerful solution to access, use and share knowledge in an effective manner. The element of access which is linked to issues of policy is an area with limited focus. This study attempts to enquire whether issues of policy and legislation are indeed limitations or barriers towards access and basic sharing of information. The benefits of netcentricity for knowledge management will be highlighted in the next section.

### 3.2.3 Benefits of Netcentricity

In advocating a move from networked to netcentricity for organisations, Moon (2006: 8) pointed out that in 1940, computer networks, supporting information technology and widespread digital communications infrastructure were all not available. Moon claimed that the advent of modern communication technologies and networks have made it possible to “release humans from routine and repetitive (but necessary) tasks”. Information and communication technology can undertake these tasks quicker and therefore lead to improved planning, co-ordinating and decision-making. This view is also supported by Keyes and Fresco (1969). In essence, it can be deduced that netcentricity will benefit those organisations that make use of modern technology for quicker planning and decision-making in lieu of mundane tasks being inefficiently conducted by humans. Moon (2006: 4) further suggested four features of netcentricity that can benefit organisations:
• Reach: In instances where distance and time become crucial factors, netcentricity allows for organisations to integrate and connect relevant parties across a vast area such that they can collaborate and share information via a network in real time, thus making distance appear irrelevant.

• Richness: Due to a collaborative collective of expertise being connected via a network, quality decisions can be taken within a defined time frame, for gathering, processing and sharing of information.

• Agility: Due to the above-mentioned features of reach and richness, stakeholders can adapt to circumstances, based on the rapid information sharing that takes place as and when desired, and organisation may respond appropriately.

• Assurance: Netcentricity is seen to assist organisations in achieving the expected levels of operational and systems problems by effectively detecting, deterring and ensuring recovery from organisation threats or problems.

According to Zmud and Price (2001: 1), “netcentric technologies enable a rich array of capabilities that have and will continue to redefine the nature of global competitiveness”. Zmud and Price further asserted their view on the benefits of netcentricity as providing:

• An instantaneous and reliable exchange of information assets and services both within and beyond organisational boundaries. This supports the claim of the ‘reach’ feature made by Moon above and by Anderson and Shane who considered face to face interaction a thing of the past;

• Instantaneous collecting, sorting and disseminating of information, both within and beyond organisation boundaries, such that decision-making is accelerated;

• Instantaneous and reliable construction and reconstruction of the collective information.

Zmud and Price (2001) reiterated the speed with which information and communication technology can be used in a netcentric organisation in order to both
accelerate and broaden organisation transformation. In their analysis of transaction costs and information technology systems implementation, Gurbaxani and Plice (2004: 3) indicated that, as the use of inter-organisational computer systems increases, the costs of doing business with these external entities will shift, such that even smaller, specialised firms may make their capabilities known to potential or trading partners. The authors discussed the global company Walmart, which has invested heavily in inter-organisational information systems that essentially enable the company to monitor the performance of its suppliers in real time. In this way, Walmart is privy to where their stock is in the supply chain. In essence, by applying inter-organisational systems, Walmart is able to view the same information that was once only seen by the managers of the supplying company. This provides Walmart with the ability to act on events outside the organisation, and significantly reduces previous associated costs of monitoring and verifying. Gurbaxani and Plice further explained how a netcentric organisation could also mitigate costs associated with non-performance and default. The authors used the additional examples of Amazon and eBay, internationally known companies through which individuals can purchase goods online. Both companies use seller ratings to give buyers information about the past performance of potential sellers. This information sharing, furnished by previous buyers, reduces the likelihood of inferior products or contract default based on the reputational performance gained and experienced by previous purchasers. Thus, Gurbaxani and Plice demonstrated, the netcentric organisation can use information and communication technology to potentially reduce anticipated external transaction costs, and ultimately benefit the organisation.

3.2.4 Netcentricity in the Public Sector

Thompson and Jones (2008: 148) stated that public management arrangements differ from country to country. Furthermore, they said, public sector organisations are rapidly transforming as they welcome the advancing information and communication technologies. More importantly, the authors stressed that the need for this transformation is required in meeting the service needs of citizens. McDaniel, McCully and Childs (2007: 215), in support of Thompson and Jones, emphasized that governments today need to transform to netcentric organisations in order to ‘sense and respond’ to the needs of their citizens. In order to become netcentric,
Thompson and Jones (2008: 149) asserted that there is one precondition, namely a better understanding of cultural elements in public management reform. Some cultural factors that may not have been explored in detail pertain to the following questions posed by Thompson and Jones:

- What are the effects of civic culture on public management reform? This might be relevant in developing countries where the citizens may not have access to or be educated on advancing technologies;
- What is the influence of religious concepts on public management arrangements?
- New public management’s *lingua franca*, or common language, is English. As such, non-English speaking countries may be challenged in translating a concept into their own language. Thus, what will be the impact in terms of public sector reform concepts and processes worldwide?
- How do different cultures influence public management arrangements?

The objective of Thompson and Jones was to highlight the importance of civic culture on the adoption of emergent technologies in public organisations and its influence on organisation design and behaviour. Essentially the need for organisations to rethink their organisational design has become imperative.

Gurbaxani and Plice mentioned the benefits of netcentricity by using the examples of international companies like Walmart, Amazon and eBay, as described above. Thompson and Jones further highlighted the netcentric concept used by global companies such as IBM, Ford and Toyota, which adopted the move from analogue to digital to exploit the power of information and communication technology in order to perform a variety of tasks. The authors acknowledged that it took a few years for these corporations to recognise and exploit the potential possibilities in new technologies, although the actual reorganisation of processes using the enabling technology only took a few months. In light of the ensuing successes made possible by the use of netcentricity principles in these private sector companies, Thompson and Jones (2008: 156) posed the following further questions:
Can government copy the netcentric model, organising itself into an alliance of networks, sharing top management and core competencies, investing in multi-disciplinary teamwork and a common culture, and using computers to chart activities and operation flows?

Can it use real time information on operations made possible by modern information technology systems to pass the exercise of judgement down into the organisation to wherever it is most needed, at service delivery, in production, or to the client?

Can government abandon its hierarchies, its need to push operating decisions to the top of the organisation, or its stove-piped functional organisations?

Can it consistently focus and communicate goals, foster information access and communication throughout the organisation, link incentives to performance, hire the best people, and invest in human capital, as well as computers and software?

The authors stressed that although the benefits are clear, the associated costs need to be considered. They suggested that the adoption of a netcentric organisation by government may be problematic, for two reasons: firstly, governments may fail to understand that a networked system requires a collective or holistic view of leadership, in which each part complements the other. The second reason is the unwillingness of people at the top of an organisation to share their power and authority.

Thompson and Jones (2008: 172) argued that the use of information technology improves communications and efficiency for government departments and agencies. Furthermore, Thompson and Jones also suggested that governments at all levels need to realise how new technologies can contribute to the democratic process and towards improving citizen engagement. The authors acknowledged that radical change may not be likely, but suggested that cultural and environmental change will encourage some movement towards an inevitable netcentric operation for governments. If governments want to benefit from netcentricity then, according to Alberts and Hayes (2003), they need to flatten their organisation structures and empower decisions at the bottom or front end of the organisation. In essence, Alberts and Hayes suggested that organisations, especially those in the public sector, need
to transform from the industrial age to the information age. In doing so, vertical, autocratic, hierarchical structures need to dissolve into flatter horizontal structures which “gives power to the edge”.

Although resistance appears prevalent in government institutions, it is clear from the literature that the benefits of netcentricity far outweigh the costs. Instead, issues like culture, organisation design and leadership appear to be the major pillars for netcentricity, which are discussed next in Section 3.3.

3.3 PILLARS OF NETCENTRICITY

As noted previously, the concept of netcentricity, like knowledge management, cannot be viewed in isolation. It is interesting to note that the pillars identified for knowledge management are similar to the pillars for netcentricity, namely leadership, information and communication technology, and organisation culture. Two additional pillars – ‘security’ and ‘people’ were identified by Raduege (2010), whose five pillars for netcentricity have been adopted in this study:

- Leadership (power to the edge)
- Information and communication technology (ICT) – communications infrastructure
- Security (privacy/cyber security)
- Organisation culture
- People (power to the edge)

3.3.1 Leadership

Previously cited authors (Alberts and Hayes, 2003; Gurbaxani and Plice, 2004; Anderson and Shane, 2002) convincingly stated that organisations need to transform their organisational structures from that of the industrial age to the information age. Jackson, Myers and Cowper (2010: 138) further enhanced this view by stating that “the world needs a new organisational paradigm that provides adaptability and flexibility”. Jackson et al. argued that traditional hierarchies need “to be toppled” and
called for new, flatter structures, via the netcentric organisation, as the successor to such hierarchies. The authors offered a concise yet interesting insight into the history of leadership. According to Jackson et al., leadership has always been important. Early leaders were described as kings, who although possessing similar skills to their followers, were expected to be the first in battle, leading the charge against the enemy. With the rise of bureaucracy and the emergence of labour, merchant classes and bureaucrats, empires, nation states and parliaments appeared. During the industrial age, modern corporations emerged and leadership then entered the managerial era. Now, in line with the recommendations offered by various authors, including Jackson et al., it is clear that leaders of netcentric organisations need to adapt or align themselves within the current information age. Jackson et al. described leaders in the information age as smart, visionary and flexible. The authors compared this type of leader to a music conductor, capable of transforming their organisations from a managerial phase to what Jackson et al. described as an “orchestral phase”.

Phillips, Picavet and Reniers (2008: 2) stated that, in order for organisations to become netcentric, leaders inevitably need to commit to certain key factors, which were supported in an international survey conducted by IBM in 2007. Some of these key factors for leaders include:

- Agreeing to the netcentric organisation destination – leaders need to understand and communicate that transformation is required throughout the entire organisation and be agile to prepare for related projects;
- Embracing emerging technical approaches – leaders need to ensure that the latest available information and communication technologies are adopted;
- Exploiting the latest technical solutions – the realisation that some of the challenges for organisations can now be resolved with adaptable and affordable technological solutions; and
- Addressing the change management – changes to individual’s skills, roles and overall organisational design and structure is essential.

Anderson and Shane (2002: 9), who studied the impact of netcentricity on virtual teams, asserted that leaders of teams must ensure that all members have the necessary ‘tools’. In terms of an ‘information age’ organisation, the authors suggested that, in a virtual team scenario, leaders should encourage a sense of
‘shared leadership’ amongst the whole team. Furthermore, the authors highlighted that leaders must have experience and also be trained to resolve communication problems, which are prevalent in virtual teams.

Stenbit (2003: 14) stressed that in order for a commitment to transformation, there needs to be a sustained leadership presence to ensure that new processes are institutionalised. Peat (2003) concurred with the above authors and pointed out that leadership is key in transforming both the usefulness and meaning of information. While Anderson and Shane focused on leadership at team level, McDaniel et al. focused on government becoming a ‘sense and response’ organisation, and suggested that, in order for organisations to transform, executives must ensure a netcentric model of leadership. This, in turn, should induce an increasingly agile culture which is also increasingly committed. Zmud and Price (2001: 16) confirmed the above view when they maintained that executive leadership must “configure, direct and co-ordinate the work units”.

Gurbaxani and Plice (2004: 2), whose study focused on high value networks, believed that an organisation must have a value network leadership present. They further asserted that good leadership is key when dealing with the challenge of balancing the high value network to the proprietary nature of a firm’s tacit and technical knowledge assets. In other words, the authors implied that, in order to build networks, there is a responsibility to share information, especially between organisations. The challenge, they emphasised, is in ensuring that the information supplied does not erode the knowledge base of the organisation, hence the importance of leadership to minimise the risks from a security perspective, and to ensure that key knowledge assets are not breached.

It is clear from these authors that leaders at all levels are important in leading their organisations’ transformation from the industrial age to the information age. It is equally critical for leaders to support a sustained commitment to such transformation. In concluding, Phillips et al. (2008: 2) fittingly asserted that leaders should “plan carefully, use the latest technologies, take lessons learnt from those who have passed before and seek support from those that know the terrain ahead. Ultimately,
success will depend on the confidence, commitment and determination of leaders themselves”.

### 3.3.2 Information and Communication Technology (ICT)

Brynjolfsson and Hitt (2000: 2) pointed out that the “dawn of the computer age” emanated from the United States’ military research into the trajectories of artillery shells, for which the first digital computer was created in 1959 with great calculating capabilities. However, as the authors made clear, computers are not merely about number crunching and not all problems relate to numbers. Brynjolfsson and Hitt suggested that, as computers become more affordable and more technologically advanced, the challenge will be for leaders also to come up with new ways in which to use these ever-advancing capabilities. This assertion, that netcentric organisations need to exploit the use of information and communication technology, is supported by other subject matter experts, including Phillips et al. (2008), Alberts and Hayes (2003) and Zmud and Price (2001).

#### 3.3.2.1 Cost versus Benefit Analysis of Information Communication Technology

Thompson and Jones (2008) and Reid, Goodman and Johnson (2005: 338) both criticised the high costs of information and communication technology investments. The latter authors questioned whether the costs incurred for such technology justified the use of the ‘public purse’. Reid et al. argued this point mainly from the perspective that these monies are used by the military, which in their opinion deals in death and destruction. In essence, they questioned whether the billions invested in information communication technology (ICT) for eventual death and destruction was a justifiable cause. Of course Thompson and Jones propose that ICT be used for the betterment of society in terms of responding to the needs of society. Gurbaxani and Plice (2004: 9) counter Reid et al.’s question on monies being used by the military for destructive purposes, by suggesting that inter-organisation information systems links, like those rolled out by Walmart (as one international example) actually “mitigate costs” by sharing them between the organisation and its related suppliers. Furthermore, they claimed, information technology allows firms to interact and share information across
organisational boundaries. Brynjolfsson and Hitt (2000: 1) supported Gurbaxani and Plice by adding that the “benefits of information technology are often intangible and disproportionately difficult to measure”. They claimed that, due to the increasing adoption of new technology and the consequent obsolescence of old technology, many computer costs drop by between 3 and 4% each month. In addition, Brynjolfsson and Hitt (2000: 11) stressed that computer-enabled procurement resulted in a reduction in purchase input costs by between 10% and 40%, depending on the industry.

In the coming century, Markus, Houstis, Catlin, Rice, Tsompanopoulou, Vavalis, Gottfried, Su and Balakrishnan (2000: 33) predicted, “the available computational power will enable anyone with access to a computer to find an answer to any question that has a known or effectively computable answer”. This bold statement echoes and reaffirms the views held by previously cited authors, who contended that technology today must be exploited in order to supply organisations with information quickly, so that decisions makers are better informed when resolving problems.

From an inter-organisational or intra-organisational perspective, Ferris (2004: 208) asserted that creative, interactive databases are necessary to enable searches for information gathered by members of the intelligence community. Anderson and Shane (2002) conceded that interactive databases, used during inter or intra-organisation/agency collaboration, are conducive to the creation of virtual teams to mitigate the issue of distance. Gurbaxani and Plice (2004: 15) corroborated with Anderson and Shane by highlighting that both inter and intra-organisation communication systems “allow project teams to share technical knowledge across boundaries and to interact with stakeholders in real time”. Zmud and Price (2001: 12) added that external stakeholders provide greater knowledge to the collective pool of information, thus reaffirming the point made by Thompson and Jones (2008) when they maintained that “two heads are better than one”. These arguments, together with the claim that inter-organisation information can, in fact, reduce costs (Gurbaxani and Plice, 2004), make it clear that information and communication technology is beneficial for organisation and inter-organisation collaboration.
Anderson and Shane (2002: 9) suggested that, when using information technology for inter-organisational collaboration in the virtual team scenario, leaders should ask the following potent questions: “Who needs to talk to whom; about what; through what medium; how often; who needs to be informed; at what time; and by whom?”. Ferris (2004: 217) further supported these crucial questions by emphasizing that knowing “what information is required” is essential in order to prevent any organisational risks.

3.3.2.2 Criticising Information Communication Technology (overlooking the humanist paradigm)

When identifying and analysing the criticism of information and communication technology by various authors, three main categories of criticism emerge. These are directed at issues of cost, security, and the fact that the sole focus of such technology ignores people and other pertinent assets of an organisation. Anderson and Shane (2002: 9) pointed out that in virtual teams, information technology ignores “eye contact, facial expressions and gestures, and the trouble flags”. The benefits of face to face communication over communication technology, such as telecoms, are analysed and criticised accordingly. Another possibility of misunderstanding and miscommunication may occur in a ‘non-controlled’ telecom situation, when one member of the group interrupts whilst another is talking, simply because he or she did not have the appropriate physical cues to know when the other was finished. This is thus another shortcoming of technology. Although they acknowledged these challenges, Anderson and Shane (2002) reiterated that information and communication technology minimises costs and convenience, especially when teams are widely dispersed. However, Phillips, Picavet and Reiners (2008: 4) emphasized that, in order to be successful, netcentric initiatives need to be much broader than just information technology implementation. In essence, and in concurrence with many other subject experts (Malhotra, 2003; Alavi and Leidner, 2002), information and communication technology must not ‘hijack’, or shift focus away from the greater issues like people in the case of knowledge management and netcentric initiatives.
3.3.3 Security

Anderson and Shane (2002: 6), whose study focused on netcentricity in virtual teams, pointed out that “without network security, netcentricity can turn business dreams into nightmares.” In most virtual, netcentric teams, it is common for members to interact via e-mail, as it is a fast, cheap and convenient means of communicating. However, Anderson and Shane (2002) contended that information communicated in this way is vulnerable and may be exposed to “snoopers and hackers” if not properly encrypted. In order to mitigate this risk, Anderson and Shane (2002: 7) urged companies should use encrypted programmes. According to Anderson and Shane (2002: 7), cryptography is described as “the art of encrypting and decrypting messages using software that make it hard, if not impossible, for external parties to break into a company’s system and ‘steal’ or destroy information and trade secrets from the victim’s information system”. However, the authors contended that these programmes “are not highly secure”. They also highlighted the threat of viruses (codes which attach themselves to a file, leading to infection, modification or deletion of information stored in a system). The authors stressed the importance of teams ensuring that information comes from trustworthy sources.

Phillips et al. (2008: 8) raised similar concerns as those of Shane and Anderson, when stating that most information technology systems, due to multi-level security structures, have been designed with physical separation between various levels, thus making networking practically impossible. The authors stressed that the security challenge was more than just a technical one, and implied that security policies and procedures might require changes, which usually required a journey through bureaucratic channels. However, the authors maintained that security solutions are being found in new, more sophisticated technology, for example, methods with which to validate access rights, such as Virtual Private Network security, biometrics and location data. More cost-effective approaches are also at an advanced stage via a Service Oriented Architecture based approach.

From a governmental intelligence perspective, Ferris (2004: 211) indicated that the United States, in its approach to centralising intelligence, has made use of a system known as C4ISR (an acronym for Command, Control, Communications, Computers,
Intelligence, Surveillance and Reconnaissance), and, according to Ferris, “a centre of gravity for its power as well as its greatest vulnerability”. Ferris (2004) pointed out that in 2001, 16,000 attempts were made to enter the United States Navy computer networks. Out of these infiltrations, 400 gained entry whilst 40 merely perused the network. This threat encouraged intelligence agencies to “hide” their information within “security gates or separate intranets”. Ferris suggested that “the intelsphere must stand apart from the infosphere”.

Stenbit (2003: 4) offered a solution to the challenge posed by Ferris above by suggesting that organisations who make use of collaborative groups known as Communities of Interest (COIs) must ensure that only users who exchange information in pursuit of common goals be provided with the necessary access. McDaniel, McCully and Childs (2007: 219) suggested that “netcentric organisations create processes that enable global connectivity, real-time collaboration, rapid and continuous information exchange that is boundary-less and ubiquitous, and access to data and information that is secure and reliable”. It is therefore evident that, because challenges pertinent to security risks are always present, leaders in a netcentric organisation need to take heed and ensure they mitigate such risks in the planning and designing of their information and communication technology system.

3.3.4 Organisational Culture

According to Phillips et al. (2008: 2), one of the critical success factors for a netcentric organisation is the issue of change management. In particular, there is a need for individuals to know where they fit into the ‘bigger sense of things’. Furthermore, they need to be informed of what their specific role is to be. McDaniel, McCully and Childs (2007: 217) pointed out that decision-making must be decentralised “in a culture in which the purpose and scope of the business are clear to everyone”. Anderson and Shane (2002: 6) also highlighted the importance of organisation culture and stated that it is important for a team to have a diverse collective of people. It is apparent that diversity is becoming increasingly common in senior management teams due to the globalised world in which organisations thrive today.
From a governmental perspective, Ferris (2004: 209) described a case study in which an investigation of the United States NSA (National Security Agency) revealed the organisation to be focused inward only, rather than on their customers, partners and stakeholders. In essence, the agency made information-sharing difficult by having ‘classified systems’ that restricted other stakeholders from obtaining information. In addition, the communication used by the agency was so limited by agency jargon, that it was unable to provide fast, flexible and easily interpretable information to clients and other stakeholders. In a classic example of resistance to transformation, the investigation indicated that the National Security Agency was actually limiting the total move from an industrial age to an information age. The report called for institutional culture changes, and also suggested that the agency needed to overcome “its culture that discourages sending bad news up the chain of command”. Ferris concluded that such cultural problems called for education and the assessment, creation and use of a new culture. McDaniel et al. (2007: 216) supported Ferris’s statements and asked the pertinent question: has anything really changed within government? McDaniel et al. asserted that the inefficient and unresponsive nature of government is out of touch with information age opportunities and expectations. Most noticeably, while there has been some evidence of e-government, “the fundamental culture, nature and core processes of government have changed little so far in the information age”. More positively, McDaniel et al. highlighted the committed endeavours of the United States Department of Defence and of higher education, both of which are described as ‘tradition bound’ institutions, yet which have earnestly begun the transformation to netcentric and information age organisations.

Thompson and Jones (2008: 153) concurred with Brynjolfsson and Hitt (2000) who asserted that there is compelling evidence to show that computers do increase productivity. Thompson and Jones (2008) emphasised, however, that it is not only the effort that one puts into the implementation of information technology systems that is important, but also the effective systems architecture, set of processes and culture to which organisations need to pay special attention. Gurbaxani and Plice (2004: 23) suggested that netcentric organisations adopt a culture which drives revolutionary change. In the case where an organisation is already leading product change and development, the authors suggested that members of a networked team
constantly seek improvement by re-evaluating their assumptions, procedures and the product itself. In this way, the organisation will drive innovative change rather than waiting for a competitor or another stakeholder to invent something new. Peat (2003) maintained that “the organisation’s culture is demonstrated through its social network, whose nodes are individuals and whose links represent various social interactions”. Essentially, the author was advocating the use of COI (communities of interest), networks of individuals with similar interests or goals, and suggesting that problems can be better solved in a culture where there is a mutually shared interest.

Another crucial element, which was highlighted in the literature and deemed appropriate due to its link to all pillars as discussed within the organisation culture, is the element of trust. Zmud and Price (2001: 13) conceptually referred to trust as “the mutual confidence that no party to an exchange will exploit another's vulnerability”. Both internally and across organisations, trust furthermore depicts the willingness of one party to engage with another “in mutually dependent activities in the absence of governance structures”. Zmud and Price suggested that, like knowledge networks, trust networks can be both locally and globally based. Anderson and Shane (2002: 9) pointed out that, in the case of virtual teams, team members need to ensure that any data and information communicated through files come from a trustworthy source. Of course, this is due to the security risk that files from an untrustworthy source have the potential to corrupt the whole system if they contain a virus. Stenbit (2003: 96) also affirmed that one of the strategies of a netcentric organisation is to enable data to be trusted. Organisations need to ensure that their systems have access control mechanisms so that only relevant users are granted access, especially to sensitive information.

In the global context, international companies require strategic alliances. Thompson and Jones (2008: 168) highlighted Toyota by way of example, which wants suppliers to remain independent companies, although it has an integrated supply chain. As a result, trust based alliances are required in order to ensure that good relations are sustained. Gurbaxani and Plice (2004: 4) reiterated the point made by Thompson and Jones in that, where sensitive product information is made by Company A to a supplier who also services a competitor (Company B), trust becomes crucial. By implication, if the supplier were to immaturely let this sensitive information get ‘into
the hands’ of Company B, it could potentially create serious problems for Company A who may even be put out of business.

The issue of leaders and trust have been highlighted by many reputable authors such as Covey (2006), Lakshman (2005) and Crane, Downes, Irish, Lachow, McCully, McDaniel and Schulin (2009). In fact, Crane et al. (2009: 223) indicated that “leaders need to communicate explicitly their intent and develop trust in their followers”. Covey (2006: 6) highlighted thirteen behaviours of a high trust leader. One competency identified was for a leader to extend trust “abundantly to those who have earned your trust”. Such empowerment due to trust in people brings us to the next pillar, which will focus on empowering people or, as suggested by Alberts and Hayes (2003), giving ‘power to the edge’.

3.3.5 People (Power to the Edge)

Raduege (2010: 1) highlighted an important point when stating that technology is the easier part of the netcentric equation, whereas predicting the “ways people think and act” is the biggest challenge. Alberts and Hayes (2003: 5) explained the term “power to the edge’ as an approach to “changing the way individuals, organisations, and systems relate to one another and work”. Furthermore, the authors emphasized the importance of empowering individual workers who are at the ‘edge’ of the organisation, in other words those who have the most contact with the external environment. The key word here is empowering. Due to the points highlighted thus far by Raduege, and Alberts and Hayes, the ‘people’ pillar is deemed to be critical, although sometimes neglected because the focus in organisations tends to be on the ‘top’ rather than on the bottom or edge. Clearly Raduege’s opinion that change is more difficult for people to manage than technology, which can more easily be repaired, stems from the intangible issues associated with the human element. Thompson and Jones (2008: 153) echoed Alberts and Hayes by reiterating that “moving from analogue to digital processes and distributing decision rights to front personnel are the practices that truly distinguish the netcentric organisation from more traditional bureaucracies”.

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Anderson and Shane (2002: 8) argued that in an independently operating virtual team, some employees may get away with doing nothing or ‘freeloading’ off those who are productive. This, in turn, could lead to the productive workers becoming demotivated and even leaving the company. It is therefore important for leaders to ensure all members get along and that each one contributes to the knowledge pool. Furthermore, they argued, leaders need to facilitate communication and give teams the power, freedom and the necessary tools to perform effectively.

Alberts and Hayes (2003: 83) highlighted a further advantage of the people pillar, namely the shift of processes from a ‘push’ to a more pull-oriented approach. In the intelligence gathering process, the power to the edge will advocate that users seek rather than merely wait for information, which is seen to be a proactive rather than a reactive approach. Alberts and Hayes (2003) suggested that most autocratic organisations (in traditional industrial age) practice the top down approach, as is common in most government organisations. The netcentric approach, however, strongly suggests shifting this structural paradigm to a bottom up or participative approach. Having said this emphatically, it is equally responsible to highlight critical factors when giving the ‘power to the edge’, namely:

- Leaders need to ensure that the ‘right’ person/s with the right skills are deployed;
- The ‘right’ information must be supplied to the end users. This extended distribution of information must be mutually agreed and approved on a policy level, which previously prevented certain information from being circulated. To further elaborate, if information is primarily not allowed to go to ALL persons, specific authority needs to be granted to the selected individuals to attain their ultimate objectives.
- All users need to accept responsibility and accountability for the usage and sharing of relevant confidential information.

Phillips et al. (2008: 11) pointed out that one of the greatest barriers to implementing a netcentric organisation is the lack of sufficient skills required to do certain functions. Therefore, as stated by Alberts and Hayes above, upskilling people is equally important to merely implementing new technologies.
It is again worth noting that the key enablers, like leadership, organisational culture and information and communication technology, are critical for both knowledge management and netcentricity. Of course, issues of trust form part of the organisational culture and are also important to both knowledge management and netcentricity. The issue of security was the only pillar or enabler specifically associated with netcentricity, due to the logic that information and communication is transferred across various organisations. This issue of security also falls within the ambit of trust and therefore warrants inclusion in the research.

3.4 Models of Netcentricity

3.4.1 The Effective Procurement Model

Phillips et al. (2008) asserted that netcentricity is now a widely accepted goal for organisations. However, achieving this goal appears to be challenging for some. The authors concluded from their experience that critical success factors, mentioned below are important for netcentricity. These factors were supported by an international survey conducted by IBM in September 2007 (Phillips et al., 2008). One critical success factor suggested by the authors is the designing of an effective procurement model. The international IBM survey revealed that 60% of those surveyed considered their procurement processes ineffective. The authors highlighted the fact that current procurement processes are dependent on traditional procedures created in the industrial age and are therefore not efficient for a netcentric organisation. The authors asserted that lengthy processes often result in outdated technology and solutions, and proposed a new procurement model for netcentric organisations, which includes:

- A more agile approach that recognises that lengthy processes are no longer acceptable and recognises the spiral nature of netcentric organisation development instead;
- Improved coordination across departments, which breaks away from the traditional ‘silos’ or ‘stove-pipe’ method of procurement;
• Sponsorship and commitment, from senior managers - the initial benefits of netcentricity are difficult to measure and so sustained assurance and support is required;
• Enhanced commercial relations with suppliers in order to improve supplier performance and sharing of risk.

Phillips et al.’s procurement model seeks to ensure an “agile and flexible procurement process” which will identify and focus on a smaller number of suppliers and set up agreements accordingly. According to the authors, a coordinated approach to procurement may prove difficult in a large organisation, in which instance they suggested, a “light portfolio” approach over a centrally imposed approach. In their “light portfolio” approach, freedom to procure within certain parameters are given to lower levels, although a central authority is responsible for maintaining standards and overall technical approaches. The central authority is also responsible for quality assurance by reviewing new purchases. In order to ensure commitment, a convincing business case needs to be presented to the relevant decision makers and sponsors. The business value and associated ‘tangible’ benefits also need to be highlighted. The authors stressed that this needs to be in “high priority and visible areas”. They went on to say that strategic partnerships with key suppliers need to be developed and maintained, in line with mutual goals. Incentives may also be awarded to suppliers in order to ensure that delivery outcomes are met or even to encourage suppliers to accept greater risks. Ultimately, the authors highlighted, the goal is to ensure that the best information communications technology is obtained in the most efficient manner.

3.4.2 Stenbit’s Netcentric Data Strategy

Stenbit (2003), defined netcentricity as “the realisation of a networked environment, including infrastructure, systems, processes and people, that enables a completely different approach to business operations”. Stenbit proposed a netcentric data strategy in order to enable transformation of the United States Department of Defence. The key attributes of Stenbit’s strategy included the following:
• Ensuring visible, available and usable data is needed when needed and where needed in order to accelerate decision making;
• ‘Tagging’ relevant data (intelligence, non-intelligence, raw and processed) with metadata in order to enable discovery of data by users;
• Posting all data to shared spaces in order to provide access to all users except when limited by security, policy or regulations;
• Advancing the department by defining interoperability through point–to-point interfaces to enable many-to-many exchanges typical of a netcentric data environment.

The strategy also incorporated management of data within communities of interest (COI’s), instead of standardising elements across the organisation. Furthermore, Stenbit suggested an integrated approach for delivering a netcentric environment. The foundation for netcentricity, according to Stenbit, is the United States Department of Defence’s Global Information Grid (GIG). The integrated approach uses communications, computing and applications technologies. However, Stenbit’s approach also recognised that cultural barriers against trust and data sharing require acknowledgement. The approach essentially combined the overall netcentric data strategy highlighted above, with an information assurance (IA) strategy aside the implemented layers of the Global Information Grid, as illustrated below:
Figure 3.1 Netcentric Data Strategy

3.4.3 The Semantic Model

Orbst, McCandless, Stoutenburg, Fox, Nichols, Prausa and Sward (2007: 2) acknowledged that the United States Department of Defence is challenged with vast amounts of information despite vastly improving technologies, and suggested the creation of semantic models in order to combine the data. The authors described “a more intelligent” method wherein “data is semantically interpreted by machines, allowing for automated reasoning to assist human decision makers”. Orbst *et al.* viewed the Department of Defence’s attempts at centralising thousands of systems and networks as a seemingly impossible task. The authors suggested several initiatives “demonstrating the effectiveness of using semantic web technology to aid organisations in managing their information and making better decisions”. In order to
achieve netcentricity, the authors recommended that systems require standards and formats for describing data, five of which they list as:

- A glossary;
- A conceptual model;
- A semantic model;
- Business rules; and
- A list of authoritative data sources.

3.4.4 A Network Centric Organisation Model

Gurbaxani and Plice (2004: 5), in their attempt to clarify and describe netcentric concepts and principles, incorporated two views with which to describe the future (netcentric) organisation, namely an economics view and a strategy view.

Figure 3.2: The Network-Centric Organisation

[Diagram of network-centric organisation model]

Source: Gurbaxani and Plice (2004)
For this model, Gurbaxani and Plice (2004) primarily explored organisational economic theories and the impact of a networked information communication technology infrastructure on organisational outcomes. The authors looked at the associated theories which view firms from different perspectives. One such view defines the firm as an entity which avoids costs associated with the marketing of the firm. Another view focuses on ‘hold-up’ problems, whilst information considerations are also discussed. The authors argued that “information flows more freely within a firm than between firms”. The use of agencies is also a concern, especially when it comes to performance management. However, the authors highlighted that the difficulty in applying the various theories in practice is due to an unclear distinction between what is internal and what is external to the firm. Whilst the property rights approach clarifies what is internal to a firm (non-human assets under common ownership), various contracts tends to prolong any distinct clarity. The authors therefore suggested that the question of whether an entity is inside or outside of a firm, demands that two issues be considered concurrently, namely the degree of ownership and the degree of coordinated integration.

The impact of information communication technology on inter-organisation facilitation has increased and, according to Gurbaxani and Plice (2004), has significantly reduced the associated transaction costs. The benefits of information communication technology have been discussed in depth above, with examples of international companies like Dell and Walmart, who have proven successes via the use of information communication technology. The view “of the firm as an alternative to markets” is justified in an era in which information technology is continuously advancing. This in turn erases boundaries between organisations. The view by Gurbaxani and Plice is that the firm is “a bundle of capabilities”, focuses more on the human element. However, the authors asserted that information technology can best be used to facilitate the networks created via interorganisation links in order to strengthen the knowledge base. The benefits, then, are clearly greater when the capabilities of organisations are combined, rather than operating in isolation.

In describing their “strategy view”, the authors focused primarily on the perspective of “customer intimacy”. Gurbaxani and Plice suggested that in a netcentric organisation, the uniqueness of each customer needs to be properly understood. In order to
achieve this, they continued, a unique team of organisations should connect. The authors suggested that highly valued networks need to be pursued, which would lead to knowledge creation and acquisition in a netcentric environment. Within such an environment, (netcentric) data supports decision making from both inside and from activities performed externally, in other words from other organisations in the supporting value network. The challenge for leaders is to gain knowledge from the collective and improve organisational knowledge when operating in high value networks. However, allowing the knowledge to flow out to other organisations also poses a risk in terms of loss of intellectual capital. The authors responded to this anxiety by indicating that the nature of a netcentric organisation is precisely what minimises the risk of loss. In other words, because a netcentric organisation is viewed as a dynamic, rather than a static, entity, the challenge of creating new knowledge and retaining past knowledge is crucial.

McDaniel et al. (2007: 18) suggested that, in attempting to become a “sense and response” academic or government organisation, organisations need to transform to become netcentric and agile. Key components of such a transformation would be:

- Sensing and being able to respond to the current environment whilst anticipating the future;
- Transforming an agile culture where the model leadership must support collaboration;
- Building and linking collaborative networks;
- Creating processes that are netcentric enablers;
- Identifying and sourcing technologies that are netcentric enablers.

Like authors cited previously in this chapter, McDaniel et al. suggested that organisations transform from the traditional hierarchical to the information rich era. They also stressed that leaders should set the course for agile and netcentric organisations, which are able to sense and ultimately respond to the needs of citizens and stakeholders.
3.4.5 Moon’s Human Cognitive Model for Netcentric Operations

Moon (2006: 3) suggested the use of a simple human cognitive model for netcentric operations.

Figure 3.3 Human Cognitive Model

- Used in computer science for modelling human problem solving (virtual humans).
- Consistent with Cybernetic concepts – feedback loop.
- Also called:
  - Action-Learning Cycle
  - Sense & Response Adaptive Loop
  - And, in military circles, an OODA loop or sensor to shooter chain.

Source: Moon (2006: 3)

Moon (2006: 3) viewed human cognitive modelling as “an area of computer science that deals with simulating human problem solving and mental task processes in a computerised model”. Moon suggested the use of the “sense-decide-act” feedback loop, also referred to as the “action learning cycle” and in military circles, a ‘sensor to shooter chain’ (Moon 2006). The key feature of this model also advocates the use of information technology in assisting human decision makers in analysing information, deciding what options or measures to take and, ultimately, actioning the information received.
In this chapter, numerous authors were cited as having acknowledged that information and communication technology, which is advancing continuously, has changed the organisational landscape. The potent arguments by Alberts and Hayes (2003), Gurbaxani and Plice (2004), Jackson, Myers and Cowper (2010), Stenbit (2003), and Zmud and Price (2001) all strongly suggested that organisations need to transform from the industrial age to the current information age.

These authors also argued that the information age has resulted in ‘information overload’, thus creating an opportunity for organisations to exploit information technology, rather than continue with inefficient manual processes. Brynjolfsson and Hitt (2000) provided a concise history of computers, whilst Moon (2006) asserted that the “power” of computers today is vastly superior to that of twenty years ago. In fact, Moon noted that in the 1940s computers were not available to support information and communication technology. By implication, what was impossible then is now standard practice. Gurbaxani and Plice declared that globally established companies, like Walmart, eBay, Toyota and Dell, to name a few, had begun the transformation from the industrial to the information age, changing from analogue to digital, with successes from both a cost and productivity perspective.

Thompson and Jones (2008) asked pertinent questions about whether the public sector could, in fact, copy the netcentric model? They queried whether the culture in government would be able to upset long held traditions like flattening of structures, people in authority losing their command, and control of power. Although culture was mentioned in the literature, the question of change management, in which people are financially threatened by a move or loss of jobs, was not examined. Furthermore, very little in the literature focused on legal or policy limitations, which is especially relevant in the public sector, where the need to share yet keep information secure requires attention. However, as indicated by McDaniel et al., the private sector has made huge and successful strides in adopting the netcentric approach. Thompson and Jones, Gurbaxani and Plice and others maintained that governments need to pursue the netcentric approach in order to meet the needs of their citizens.
Gurbaxani and Plice emphasized further the cost benefits in the case of inter-organisation information sharing.

As previously alluded to, the relevance of netcentricity for knowledge management emanates from the reality that currently, organisations appear to be drowning in information. The need for organisations to sort and analyse the flood of information requires the intervention of technology, such that information is easily sorted and retrieved by the users who require the information. The concept of netcentricity also allows for users to extract information from a central database whilst further empowering user's access to information easily. The speed in which information is transferred between relevant stakeholders allows time for more meaningful analysis and interpretation of the information such that employees apply the information and ensure the transformation from information management to knowledge management, as suggested in Section 2.3 of Chapter 2. Thus, the need for organisations to transform and align to the global information age appears obvious. It is also evident that leaders who are not willing to share information, especially in government where certain agencies hoard or hold information as “their own”, will result in the failure of a netcentric approach towards knowledge management. From the literature revealed above and in Chapter 2, it is evident that leaders driving the netcentric agenda consider all of the above-mentioned pillars. Failure to do so may derail the road to transformation from the industrial to information era.

From the various models introduced in Section 3.4 above, it is evident that the majority of models are aligned to the military industrial complex. The researcher identifies Moon’s Human Cognitive Model as the most appropriate model proposed. The reasoning behind the decision amounts to the fact that it involves the human element and uses technology as an enabler towards problem solving. This aligns to the emphasis of endorsing and ensuring a ‘people focus’ and a suggestion that information technology (IT) and people be synergised – as discussed in Section 2.9 of Chapter 2. The following Chapter will chart a model of knowledge sharing for government agencies in South Africa. This model will guide the empirical component of this study.
CHAPTER 4

A THEOREtical model FOR knowledge SHARING BETWEEN SOUTH AFRICAN GOVERNMENT AGENCIES

4.1 INTRODUCTION

In the previous chapters, the various enablers and inhibitors of knowledge sharing within and between organisations were discussed. Knowledge sharing was outlined as an actionable form of the knowledge management discipline and was also described as one of its greatest challenges. The concept of netcentricity, which highlights the need for technology to be installed as an enabler of knowledge sharing, along with its associated risks, has also been discussed. Other pertinent enablers for knowledge sharing between government agencies were categorised as: leadership; organisational culture; policies and legislation; and information and communication technology.

This chapter will propose and discuss a model for knowledge sharing between South African government agencies. The main focus of this study is on those factors, commonly identified and acknowledged by international experts that enable knowledge sharing within private and public sectors. The model proposed in this chapter will incorporate these factors in an attempt to ensure that the principles of knowledge management are instilled. A dependent variable – the perceived effectiveness of knowledge sharing – and its hypothesised relationships with various independent variables – the factors that enable knowledge sharing – will be presented and discussed within the parameters of the model. It should be noted that the scope of this study is within the public sector. The research seeks both to understand the current state of knowledge management as a discipline, whilst also enquiring if and how knowledge sharing occurs within government through the selected government agencies.
4.2 THE MODEL

In this investigative model, the dependent variable is the perceived effectiveness of knowledge sharing between South African government agencies. The independent variables are enablers such as leadership, organisational culture (including the element of trust), policies and legislation, information and communication technology (ICT), communities of practices (knowledge sharing methodology), and elements of a learning organisation. The theoretical model, and the hypothesised interrelationships between the variables, is outlined in Figure 4.1 below.

![Theoretical Model of Perceived Effectiveness Knowledge Sharing Process]

Source: Researcher’s Own Construction
Based on the theoretical model (Figure 4.1), it must be noted that the ensuing discussions which are going to highlight the relevant hypotheses, will begin with the dependent variable knowledge sharing, which is H\textsuperscript{23}. Thereafter, the hypotheses of the intervening variable netcentricity and its influence on KM and knowledge sharing are highlighted. Following this, the related hypotheses of the listed independent variables and its influence on the dependent variable are presented and discussed.

4.3 INFLUENCE OF THE INTERVENING VARIABLES ON THE PERCEIVED EFFECTIVENESS OF KNOWLEDGE SHARING

A report from the Economist Intelligence Unit (2006: 3), which assessed likely changes to the global economy between then and the year 2020, stated that knowledge management as a discipline would be the major boardroom challenge. In fact, the report highlighted survey results in which knowledge management was rated the area that offered the greatest potential for productivity gains. Yuen (2007), in a global workshop held on managing knowledge to build trust in governments, highlighted the explosion of digital connectivity and further stated that most governments had accepted the use of IT for knowledge, and ultimate public sector, reform. The strategic importance of the knowledge management discipline for governments and organisations has also been acknowledged by a number of subject matter experts, including Bebensee, Helms and Spruit (2011); Cheng, Ho and Lau (2009); Ibrahim and Reid (2009); Tiago, Tiago and Couto (2009); Jakubik (2007); Cortes, Sa’ez and Ortega (2007); O’Riordan (2005); Riege (2005); Dickson (2000); and Knight and Howes (2003).

Knowledge sharing in the public sector differs somewhat from the private sector in that “organisational realities impede the creation of high quality knowledge” (Lahneman, 2004). Lahneman highlighted the fact that government agencies each perform specialized tasks and tend to keep their information ‘sacred’, thus creating a problem commonly referred to as ‘stove-piping’ or knowledge ‘silo-ing’. Collaboration across boundaries was also seen as a learning challenge by Puonti (2003), who described underlying tensions emanating from disagreements and the consolidation of boundaries.
Over the past few years, a growing number of companies have focused on their intellectual assets and have introduced a variety of knowledge management programmes so as to improve performance levels and achieve competitive advantages. The most notable companies to have successfully harnessed their knowledge through a range of innovations include Skandia Assurance and Financial Services, Netscape, Microsoft, Sun Microsystems, American Airlines, 3M, Dow Chemical, Asea Brown Boveri, BP Amoco and General Electric (Probst, Raub and Romhardt, 1998; Skyrme, 1999).

Grover and Davenport (2001) noted that the most visible development in knowledge management is the employment of knowledge specialists, such as knowledge managers and chief knowledge officers (CKO). Both have symbolic and operational roles. On the operational side, the CKO serves as the chief designer of the knowledge architecture and must change culture by example, creating models, lighting fires and linking knowledge management to measurable goals in order to overcome barriers to change. Generally, a cadre of knowledge managers, tasked with knowledge activities, supports the CKO.

Organisations can achieve important benefits from knowledge management, but, to be successful, their approach must fit both the culture and the specific business objectives of that organisation (Seeley and Diedrick, 2000). Positive outcomes must also be paid for with significant investments of time, energy and resources. Many organisations that have achieved success through their knowledge management efforts share the view that the investment was worth the effort (Coates, 2001; Schein, 2000).

According to Davenport and Prusak (1998), most knowledge management projects have one of three aims:

- To make knowledge visible and show the role of knowledge in an organisation, mainly through maps, yellow pages, and hypertext tools.
- To develop a knowledge-intensive culture by encouraging and aggregating behaviours such as knowledge sharing (as opposed to hoarding), and proactively seeking and offering knowledge.
To build a knowledge infrastructure – not only a technical system, but a web of connections among people given space, time, tools and encouragement to interact and collaborate.

Knowledge management is largely regarded as an initiative involving various activities. Slight discrepancies in the delineation of the processes appear in the literature (Probst, Raub and Romhardt, 1998; Buckman and Meek, 2005; Bukowitz and Williams, 2000; Alavi and Leidner, 2001). These discrepancies involve the number and labelling of processes rather than the underlying concepts. At a minimum, the four basic processes of creating, retaining, sharing, and applying knowledge should be considered. Additionally, Riege (2005) and others assert that the key enablers for knowledge managing and sharing, as highlighted in Chapter 2, must be in place or they will be viewed as inhibitors to knowledge sharing.

Based on the above, it is therefore hypothesised that:

\[ H^{23} \]: There is a positive relationship between the implementation of the knowledge management discipline and the perceived effectiveness of knowledge sharing.

Numerous authors (Gurbaxani and Plice, 2004; Thompson and Jones, 2008; Cong and Pandya, 2003; Alberts and Hayes, 2003), as mentioned in Chapter 3, have asserted that the netcentric organisation is one which is able to transform itself from an industrial age organisation into an information age organisation. The implication is that if the concept of netcentricity is applied, then organisations would be able to adapt easily to the increasing and continuously changing impact of information and communication technologies. According to Friedman (2006), if an organisation does not align itself, then it is doomed to failure in light of globalisation and the ‘flattening of the world’ by technology. Whilst the concept of netcentricity began in close association with the military industrial complex (Walker, 2006; Philips, Picavet and Reiners, 2008), its objective – to ensure that relevantly mined information reaches end users timeously – has made it widely accepted in the public sector as an effective tool for problem solving (Thompson and Jones, 2008; McDaniel, McCully and Childs, 2007). Furthermore, and aligned to the discipline of knowledge
management, netcentricity is viewed as an efficient and effective means of ensuring that the right information goes to the right person or persons.

When comparing the pillars for knowledge management and netcentricity, it becomes obvious that they are similar for both intervening variables, although netcentricity may be viewed as a subset of the knowledge management discipline. Due to this interrelatedness, it can be hypothesised that:

\[ H^{22}: \text{There is a positive relationship between the implementation of netcentricity and the perceived effectiveness of the knowledge management discipline.} \]

It can also, therefore, be hypothesised that:

\[ H^{24}: \text{There is a positive relationship between the implementation of netcentricity and the perceived effectiveness of knowledge sharing.} \]

Research and literature concerning collaboration and knowledge sharing between organisations is limited (European Conference on Knowledge Management - ECKM: 2008). However, there seems to be a general consensus that collaboration between government agencies is crucial in resolving commonly identified problems. The relevant pillars (antecedent variables) that influence both intervening variables and the knowledge sharing process will now be considered.

### 4.3.1 Leadership

Government leaders today face many challenges. Globally, for instance, the debt crisis has increased unemployment, crime and poverty levels. In order to meet these modern challenges, a case study by Girard and McIntyre (2010: 72) indicated that leadership was “significantly more important” than other elements (technology, culture, measurement and process).

Although countless articles, interviews and published works exist about Jack Welch, former CEO of General Electric and one of the most admired top executives amongst
Fortune500 corporations, Lakshman (2005) pointed out that none of these have focused on his knowledge management activities. Lakshman revealed through his study the effective and active role that leadership plays in knowledge management. Some of the roles described by Lakshman include: destroying the ‘not invented here’ syndrome, which invariably initiates a creative culture; instituting programmes of internal and external knowledge transfer; establishing communities of learning; human resource based strategies and IT-based knowledge management systems, amongst others. Social networking is also viewed as a critical component of knowledge management and is thus a crucial responsibility of executive leadership (Buckman and Meek, 2005; Kets de Vries, 2005; Saint-Onge, 2005).

Lakshman noted that Jack Welch’s leadership centred on knowledge management. Furthermore, Welch’s leadership drove the following:

- **Mission, values and strategy** – In order to ensure the mission, values and strategy were achievable, Welch undertook various knowledge management initiatives to deal with two important changes, namely technology and globalisation.
- **Value of boundarylessness** – Welch wanted the organisation to eradicate internal divisions so that everyone worked as a team. Suppliers and customers became partners and there was to be no segregation between foreign and domestic operations.
- **Structuring of information and knowledge transfer** – The organisation was restructured so as to reduce the layers and make it less autocratic. The flatter structure ensured that communication moved quicker and information was transferred across boundaries. Welch also had teams of executives from across divisions working on problems at the company’s learning centre. This restructuring thus also assisted towards the goal of eliminating boundaries.
- **The Corporate Executive Council (CEC)** – The council, which comprised of approximately 30 high ranking leaders, met for two days every quarter at the learning centre. Their main objective was to share information, to swap ideas and to transfer learning and knowledge between business areas. These highly informal meetings were also a means of building trust and ensuring
that leaders were familiar with each other’s business. In the process, key problems could be solved.

- **Work-out** – This empowering and knowledge intensive methodology was used to ensure that, on any given day, an employee could engage in dialogue and challenge their bosses on issues of productivity, processes et cetera. In the words of Jack Welch, “the job of the leader is to create, not to control”.

Whilst Beinecke, (2009) supported the critical role of leadership on KM as stated by Lakshman, Beinecke (2009: 2) emphasized that we are in an era of ‘wickedness’, with wicked, complex problems such as unanticipated interconnectivity, unforeseen structures, radical innovation and transformation. In addressing these complex challenges, leaders are required to manage dynamic processes that require flexibility, adaptability, speed and experimentation. A set of theories that emerged in the 2000s, suggested that leadership styles should be facilitative, empowering, catalytic, and connective and often require collaborative leadership (Sullivan and Williams, 2007). Chrislip and Larson (1994:146) concurred with Beinecke and highlighted that leaders with complex issues need to inspire commitment and action. They need to lead as peer problem solvers, build broad base involvement and sustain hope and participation.

Alberts and Hayes (2003) also highlighted the need for leadership to transform itself from the industrial (management) age to the information age, which is also synonymous with the knowledge based economy, where leaders are seen as conductors (or section chairs) in an orchestra. Oliver and Kandadi (2006: 11) confirmed through their study that positive leadership, not only at the strategic (senior) level but also at the middle and front end levels, is essential for installing and supporting a knowledge sharing culture throughout an organisation. In the public sector, Butler and Murphy (2007) further emphasized that the commitment of top management (leadership) is critical in the overall success of any knowledge management programme. Cheng, Ho and Lau (2009) posit that, although there are various factors that influence the sharing of knowledge in any organisation, leadership and organisational culture both have a significant impact on the intensity of knowledge sharing (Lin, 2008; Riege, 2005; Malhotra and Majchrzak, 2004;Syed-Ikhsan and Rowland, 2004). Whilst most authors above focus specifically on the
important role co-ordination required of leadership for KM purposes, Cloete (2007: 19) asserted that if knowledge management systems are appropriately implemented, they will promote the effective establishment of trusting relationships, especially where information is transparent and readily available. Thus, Cloete highlighted the component of trust, which leaders must create within their organisation.

It may thus be concluded that the right leadership in any organisation is necessary to drive the knowledge agenda in a vastly evolving global environment. Leadership is a key enabler in creating a knowledge sharing culture. As indicated, the discipline of knowledge management seeks to ensure the sharing of knowledge in and amongst organisations within government. Furthermore, both knowledge management and netcentricity have similar dependent variables, of which leadership is one. Due to this commonality, a variety of hypotheses can be associated to this specific dependent variable. It is therefore hypothesised that:

\[ H^8: \] There is a positive relationship between effective leadership and knowledge management to ensure the perceived effectiveness of knowledge sharing.

\[ H^1: \] There is a positive relationship between effective leadership and the perceived effectiveness of knowledge sharing.

\[ H^{15}: \] There is a positive relationship between effective leadership and netcentricity to ensure the perceived effectiveness of knowledge sharing.

4.3.2 Organisational Culture

With the emergence of the knowledge economy, many organisations realised the need to implement knowledge management programmes. However, due to the vast and abstract nature of knowledge management, it became obvious that many factors, like organisational culture, play a critical role in the knowledge agenda. In fact, Davenport and Prusak (1998) emphatically suggested that organisations take a good look at their organisational culture before embarking upon any knowledge initiative.
According to Oliver and Kandadi (2006: 6), several other authors supported the view that organisational culture should be the focal point of knowledge management programmes. From a strategic standpoint, cultural integration allows knowledge management to be part of an overall organisational culture (Minnone and Turner, 2009: 584).

Although culture is acknowledged as a critical knowledge ‘ingredient’, Oliver and Kandadi (2006) argued that that there was insufficient literature on the factors that drive a knowledge culture. In their ensuing study, Oliver and Kandadi identified and proposed a framework for creating and developing a knowledge sharing culture. Their framework highlighted ten key factors: leadership (discussed in point 4.3.1 of this chapter); organisation structure; evangelisation; communities of practice; reward systems; time allocation; business processes; recruitment; infrastructure and physical attributes. In today’s fast paced global economy, in which vast amounts of information need to be analysed and dispersed speedily, the traditional mind-sets need to be transformed. This view is shared by Lakshman (2005), Correia, Paulos and Mesquita (2010), and Alberts and Hayes (2003) amongst others. In a scenario in which members of a unit or team are vastly dispersed, virtual teams may be required whose members need to operate with advanced technologies instead of traditional, face to face interactions. Correia et al. (2010) identified further constraints for knowledge sharing, particularly in relation to culture and organisational issues, namely: a lack of recognition by management when sharing and making information available to others; a lack of knowledge about communities of practice that exist in the organisation; a lack of participation if and when members feel they have nothing to contribute; a lack of opportunity to participate; and also a lack of time to learn and share knowledge with one another.

Cheng, Ho and Lau (2009: 314) asserted that the friendliness of the IT system and the effectiveness of the reward system driven by the organisational culture are important ‘ingredients’ for the ultimate success of the knowledge sharing process through an open network (sharing through a central network repository). In an endeavour to summarise the different approaches found in the literature, Hsu (2006) identified three in an organisational culture that promotes and encourages knowledge sharing. The first approach is referred to as the “tool–based” approach, in which the
focus is on building a competent IT system for knowledge sharing. The second approach is the “incentive-based” approach, which asserts the importance of incentives to encourage knowledge sharing and ultimate productivity. The third approach is an “integrative” approach, which not only looks at management values, but also incorporates the organisational culture, processes and structure in order to facilitate and encourage knowledge sharing.

Cheng, Ho and Lau (2009) highlighted the fact that the vast literature on knowledge sharing reveals many different factors that influence people to engage in knowledge sharing activities, including the issue of trust, which will be exposed in the next point. These authors (Cheng, et al.) summarised by grouping the factors into three subgroups: organisational factors, individual factors and technical factors. Although Cheng et al. acknowledged rewards and incentives as key factors for knowledge sharing to occur, they and various other authors (Lin, 2008; Riege, 2005; Malhotra and Majchrzak, 2004; Syed-Ikhsan and Rowland, 2004) concurred that organisational culture has a significant impact on the intensity of that knowledge sharing.

It is therefore hypothesised that:

\[ H^2: \] There is a positive relationship between organisational culture and the perceived effectiveness of knowledge sharing.

\[ H^3: \] There is a positive relationship between a collaborative organisational culture and knowledge management to ensure the perceived effectiveness of knowledge sharing.

4.3.3 Trust

With technology evolving at a rapid pace, an increasingly competitive global market and the need for quicker decision making, organisations require external support in terms of technology and information sources (Foos, Schum and Rothenberg, 2006). These types of interactions, however, usually require an element of trust (Scarso and Bolisani, 2011).
In the knowledge sharing process, it is commonly understood by various subject matter experts that knowledge may be shared via two modes, namely explicit and tacit. The latter mode (tacit) is described as more difficult to manage and transfer knowledge, as tacit knowledge is ‘internalised’ and resides in people’s heads whereas explicit knowledge is tangible and is documented in documents or intranets (Polanyi, 1966; Nonaka and Takeuchi, 1995). It is a commonly held view as per the authors above and should be emphasized that, because of the personal nature of tacit knowledge, trust is a crucial factor in the tacit knowledge sharing process.

Human beings generally perceive trust as a foundation for human relationships. Inter-firm relationships also require trust to hold each other in high regard (Cavusgil, Tamer, Calantone and Zhao, 2003). The need for trust building mechanisms was echoed by Scarso and Bolisani (2011: 49), who suggested that, before creating trustworthy environments, organisations need to understand what is “intended by trust”. In accordance with the accepted views of many authors who have attempted to define trust, Scarso and Bolisano (2011) interpreted the intent of trust to mean trusting someone in a way such that the probability of that person performing a beneficial action is high, and such that a mutual sense of cooperation is agreed upon.

The impact of trust and reputation play a critical role in the transfer of knowledge. Furthermore, where trust exists, it enhances and increases the intent for sharing information amongst the trusting parties. As this trustworthiness increases, both the knowledge seeker and knowledge provider are seen as willing participants of the knowledge sharing process (Lucas, 2005). Zmud and Price (2001: 13) suggested that, like knowledge networks, trust networks can be both local and globally based. Anderson and Shane (2002: 9) indicated that, in the case of virtual teams, team members need to ensure that any data and information through files come from a trustworthy source. Of course, this is due to the security risk of files corrupting the whole system if they contain a virus or come from an untrustworthy source.

From a public sector perspective, Yuen (2007: 12), whose paper presented an overview of trends in the public sector from primarily developing countries, asserted the importance of knowledge management in government. Furthermore, Yuen found
the issue of ‘trust’ to be crucial in the government sector. Cloete (2007: 1) indicated that citizens in South Africa require trust in government. The rationale by Cloete (2007) was that “building of trust is the foundation of good corporate governance”. This is due to the decline in the public’s trust of governments worldwide. Although there are several governance and institutional components that promote trust, Cloete focused on the effective management of knowledge as a critical component. It is further suggested that knowledge in society about government processes, policy decisions and actions are able to improve the trust in government.

The introduction of the information society has recently made it possible, for what appears to be the first time in history, for information to flow freely and readily between governments and their general populace. The knowledge agenda is increasingly digitised; the United Nations and other international development agencies have all acknowledged and transformed their organisations to align with the electronic or information age. It is therefore suggested that, if the theory of knowledge-based trust is correct, distrust in government should in fact be increasingly declining as more information becomes available and transparency about governmental activities increases (Cloete, 2007).

Based on the above-mentioned research findings, it is therefore hypothesised that:

\[ H^7: \text{There is a positive relationship between the levels of trust embedded in an organisation and the perceived effectiveness of knowledge sharing.} \]

\[ H^{14}: \text{There is a positive relationship between the levels of trust embedded in an organisation and knowledge management to ensure the perceived effectiveness of knowledge sharing.} \]

\[ H^{21}: \text{There is a positive relationship between the levels of trust embedded in an organisation and netcentricity to ensure the perceived effectiveness of knowledge sharing.} \]
4.3.4 Learning Organisations

As stated in Chapter 2, the term ‘knowledge management’ has various connotations in the literature. One label for knowledge management is the ‘information-centred’ label, in which IT is used to transfer knowledge and access is a key driver. Another body of research refers to the social aspects of knowledge management, where learning takes place. This is termed ‘learner-centred’ knowledge management and it seeks to engage and encourage stakeholders in the learning process (Akoumaniakis, 2008: 14). Learning occurs when knowledge from one part of an organisation effectively moves to other parts in order to resolve problems or introduce innovative alternatives. As such, knowledge transfer is viewed as a key dimension of a learning organisation (Goh, 2002: 23).

Obtaining knowledge that is tacit in nature requires participation and ‘doing’. When new technology is introduced into the organisation, the learning curve is viewed as short. However, it has been suggested that a project manager should be appointed to deal with issues such as due diligence who would ultimately deal with all related issues and ensure that effective learning and knowledge transfer takes place (Foos, Schum and Rothenberg, 2006).

A more recent term in knowledge management circles, and relevant to a learning organisation (LO), is the term ‘unlearning’. This term, as examined by Cegarra-Navarro, Cepeda-Carrion and Jimenez-Jimenez (2010) and Niri, Mehrizi and Atashgah (2009), points out that all knowledge that is stored on systems or is documented, will eventually become outdated. In the ever evolving changes in technology, it is also possible that current systems will become obsolete. It is for these reasons that the authors strongly recommend that organisations critically examine their organisation memory with a view to unlearning or forgetting, as information may be redundant. In doing so, a new learning process should ensue. The unlearning context, in essence, attempts to re-orientate organisational values, norms and behaviours by changing cognitive structures (Nystrom and Starbuck, 1984), mental models (Day and Nedungadi, 1994), dominant logics (Bettis and
Prahalad, 1995), and core assumptions that guide behaviour (Shaw and Perkins, 1991). If this is so, the context in which unlearning can take place could be considered as a means towards a competitive advantage (Sinkula, Baker and Noordewier, 1997).

Minonne and Turner (2009: 583) acknowledged the need for organisations to seek a more integrated way of managing the three interdependent pillars for knowledge management, namely the management of organisational knowledge, management of intellectual capital and management of the learning organisation. In fact, the authors concernedly stated that the three concepts “lack a unifying vision.” Instead, Minonne and Turner (2009) proposed an integrated approach in order to maximise knowledge sharing.

Berce et al. (2008) also stated that, although knowledge management, learning organisations and information communication technology (ICT) have been studied in depth individually, an integrative approach is lacking. Berce et al. identified two different processes of organisational change linked to a learning organisation: an adaptive and a proactive learning process. In essence, a learning organisation needs to promote information exchange and sharing of knowledge.

Based on the above-mentioned research findings, it is therefore hypothesised that:

H^4: There is a positive relationship between a continuously learning organisation and the perceived effectiveness of knowledge sharing.

H^11: There is a positive relationship between a continuously learning organisation and knowledge management and the perceived effectiveness of knowledge sharing.

H^18: There is a positive relationship between a continuously learning organisation and knowledge management and the perceived effectiveness of knowledge sharing.
4.3.5 Communities of Practice (CoP)

Tacit knowledge has been defined in the literature (as described in Chapter 2) as a challenge for management to exploit from a knowledge sharing perspective. Mooradian (2005:108), however, suggested that tacit knowledge may be exchanged when people get together in small groups in order to talk and share ideas. As such, knowledge sharing may be successful in all individual and group thinking. The informal character of these groups, (commonly referred to as communities of practice (CoP), raises challenges and opportunities for knowledge sharing purposes (Mooradian, 2005). One of the shortcomings is that existing communities of practice analyse community management in single organisations, either public or private (Juriado and Gustafsson, 2007). The more demanding problem of community formation across organisational boundaries – either through inter-organisational partnerships or external communities of practice – is seldom addressed (Dewhurst and Cegarra Navarro, 2004).

Communities of practice are also seen as crucial for initiating knowledge sharing cultures in organisations (Hustad, 2010: 69; Oliver and Kondadi, 2006). It is equally important for leaders, as knowledge evangelists, to make sure that the entire organisation is made aware of the relevant participants of these communities of practice; in other words, organisations need to ensure that the names of the individuals who actively share their knowledge are known to all employees (Oliver and Reddy, 2006). These names, or databases, were termed ‘yellow pages’ for information management purposes by De Alvarenga Neto and Vieira (2006). These types of individuals are also referred to as ‘knowledge workers’, a term popularised as early as 1957 by Peter Drucker (Grant, 2011: 123).

Individuals who form part of the said communities of practice are also recognised as being crucial in the knowledge network analysis. A knowledge sharing environment model (KSEM), which identifies knowledge bottlenecks, attempts to resolve issues by ensuring that identifiable, knowledgeable persons share their expertise with less knowledgeable persons in the organisation or community (Helms, Ignacio, Brinkkemper and Zonneveld, 2010). In the study conducted by Oliver and Kondadi
(2006), the majority of interviewees, concluded that communities of practice had increased the knowledge culture in their respective organisations. Furthermore, they reiterated that the encouragement of communities of practice was an effective means in which to launch knowledge management programmes.

De Alvarenga Neto and Vieira (2011: 87) proposed a SET knowledge management model, which synergises S (Strategy), E (Environment) and T (Tools) in order to ensure that knowledge management is actionable. The latter component of the model (Tools) requires communities of practice, amongst other learning practices and processes, in order to action knowledge sharing. Grant (2011: 121) stated that a learning organisation and communities of practice were early social themes associated with knowledge, which suggests that the two terms should not be seen in isolation. Within a social practice framework, Imani (2011: 134) added that communities of practice, knowledge transfer and knowledge integration have all become influential perspectives in knowledge academe and practice. Laursen (2011: 144), in referring to Nonaka and Takeuchi’s SECI model (discussed in 2.7.1), indicated that, via the ‘socialisation’ process of the SECI model, which transforms tacit to explicit knowledge, communities of practice are key in making ‘foreign’ knowledge their own. Bebensee, Helms and Struit’s (2011: 5) analysis of Binney’s knowledge management spectrum identified communities of practice as an important factor in the knowledge innovation and creation processes. The impact of information communication technology on communities of practice will be mentioned later in Section 4.3.7 in this chapter.

Based on the examination of the abovementioned literature, it is therefore hypothesised that:

H5: There is a positive relationship between communities of practice, as a methodology or means, and the perceived effectiveness of knowledge sharing.

H12: There is a positive relationship between communities of practice and knowledge management, as a methodology or means, and the perceived effectiveness of knowledge sharing.
H¹⁹: There is a positive relationship between communities of practice and netcentricity, as a methodology or means, and the perceived effectiveness of knowledge sharing.

4.3.6 Policy and Legislation

Policies are generally considered to be guides to action or channels to thinking, as well as being closely linked to the strategy of organisations (Panday, 2007; Steiner and Milner, 1977; Newman, Logan and Hegarty, 1985; Smith, Arnold and Bizzell, 1985). The close proximity of strategy, policy and procedures is aptly referred to as ‘semantic confusion’ by Steiner and Milner (1977), who pointed out that policies initially shade with strategy and then shade into procedures. When policies shade into procedures, the procedures shade into rules, whilst strategy shades into tactics.

It is evident throughout the world today, in both developed and developing countries, and particularly in light of the recent global debt crisis, that more citizens are exerting their lack of trust in their respective governments. More relevant to South Africa, Cloete (2007) suggested that for effective electronic knowledge management to be in play, strategies and legislation adopted to eliminate corruption and promote ethical standards within the public sector need to be effectively in place. Cloete (2007: 209) observed that, although legislation and policies appear to be in place, these measures are still “flawed and need to be improved”. Cloete’s integral message was that transparency needs to be a core feature, via access to information, in order to ensure trust and knowledge management within government. One of the prerequisites in improving this trust in government is free and transparent access to information. Transparency has been defined as “the increased flow of timely and reliable economic, social and political information” (Vishwanath and Kaufmann 1999:1). The lack of transparency in public administration was viewed by Vishwanath and Kaufmann as an inhibiting factor on policy implementation. In examining the access to and transparency of information in South Africa, Cloete (2007) highlighted three pieces of legislation that are in support of the constitutional provisions, namely Sections 16 and 32 of the 1996 Constitution. These fundamentally guarantee freedom of expression and the explicit right of access to any information held by the state. The three pieces of legislation are:
The Promotion of Access to Information Act [Act 2 of 2000] (PAIA),
The Protected Disclosures Act [Act 26 of 2000], and
The Promotion of Administrative Justice Act [Act 3 of 2000]

It is important to note that some ‘persons’, such as members of parliament, are exempt from the Promotion of Access to Information Act, and that requests for access must be processed within 30 days. Access to information may also be refused in certain cases, in writing, by certain government agencies, such as the South African Revenue Services (SARS). Cloete (2007: 205) emphasised that, despite the abovementioned legislation being in place to promote transparency and access to information, the “system is extremely rigid, cumbersome and difficult to implement as a result of the many formal procedures prescribed in PAIA and its interaction with many other existing laws”. As such, Cloete proposed that governments embrace technological advances and improve their traditional policy implementation policies in order to embrace knowledge management practices and overall trust in government.

In the world of multi-unit organisations, it is acknowledged and inevitable that one department requires the collaboration and cooperation from other relevant departments. As such, Panday (2007) implied that intra-organisational coordination is an important factor for policy implementation. A lack of coordination normally occurs when there is a lack of communication, a lack of rules, a lack of standard operating procedures and an inadequate division of labour. Panday’s proposed solutions to ensure coordination in policy implementation are as follows:

- Laws and rules should be updated and should specify who will do what, how and when. In essence, rules and legislation need to be concise and clear on respective roles and responsibilities.
- Efficient and appropriately qualified staff members need to be recruited based on merit rather than political consideration.
• Political leaders should not interfere with processes. Autonomous departments need to be empowered to do their jobs independently of any political interference.

• Powers of delegation need to be pursued, particularly in cases where decisions or signage is required by ‘busy’ high powered individuals. This will eliminate bottlenecks and ensure smoother coordination of the policy and legislative processes.

• All departments need to be in constant contact with each other.

After the infamous September 11 attacks in the United States, knowledge sharing within the intelligence community was analysed and certain observations made by Lahneman (2004): firstly, that good intelligence analysis cannot guarantee good policies. In other words, good policies are dependent on high quality information getting to the ‘right’ people or analysts at the ‘right’ time. Another major reason for a lack of knowledge sharing is organisational realities, such as the reluctance of government agencies to share information with each other. This is synonymous with the statements made by Panday (2007) who clarified that, if there is no collaboration between government agencies, then policy coordination is negatively affected. Cloete (2007) highlighted legislative difficulties due to the impact of relevant Acts on the access to information, which is crucial for knowledge sharing purposes.

It is therefore hypothesised that:

**H⁶:** There is a positive relationship between policy and legislation and the perceived effectiveness of knowledge sharing.

**H¹³:** There is a positive relationship between policy and legislation support and knowledge management towards the perceived effectiveness of knowledge sharing.

**H²⁰:** There is a positive relationship between policy and legislation support and netcentricity towards the perceived effectiveness of knowledge sharing.
4.3.7 Information and Communication Technology (ICT)

“In the next century”, Markus et al. (2000: 33) predicted, “the available computational power will enable anyone with access to a computer to find an answer to any question that has a known or effectively computable answer”. It is widely acknowledged and evangelised by various authors that the world as we knew it has changed dramatically since the advent of the computer. The various subject matter experts strongly suggested that organisations exploit the use of advancing information and communication technology (Phillips, Picavet and Reiners, 2008; Alberts, 2003; Zmud and Price, 2001). Cong and Pandya (2003: 25) highlighted the fact that we are living in a rapidly changing world driven by globalisation, coupled by the ever faster development of information and communication technology. Brynjolfsson and Hitt (2000: 2) pointed out that the “dawn of the computer age emanated from the United States military generously funding research for calculating trajectories of artillery shells”. The funding was used and based upon the first digital computer used in around 1959, and resulted in digital computers emerging primarily with great calculating capabilities. However, as the authors asserted, computers are not merely about number crunching and not all problems relate to numbers. Brynjolfsson and Hitt further suggested that as computers become more affordable and technologically advanced, the challenge will be for leaders to discover how best to use the capabilities of these advanced technologies. Alberts and Hayes (2003: 79) alluded to the fact that, in most organisations today, the internet and e-mail are the new modus operandi for communicating and sharing of knowledge. Alberts and Hayes suggested that netcentric organisations, especially those in the public sector, needed to transform from the industrial age to the information age. In doing so, vertical, autocratic, hierarchical structures needed to dissolve into flatter horizontal structures, which would give “power to the edge”. Alavi and Leidner (1999) highlighted the importance of knowledge management systems in enhancing the storage of information for the purposes of knowledge creation and sharing.

From an inter-organisational perspective, Ferris (2004: 208) asserted that creative, interactive databases are necessary to enable searches for information gathered by members of the intelligence community. Interactive databases, used during inter-organisation/agency collaboration, are conducive when distance becomes a factor. In
this scenario, virtual teams can be created to mitigate the issue of distance (Anderson and Shane, 2002). Gurbaxani and Plice (2004: 15) corroborated with Anderson and Shane by highlighting that inter-organisation communication systems “allow project teams to share technical knowledge across boundaries and to interact with stakeholders in real time”. Zmud and Price (2001: 12) further added that external stakeholders provide greater knowledge to the collective pool of information, thus reaffirming the point made by Thompson and Jones (2008) and a common say that ‘two heads are better than one’. With the claim that inter-organisation information reduces costs (Gurbaxani and Plice, 2004), it is clear that information and communication technology is beneficial for organisation and inter-organisation collaboration.

When using information and communication technology for inter-organisational collaboration in the virtual team scenario, Anderson and Shane (2002: 9) suggested that leaders ask the following potent questions: “Who needs to talk to whom; about what; through what medium; how often; who needs to be informed; at what time; and by whom?” Ferris (2004: 217) further supported these crucial questions by emphasizing that knowing “what information is required” is essential in order to prevent any organisational risks. More pertinent to this study, Gaffoor and Cloete (2010) stressed the importance of e-governance in developing countries like South Africa. The advent of the information society, according to Gaffoor and Cloete, “has for the first time in history made it possible that comprehensive and free flow of information might be created between governments and their populace”. Although acknowledging that some progress in electronic knowledge management through e-government had been made, Cloete (2007) suggested that there is vast room for improvement especially as far as legislation and trust is concerned, as this might impede the sharing of knowledge.

In the technologically advanced world, face to face interactions for knowledge sharing is seemingly a thing of the past. Kimble and Hildreth (2005: 103) considered communities of practice to be groups of people who are joined together, both with an internal motivation and a common purpose. The key aspect is the relationship that is built between the members in the group, as one of the softer aspects of knowledge. More importantly, the authors stress that most recently, due to globalization, there
has been an increasing interest as to how CoP’s might function in an internationally technological environment – hence the introduction of ‘virtual’ communities of practice. The authors concluded that, instead of merely attempting to introduce and implement technological solutions, a key part of knowledge management initiatives must be focused on facilitating communication and interaction between people. Critically, the right balance needs to be struck between ‘harder’ and ‘softer’ aspects of knowledge.

Ardichvili et al. (2003: 64) highlighted that, although virtual communities of practice have sprung up in organisations globally, very little is known about the factors which lead to the success or failures of these communities. One of the critical factors of failure or success, suggested the authors, depends on the active participation of members. They also indicated that there are numerous reasons why members of a community of practice would want to share their knowledge, and suggested that intrinsic motives are seen to be more influential than extrinsic motives such as those that are monetary or administrative.

It is said that the supply of new knowledge, by the ‘input’ or active contributions of members, represents only one side of the knowledge sharing equation. It is equally important for the members to interact actively with the information on the output or demand side in order to show the willingness to share (Cross et al., 2001: 165-235). A further requirement for a successful virtual community of practice is the willingness of members to use it as a new source of knowledge. Thus, the willingness to share and the willingness to use a community of practice as a source of knowledge are seen as two major requirements that apply to any community of practice, whether virtual or face to face. A further requirement for virtual communities of practice, reported by Ardichvili et al., is the need for members to be comfortable participating in a computer-mediated, internet-based community of practice as this would involve very little or no face to face communication. The importance and relevance of culture is prevalent here.

It is evident that communities of practice are one of the means by which to effect knowledge sharing. Whether it is done virtually or otherwise will depend on the circumstances of the relevant organisation. The uniqueness of this study is in
determining the appropriate method or system where knowledge is shared within a collective of agencies within government. Once this has been explored via the research, it is hoped that the findings will increase the existing body of knowledge. The use of ICT on assisting communities of practice is clearly a new field that needs exploring in developing and government organisations.

Based on the above intervening variables, the following hypotheses can be deduced when looking at the discipline of knowledge management, the concept of netcentricity and the ultimate objective of a knowledge sharing culture:

\[ H^3: \text{ There is a positive relationship between information and communication technology (ICT) application and the perceived effectiveness of knowledge sharing.} \]

\[ H^{10}: \text{ There is a positive relationship between information and communication technology (ICT) application and netcentricity towards ensuring the perceived effectiveness of knowledge sharing.} \]

\[ H^{17}: \text{ There is a positive relationship between information and communication technology (ICT) usage and knowledge management towards ensuring the perceived effectiveness of knowledge sharing.} \]

4.4 SUMMARY

The analysis above has developed a theoretical model, to be empirically tested. This model is presented in Figure 4.1 above. Seven major factors have been determined to influence the perceived success for knowledge sharing in South African government agencies, namely: leadership; organisational culture; information and communication technology; learning organisations; trust, communities of practice, and policy and legislation, with netcentricity and knowledge management as the overall disciplines. Altogether 24 hypotheses have been proposed.

The next chapter will discuss the research design and the instruments used to measure the proposed theoretical model.
CHAPTER 5

RESEARCH METHODOLOGY

5.1 INTRODUCTION

The ‘problem’, according to Leedy (1993: 55), is at the heart of every research project and crucial to the success of the research effort. Although there has been much research conducted on knowledge management in private sector organisations, scholarly studies on public sector organisations are limited, as demonstrated in Chapter 2. In addition, the perceived effectiveness of the knowledge sharing process across or between government agencies is a concept yet to be studied from a South African perspective.

The primary objective of this study, as presented in Chapter 1, is to investigate and empirically test the influence of various enablers on the perceived success/effectiveness of knowledge sharing within and between government agencies in South Africa. The purpose of this chapter is to describe the research methodology that was employed to address this primary objective. First, a brief description of the preliminary assessment of the proposed conceptual model will be provided. Then, an introduction to the population studied, as well as a description of the sampling unit and sampling technique, will be given. Thereafter, the operationalization of the independent, intervening and dependent variables will follow, as well as an explanation of how the measuring instrument was developed and administered. Demographic information pertaining to respondents will be summarised. The chapter will conclude with a description of the Structural Equation Modeling (SEM) technique used to test the proposed theoretical model, shown in Figure 4.1 of the previous chapter.
5.2 RESEARCH DESIGN

Research, according to Hussey and Hussey (1997: 1) means different things to different people. Whilst many different definitions are offered, there appears to be consensus that research is a systematic process of enquiry and investigation towards increasing knowledge (Hussey and Hussey, 1997: 2). The selection of the research design is influenced by a number of factors. In addition, it is crucial that the facts and data to be collected are significant to the questions of the study.

The nature of research can be either quantitative or qualitative. According to Hussey and Hussey (1997: 12), the quantitative research approach provides objective and unbiased results that have not been influenced by the researcher. Qualitative research refers to “any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification” (Strauss and Corbin, 1990: 17).

The two philosophical research paradigms commonly identified in the literature are referred to as ‘positivist and ‘phenomenological’. The key feature of the positivist paradigm is that the world is external and objective. The observer is independent and science is value-free. Comparatively, the phenomenological paradigm views the world as being socially constructed and subjective. As such, the observer is a part of what is observed and science is driven by human interests (Burrell and Morgan, 1979: 27).

For purposes of this study, a quantitative and positivist approach appeared to be the most appropriate. The rationale for selecting the positivist approach is based on the following facts which are aligned to the distinct features as pointed out by Burrell and Morgan (1979):

- The researcher is independent
- A relatively large sample is to be used
- Operationalizing concepts
- Hypotheses are formulated in order to be tested
• Focus on facts and look for causality

Next, the quantitative testing and analysis shall be described.

5.3 QUANTITATIVE TESTING AND ANALYSIS

5.3.1 Preliminary Assessment

The proposed model was first discussed with various experts (Dr Van Niekerk) who is familiar with the knowledge management discipline and Professor Boshoff who is a research analysis expert. Informal interviews were also conducted with managers of three relevant government agencies. Due to anonymity, the relevant names of the agencies are not disclosed. After minor changes were made to the model, a questionnaire was developed.

5.3.2 Population Studied

Collis and Hussey (2003: 55) described a population as “any precisely defined set of people or collection of items under consideration” for research. As this study is concerned with the knowledge management discipline of South African government agencies, and as it is particularly interested in the pillars or enablers for knowledge sharing within and across these agencies, these government agencies formed the population being studied. Units or sections within these agencies that specifically require relevant information for knowledge sharing and problem solving purposes were further identified. For example, within Agency A, the audit and criminal investigations units were identified. The heads of the relevant government agencies were approached with the strategic objectives of the research and to ensure support for the research process. A formal research engagement letter and request for confirmation of support was sent to managers in the relevant agencies, followed by an electronic link to the questionnaire, with a request that it be forwarded to the relevant employees. The rationale was firstly, one of security, but it was also reasoned that the research would have a more successful return if the link was sent by a manager to his or her staff rather than by an ‘outsider’ with no ‘authority’. However, this did not assure compliance. Respondents were not compelled to
complete the questionnaire, and some initial attempts to ensure responses were met with ‘no response’. The other measure of bias was the impact, rumour and debate surrounding the ‘Secrecy Bill’ linked to the Promotion of Access to Information Bill, current under parliamentary debate at the time, which would have inhibited departments from sharing information, thus making it even more difficult to gather support for this research.

Due to the researcher being employed within one of the relevant government agencies identified for this research, it was not difficult to gather support for the research, although various administrative and legal processes had to be followed and authority granted by senior management. The researcher was required to meet with regional as well as national heads of departments, in order to gather support. Most of the support came from the regional (Eastern Cape) agencies, possibly due to the fact that managers in these agencies had physical interactions with the researcher.

After gathering the necessary support, a snowball sampling technique was adopted, with managers who had agreed to support the research forwarding the questionnaire link to their counterparts in other regions of South Africa with a request for assistance with the research process.

5.3.3 Sample Unit and Sampling Method

A sample is a subset of a population or group of participants carefully selected to represent the population (Cooper and Schindler, 2007: 717; Collis and Hussey, 2003: 56), whereas the sampling unit or unit of analysis is the case to which the variables under study and the research problem refer, and about which data is collected and analysed (Collis and Hussey, 2003: 121; Zikmund, 2003: 262). According to Zikmund (1994: 262), the sampling unit is a single element or group of elements subject to selection in the sample. Sampling can be divided into two categories, namely non-probability sampling and probability sampling. Non-probability sampling may, in turn, be divided into two types, namely convenience (also called haphazard or accidental) sampling, and quota sampling. Convenience sampling refers to the procedure of obtaining respondents (units or people) who are most conveniently available. Researchers generally use convenience samples to obtain a large number of
completed questionnaires quickly and economically, however it does not always lead to representative samples (Zikmund, 1994: 367; Zikmund, 2003: 380). Snowball sampling, on the other hand, refers to a variety of procedures in which initial respondents may or may not be selected by probability methods, but in which additional respondents are then obtained from information provided by initial respondents. This technique is used to locate members of rare populations by referrals (Cooper and Schindler, 2007: 425; Zikmund, 1994: 370).

Alternatively, probability sampling allows the researcher to select in advance the segment of the population to be represented (Leedy, 1997). For purposes of this study, probability sampling was done with the identification and selection of government agencies and leaders. In this study, the relevant agencies were first identified, with a focus on the Audit and Investigations divisions. The research objectives were explained and support for the research obtained from the relevant managers within these units, who then sent the questionnaires (electronic and manual – according to preference and internet connectivity) to their respective teams. This process followed the convenient snowballing method. It must be pointed out that the subsequent mails sent by the managers and leaders were not randomly distributed but went to teams within their jurisdiction. In this way, the ‘authority’ and request by management of the respective government department was maintained as a means to ensure that team members adhere to the request.

5.3.4 Method of Data Collection-The Questionnaire

Leedy (1997: 191) pointed out that data at times lies “within the minds or the attitudes, feelings or reactions” of people. As such, the first challenge for researchers is to design a tool that can probe internal thoughts and perceptions. Leedy (1997) further highlighted the questionnaire as a common tool for observing data that is beyond the physical reach of the observer, and which can also be sent to people who may never be seen by the researcher. As such, the questionnaire may be viewed as an impersonal probe. Leedy laid down four practical guidelines: Firstly, the language must be unmistakeably clear. Secondly, a questionnaire should be designed to fulfil a specific research objective. Thirdly, Leedy emphasized proper planning and suggested that the researcher must highlight the importance of the research and its
potential value to the respondents. Finally, Leedy stressed that the initial, covering letter is extremely important in clearly acknowledging and dealing with any concerns respondents may have.

Based on the literature, as discussed in the previous chapters, a structured questionnaire was developed for this research study, reflecting the factors that could influence perceived knowledge sharing. Collis and Hussey (2003: 173) described a questionnaire as a list of carefully structured items (questions), selected after extensive testing, with a goal to obtaining the appropriate responses from a chosen sample. Over and above the four guidelines mentioned by Leedy above, Zikmund (2000: 310) contended that response errors and inaccurate answers should be minimised by the questionnaire and further added that the questionnaire should collect only the relevant information needed to solve the problem.

The self-administered, structured questionnaire was distributed mainly via email but also delivered manually or sent by post. A self-administered questionnaire is common to a positivistic research paradigm (Collis and Hussey, 2003: 66) and is thus appropriate for this study. The measuring instrument developed for the study (see Annexure A) comprised a covering letter and two additional sections. The cover letter provided details concerning the purpose of the study and the type of information being solicited. In addition, assurances of confidentiality, as well as instructions on how to respond to the statements and how to return the completed questionnaire, were provided. The letter included the emblem of the NMMU Business School and introduced the researcher as an employee of an agency within the government sector.

The first section of the questionnaire requested demographic information from recipients, ranging from their specific organisation and region, to their length of service and experience in the organisation, as well as their age group. The latter questions were deemed as important in establishing the experience and skills levels of the recipients. The location of the recipients was required in order to ascertain national coverage of the population. The second section consisted of 61 statements (items) linked to the variables that influence knowledge sharing, as described in Chapter 4. Using a 7-point Likert-type interval scale, respondents were requested to
indicate their extent of agreement with regard to each statement, from 1 = strongly disagree to 7 = strongly agree. Items were designed to assess the factors influencing knowledge sharing as perceived by the respondent. Adopting an interval scale as the measuring instrument enables the required inferential statistical data analysis (Cooper and Schindler, 2003: 227-228; Leedy and Ormrod, 2005: 26-27) and allows for the use of more advanced statistical procedures such as product moment correlation, t-tests, F-tests and other parametric tests (Blumberg, Cooper and Schindler, 2005:376).

5.3.5 Pilot Study

Preliminary tests, or pilot tests, are trial runs with a group of actual, identified respondents, the main purpose of which is to detect potential problems in the questionnaire’s instructions or design (Cooper and Schindler, 2007:76). For preliminary testing purposes, the feedback of other research professionals, such as colleagues, friends and respondent surrogates (Zikmund, 1994: 216) may also be used to evaluate and possibly refine the instrument (Babbie and Mouton, 2001: 244; Cooper and Schindler, 2007: 76).

In order to test the questionnaire amongst the intended sample group, a preliminary test was electronically distributed to 20 candidates in Agency A. The aim of the pilot study was to determine the ease of understanding and the time taken to complete the questionnaire. Furthermore, as the questionnaire was being made available electronically via the internet, the pilot study was important in ensuring that the intended recipients would not experience technological problems in accessing the document. In order to assess the content validity of the measuring scales, a research expert was also requested to scrutinise the questionnaire. The research expert was given the construct definitions of the different factors and asked to ascertain whether the items in the measuring instrument were considered relevant, necessary, meaningful, and were correctly worded. Consulting with experts is, according to Nunnally (1978), an acceptable method for ensuring content validity. The initial 20 completed questionnaires were subjected to a preliminary reliability assessment. Based on the initial reliability estimates and other feedback, minor changes were made to the original questions and final items were randomly sequenced. The
questionnaire was then finalised and made available for distribution in electronic and print formats.

5.4 OPERATIONALIZATION OF VARIABLES

Where possible, the researcher additionally incorporated and combined other reliable and valid measuring instruments into the study. Questions were formulated in such a way as to ensure that every latent variable in the measuring instrument was measured by at least four items. For the purpose of the present study, it is essential to define the variables used in the proposed model. Various definitions of 'independent', 'intervening', and 'dependent' variables will be discussed below.

5.4.1 Operationalisation of the Dependant and Intervening Variables

5.4.1.1 Dependant Variable: Perceived effectiveness of knowledge sharing process

For the purposes of this study, the perceived effectiveness of knowledge sharing is defined as the degree to which knowledge is shared within and between government agencies. This degree or level of effectiveness is primarily based on the extent to which the independent variables are perceived, or in other words the way in which employees within these agencies view or experience the independent variables within their respective organisations. At its most fundamental, “knowledge sharing involves the processes through which knowledge is channelled between a source and a recipient” (Cummings, 2003: 6).

This study seeks to obtain the perceptions of employees about knowledge sharing processes, based on Stankosky’s commonly identified pillars for knowledge, which were adapted by Cranfield and Taylor (2008) and illustrated in Chapter 2. Furthermore, the commonly identified barriers for knowledge sharing, as identified by Riege (2005) will also be investigated. The knowledge sharing process is commonly understood by many authors as being essentially of collecting, organizing and conversing knowledge from one to another. The value of knowledge expands when it is shared, due to the fact that the sharing process is more than just the collation of
data and information. If managed adequately, knowledge sharing can vastly enhance quality, decision-making and problem-solving for an organisation (Syed-Ikhsan and Rowland, 2004; Yang, 2007). There are essentially two non-exclusive ways for organisations to action or apply knowledge sharing: closed-network sharing (person-to-person sharing) and open-network sharing (sharing through a central, open repository). In the former (closed sharing model), an individual has the liberty to decide on the mode of sharing and a choice of partners with which to share knowledge. This interactive approach caters for a more personal touch and more direct sharing is expected. Personal relationships and trust are but some of many factors that explain the success of the sharing activity in this model (Cheng, Ho and Lau, 2009). On the other hand, open-network sharing refers to the sharing of knowledge amongst members of a group through a knowledge management system, such as a central database. This invariably involves multiple individuals sharing multiple knowledge assets in the system. Open-network sharing is widely adopted in organisations in order to share organisational knowledge. As this study examines the public sector, more focus will be on the open-network sharing method. According to Cheng et al. (2009), the efficiency and effectiveness of knowledge sharing through an open network will depend mainly on the openness and user-friendliness of the information technology system, the incentives laid out and also the culture of the organisation. The two intervening variables shall be discussed next.

5.4.1.2 Intervening variable: Knowledge management

In this study, knowledge management refers to the perception of employees about the discipline of knowledge management, which has various enablers as described in Chapter 2. Knowledge management, in its simplest sense, establishes the ways in which organisations create, retain and share knowledge. As knowledge management is a broad discipline (Dalkir, 2009), the thinking is that if organisations embrace the discipline, then knowledge sharing methodologies and processes will have a platform to ensure the success of knowledge sharing.

The scope of this study is on the public sector and, as has been acknowledged by various authors in Chapter 2, knowledge management in government is relatively new (Riege, 2005; Cong and Pandya, 2003). By implication, the successes of
knowledge management in the private sector need to be practiced in the public sector as well. This study will therefore seek to understand the level and understanding of knowledge management in the relevant government agencies.

5.4.1.3 Intervening variable: Netcentricity

Various authors in Chapter 3 have been quoted to define the term ‘netcentricity’. The definition most applicable to this research, with its focus on the public sector, is that of McDaniel, McCully and Childs (2007: 215) as per the next sentence, which puts forth Grimes’s definition of netcentricity as “people, processes and technology working together to enable timely access to information, sharing of information and collaboration among those who need it the most”. McDaniel et al. viewed netcentricity as the ultimate set of capabilities for organisations, especially government, in which to “sense and respond” to people and societal needs. Grimes (2006: 6) emphasized that the ability to integrate teams, ideas and capabilities from the private sector is crucial towards complementing public sector efforts. Furthermore, Grimes asserted that collaboration is the key at the heart of netcentric operations.

In a developing country like South Africa, the research intends to seek confirmation around the following issues:

- Do respective agencies have the appropriate technological facilities (like internet and e-mail) to connect and communicate with other government agencies?
- Is access to information allowed?
- Should all employees be granted access to information?
- Is being connected to other government departments advantageous or not?

In summary, this research intends to establish if a collaborative culture exists, and whether or not agencies have the appropriate information and communication technologies to interact, share and communicate in general.
5.4.2 Independent Variables

5.4.2.1 Leadership

Leadership is the first independent variable used in this study. As pointed out in the literature, in the current information age, leadership “requires cross-boundary, inter-agency collaboration with networking as a core strategy” (Crane et al., 2009: 223). The need for leaders to inspire commitment around complex action, whilst leading problem solving and building broad base involvement, are suggested by Chrislip and Larson (1994: 146). Leadership has also been identified by Cranfield and Taylor (2008) as one of the crucial pillars for knowledge management in a netcentric organisation. Clearly, the need for leaders to drive the knowledge agenda is paramount in the sometimes autocratic culture of government. As such, it is critical to understand whether leaders, firstly, understand the discipline of knowledge management and the collaborative need for knowledge sharing, whilst also embracing new information and communication technologies. If leaders do understand the importance of managing knowledge, then it is equally vital to establish the perceptions of employees on the leadership style of leaders in government agencies.

5.4.2.2 Organisational Culture

In this study, organisational culture may be defined as simply the perception of the character of an organisation by its employees. These perceptions, in turn, invariably combine to create the collective organisational culture. If the culture is collaborative, then knowledge sharing amongst employees should be occurring. However, a lack of important triggers like rewards, or the presence of noticeable barriers, may inhibit a sharing culture. As Riege (2005) asserted, it is thus critical to identify the barriers in order to remove them so that knowledge sharing may become a common culture with the relevant organisation.
Kreitner, Kinicki and Buelens (1999: 58) identified four functions of organisational culture, namely that “it gives members an organisational identity; it facilitates collective commitment; it promotes social system stability; and it shapes behaviour by assisting members to make sense of their surroundings”. If the leadership (first independent variable of this study) commits and drives a collaborative, learning culture, then employees at lower levels will acknowledge that the leaders in the organisation reward innovative and collaborative work habits or behaviour. Conversely, if no reward systems are put in place, then the motivation to share will be inhibited. It is clear that the independent variables are interdependent. And that a key incentive for resolution could be an effective reward system, as offered by corporations such as Hewlett-Packard and 3M.

5.4.2.3 Learning Organisation

For the purposes of this study, a learning organisation is perceived to be one that promotes the exchange of information between employees and creates a more knowledgeable workforce. It requires a particularly flexible organisational structure, where people will accept and adapt to new ideas and changes through a shared vision. This brings a new perspective and growing importance to organisational knowledge, and the learning organisation accepts the challenge of creating a culture of managing knowledge. Clearly, a learning organisation is also driven by its leadership and culture.

Goh (2002: 23) viewed ‘knowledge transfer’ as a key dimension of a learning organisation and hence as a critical factor for knowledge management. One of the methods used for knowledge transfer by learning organisations is that of initiating communities of practice. Communities of practice are viewed as ‘actionable’ means of creating a sharing culture whilst ensuring a sustainable platform with known knowledge workers and a suitable method for communicating, either in a virtual set up or within an informal meeting strategy. Kimble and Hildreth (2005: 103) concurred by considering communities of practice as groups of people who are joined together, “with an internal motivation and common purpose”. Key to this group of people is the relationship that is built between the members. Ardichvili, Page and Wentling (2003: 64), who focused more on virtual communities of practice, indicated that one of the
critical success factors of this type of learning and sharing in an organisation, is that there must be active participation. The authors (Ardichvili et al.) suggested that the group must have a common motive for actively communicating and sharing. Furthermore, the authors viewed intrinsic motives to be of more influence than extrinsic motives such as monetary reward. For purposes of this study, examples of common objectives in improving government efficiency may be issues like crime reduction, poverty alleviation or improvement in health services. The motivating objective needs to be clearly understood and shared by all relevant parties for communities of practice to be efficient and effective means of knowledge sharing.

5.4.2.4 Trust, and Policy and Legislation

The next two independent variables, trust, and policy and legislation, were not covered in depth in the previous chapters as both are more specific to, and more recently studied in relation to, knowledge management within the public rather than the private sector. The issue of trust can be widely accepted as being closely linked to organisational culture. Globally, trust in governments has come under scrutiny because of the corrupt practices of leaders. Increasingly, masses of people are losing trust in governments and their leaders (Cloete, 2007). As one of the variables in this research study, trust been mentioned both within the section on knowledge management in government and within the organisational culture literature.

Policy and legislation, as an integral variable, has also only recently become a focus within knowledge circles in the public domain. Internationally, it has been briefly touched upon in countries like Iran, where Salavati, Shafei and Shaghayegh (2010) have mentioned the impact of policy on knowledge management. However, the issue does emerge in review of the global knowledge management literature from the perspective of the private sector. Salavati et al. (2010) concurred by stating clearly that most of the research conducted in the past was focused not on the public sector but on the private sector. In fact, due to the obvious political factors present in most governments, Salavati et al. added these factors (like policy) into their conceptual framework. As is commonly known, politicians require the power of decision making, and policy and legislation. In Korea, Joon (2007), highlighted the knowledge-based administration approach, and suggested the need for a government to ensure that
knowledge sharing is made actionable in order to lead and enhance policy, quality and administrative services. Durrant (2001) who did a study of knowledge management in the Caribbean (West Indies), reiterated the importance of policies and legislation as stated by the authors above (Salavati et al., 2010 and Joon, 2007) by adding that, from a governmental perspective, knowledge management would require policy initiatives, in order to drive the knowledge discipline.

5.5 ADMINISTRATION OF QUESTIONNAIRES

The design of the questionnaire was initiated in February 2012. A preliminary test was conducted by sending the questionnaire to 20 respondents electronically, which elicited a 100% response. The responses were analysed in order to ascertain and remove any ambiguity in the questions. Furthermore, informal interviews were conducted with the respondents so as to ascertain their feedback on the questionnaire, and appropriate amendments were made in order to ensure its quality. The knowledge management variables, as outlined earlier in this research, were coded and randomly selected through a scrambled process for the final questionnaire. All correspondence with respondents, including the questionnaire, was written in English, which is the language most commonly used in South African government. Whilst the majority of the requests to complete the online questionnaires were done electronically, preliminary interviews with department heads established that some government departments had e-mail but did not have access to the internet. Instead, printed copies of the questionnaire were made available as well as soft copies on Microsoft word.

A covering letter, explaining the goals and purpose of this study was included with the questionnaire. The covering letter included the Nelson Mandela Metropolitan University (NMMU) letterhead details as well as the author’s contact details, in case recipients required clarity or any other assistance. Respondents were assured that the survey was confidential, that no attempt would be made to identify them by name or by their position in the relevant government agency, and that even the name of the relevant agency would be treated anonymously. The researcher met formally with senior managers and leaders within the relevant government agencies, in order to clarify the objectives of the research and confirm their support. These senior
managers were then requested to distribute the questionnaire to their respective team members.

The researcher optimistically targeted 200 respondents in each of the three main government departments nationally, whilst also engaging other government agencies perceived to be beneficial within the ‘security’ sector. This approach was used to optimise the response. Whilst most questionnaires (approximately 90 %) were obtained electronically by the respondents, the remainder were hand delivered and collected directly from their senior managers. The researcher monitored progress with the NMMU web survey report almost daily and, at times, humbly sent reminders to relevant ‘candidates’, especially where the specific region and government department code could be seen via the web survey report. A total of 320 questionnaires were completed by respondents from various government agencies.

5.6 DEMOGRAPHIC INFORMATION

Demographic information was obtained via Section A of the questionnaires. This information is graphically reflected and summarised below.

Graph 5.1 Regional Analysis

Source: Researcher’s Own Construction
Of the 320 completed questionnaires, 28 % (approximately 90) of the responses came from the Gauteng province. Similarly, 28 % of the responses came from the Eastern Cape province. (The researcher was based in the Eastern Cape and was therefore more accessible to the relevant managers from the government agencies in this region.) Of the remaining 44 %, 16 % of the responses were from the Western Cape, 15 % from the Free State, 6 % from KwaZulu-Natal, 3 % from the Northern Cape, and 2 % from Mpumulanga, whilst 1 % each came from the Limpopo and North West provinces. This is a fairly representative coverage of the national population, seeing that Gauteng is the highest contributor to South Africa’s Gross Domestic Product (GDP), as well as being the province with most government employees. KwaZulu-Natal, the Western Cape and the Eastern Cape follow Gauteng in their contributions to GDP ratings.

**Graph 5.2 Gender Analysis**

![Gender Analysis Graph](image)

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series1</td>
<td>160</td>
<td>160</td>
<td>320</td>
</tr>
</tbody>
</table>

**Source: Researcher's Own Construction**

From a gender perspective, out of the total 320 respondents, 160 (50 %) were male and 160 (50 %) were female. The equal responses received were not planned for,
but nevertheless contribute to a fair representative sample that denies any gender bias. This equal response augurs well for the goal of government in South Africa, whereby gender equality is treated as an important focus for many government agencies and perhaps this equitable response suggests the positive signs of equality are occurring.

Graph 5.3 Years of Experience (Tenure) Analysis

Source: Researcher's Own Construction

The respondents' period of tenure or years of experience in their organisation is important in understanding the cumulative experience and wealth of intellectual capital currently residing within government organisations, and the possible opportunities for knowledge transfer. As depicted in the graph above, 70.31% (225 out of the 320 respondents) had more than 10 years’ experience. A mere 10.63% had less than 5 years’ experience whilst approximately 19% had between 5 and 10 years’ work experience. If one were to total the ages of those respondents with more than ten years’ work experience, it might become clear that government
organisations need to initiate a strategic and sustainable transfer of tacit knowledge from these experienced employees to the newly placed employees, especially those in the 'less than 5 years’ category.

Graph 5.4 Age Analysis

Source: Researcher’s Own Construction

From the age analysis depicted above, it is apparent that almost half (47.19 %) of the respondent employees were aged between 36 and 45 years. The bulk of the respondents (61.88 %) were within the ages of 35 and 50. The older employees (from 46 to more than 65 years old) comprised 33 % of the total respondents. If most were to retire at age 65, then the organisations would have a period of a decade or so in which to ensure effective mentorships and/or knowledge transfer initiatives within the knowledge management discipline.

5.7 VALIDITY AND RELIABILITY OF THE DATA

Collis and Hussey (2003) pointed out that there are two aspects to the credibility of research findings, namely reliability and validity. Hair, Black, Babin, Anderson and Tatham (2006: 8) identified validity and reliability as two important characteristics
when the goal of a researcher is to reduce measurement error. Leedy (1997) concurred with the authors above by reiterating that, when dealing with research methodology, reliability and validity are “two words” that are repeatedly encountered.

5.7.1 Validity of the Data

Validity is viewed as the exactness represented by the data in terms of the situational analysis. Put differently, the data collected should highlight a realistic picture of what is being studied (Collis and Hussey, 2003). Hair et al. (2006: 8) reiterated that “validity is the degree to which a measure accurately represents what it is supposed to”. In this regard, it is suggested that one should have a solid understanding of “what is to be measured” in order to make the measurement as precise as possible. According to Leedy (1997: 32), validity represents the “effectiveness of the measuring instrument”, which suggests that valid research must measure what it is supposed to measure in a comprehensive and accurate manner. As such, Leedy concurred with the statement made by Collis and Hussey above. The most regular types of validity, as identified by Leedy, are listed below:

- Face validity: relies on the subjective judgement of the researcher and asks whether the instrument is measuring what it is supposed to measure.
- Criterion validity: is derived by relating performance on one measure to another measure, referred to as a criterion.
- Content validity: is similar to face validity in that it is supposed to measure the accuracy with which an instrument measures the said factors.
- Construct validity: is to be applied in instances where a construct (such as trust) is unobservable.
- Internal validity: is the elimination of possible bias when conclusion of the data is made.
- External validity: where conclusions are drawn, these can be compared to other similar cases.

Leedy (1997: 34) succinctly concluded by stating that validity is principally asking whether “we are really measuring what we think we are measuring".
5.7.2 Reliability of the Data

A study is said to be reliable if, were anyone else were to replicate the study, they would obtain similar results (Collis and Hussey, 2003). The authors also viewed reliability as an important issue in questionnaire design in a positivistic study, particularly when it comes to responses to what may have been perceived to be ambiguous questions. Collis and Hussey suggested three means to estimate the reliability of responses via questionnaires or interviews:

- Test re-tests method: questions are posed on separate instances to the same group of people, in order to determine a reliable correlation coefficient. This method does have some criticism in that respondents are generally not easily persuaded to repeat the questionnaire exercise.
- Split-halves method: the input obtained on the questionnaires or from interviews is basically divided into two halves, and each half is then compared to the other in order to establish reliability.
- Internal consistency method: each itemised response in this instance is taken such that an average inter-item correlation to measure reliability is considered.

5.7.3 Cronbach Alpha Measurement

Leedy (1997) pointed out Holm and Llewellyn who described the Cronbach alpha coefficient as a “statistical procedure with relatively little error, involving the correlation of every test item with each other”. A score over .70 is seen as being acceptable, whilst higher scores are deemed as providing a more accurate evidence of different items measuring a similar ‘trait’. The normally accepted measure of reliability ranges from 0 to 1 (Leedy, 1997; Hair et al., 2006). According to Hair et al. the Cronbach alpha measurement is “the most widely used measure”. For purposes of this study, the Cronbach alpha coefficients were used to measure reliability and validity of each of the variables in the theoretical model.
5.8 METHOD OF DATA ANALYSIS

This chapter concludes with a detailed description of structural equation modeling (SEM), the statistical technique used in this study to assess hypothesised relationships in the theoretical model generated to understand the state of knowledge sharing in and between government agencies in South Africa.

5.8.1 Structural Equation Modeling

Due to the vast amounts of information received in organisations today, it can be widely accepted that there are numerous multivariate statistical analysis methods, which provide researchers with the tools to analyse and resolve organisational issues. However, Hair et al. (1998) pointed out that most multivariate statistical methods have one specific constraint, in that each method can only observe a single relationship at a time. In order to triumph over this constraint, the statistical technique known as structural equation modeling (SEM) was developed. SEM is a relatively new analytical tool, although it can be traced back to the first half of the twentieth century (Hair et al. 2006).

According to Hair et al. (2006: 711), SEM is a combination or “family of statistical models that seeks to explain the relationships amongst multiple variables”. The “structure” of interconnected relationships is expressed via a series of equations which simultaneously examines a series of dependence relationships. The authors stated that SEM is also known as covariance structure analysis or latent variable analysis, but is mostly referred to as Lisrel, which is the name of the specialised software used in SEM. They contended (Hair et al. 1998: 578) that the reasons for the popularity of SEM are essentially the following:

- “SEM offers a straightforward way of dealing with multiple relationships simultaneously whilst also ensuring statistical efficiency”;
- “SEM offers the ability to assess relationships comprehensively and provide the analysis that transforms from exploratory to confirmatory”.
All structural equation models may be identified in three ways, as described by Hair et al. (2006: 711):

- Estimating the dependence relationships, which are multiple and interrelated
- Correcting measurement error and the ability to represent unobserved concepts in the dependence relationships
- Defining a model that can explain the entire set of relationships.

SEM also provides the researcher with the ability to accommodate multiple interrelated dependence relationships in a single model. Its closest analogy is multiple regressions, which can estimate a single relationship (equation), but only SEM can estimate numerous relationships at once. They can be interrelated in that the dependent variable in one equation can be an independent variable in another equation. This allows the researcher to model complex relationships that are not possible with any of the other multivariate techniques. It is therefore a more advanced and rigorous statistical technique to analyse data (Hair et al., 1995: 696).

5.8.2 The Role of Theory in Structural Equation Modeling

Two basic conditions for the successful application of SEM were suggested by Hair et al. (1998: 589-592). These conditions are, firstly, the provision of a sound theoretical foundation and, secondly, the development of a modeling strategy. In this study, and based on the relevant literature, a detailed and accurate questionnaire had to be developed with which to measure the theoretical constructs and foundation of variables for the model under investigation. Whilst theory is important in all multivariate procedures, Hair et al. (2006: 720) stressed that it is especially so in SEM, which, as a confirmatory analysis, is guided more by theory than by empirical results. Furthermore, the authors suggested that the most potent type of theoretical inference for a researcher to make is a causal inference, which suggests a hypothesized cause and effect relationship. In essence, the theoretical basis of the model is the platform that reinforces the method of SEM (Hair et al., 1998: 592-593). During the development of a theoretical model, researchers must not exclude key predictive variables. That said, researchers should look at the practical limitations of SEM and ensure that a balance is achieved. Hair et al. (1998: 594) suggested that,
whilst no limit is placed on the number of variables in the model, interpretation becomes a challenge if more than 20 concepts are tested.

The development of a modeling strategy, as indicated above, is the second condition for the successful application of SEM. According to Hair et al. (2006: 713), “a model is a representation of a theory”. The authors also pointed out that there is no single correct method of applying multivariate techniques. Instead, the application is dependent upon the modeling strategy, and involves specifically defining the objectives and applying the most appropriate technique, in the most appropriate manner, to achieve the set objectives. The ultimate outcome for SEM exists in the three distinct modeling strategies, namely, the confirmatory modeling strategy, the competing models strategy, and the model development strategy (Hair et al. 2006: 732; Hair et al. 1998: 590-592). It is widely acknowledged that the confirmatory modeling strategy is the most direct application of SEM. When using this strategy a single model is specified and SEM is used to assess how well the model fits the data (Hair et al. 2006: 732). For the purposes of this study, a confirmatory modeling strategy was adopted in the application of SEM. As such the objective of the study is to apply SEM to tests and potentially confirm the factors identified as influencing the perceived success or effectiveness of knowledge sharing/management in government agencies. Hair et al. (2006: 734-758) proposed six stages in analysing a model using SEM.

### 5.8.3 Steps in Structural Equation Modeling

The various steps or stages of SEM by Hair et al. (1998: 592-616) are tabled below:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Develop a theoretical model</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Constructing a path diagram of causal relationships</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Converting the path diagram into a set of structural equations and measurement models</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Choosing the input matrix type (correlation matrix or covariance matrix) and estimating the proposed model</td>
</tr>
</tbody>
</table>
Stage 5  Assessing the identification of model equations
Stage 6  Evaluating the results for goodness-of-fit
Stage 7  Making the indicated modifications to the model, if theoretically justified

Source: Hair et al. (1998: 592-616)

Whilst the two proposed implementation procedures of SEM have common characteristics, the six-stage process covers the wider aspects of research in terms of measurement development (stage 1) and design (stage 3). Hair et al. (2006: 734) stated that their later approach reflected “the unique terminology and procedures of SEM”. For purposes of this study, the independent and intervening variables, as well as the dependent variable have been defined earlier in this chapter. In addition, the scale development and operationalization of each of these variables was described. Similarly, the issues of sample size and missing data (aspects of stage 3) have been addressed. The remaining stages of the six-stage decision process are addressed in a more detailed and sequential manner in the seven-step procedure. As such, the discussions on implementing SEM in the current study are based on the seven consecutive steps proposed by Hair et al. (1998: 592-616). In their later writings, Hair et al. (2006: 721) contended that SEM alone cannot establish causality. It can only provide some evidence necessary to support a causal inference. As a result, for the purpose of this study it was decided to rename Hair et al.’s (1998: 592-616) second step from “constructing a path diagram of causal relationships” to “constructing a path diagram of dependence relationships”. According to Hair et al. (2006: 715) a path diagram depicts a dependence relationship between two constructs, in other words the impact of one construct on another construct. The seven steps of SEM are briefly summarised in the paragraphs that follow, and will be discussed individually before showing how they were implemented in the research process. In addition, the implementation of each step in the current study will be described.

Stage 1: Developing a theoretical model

As pointed out by Hair et al. (2006: 713), “a model is a representation of a theory”, and “theory can be thought of as a systematic set of relationships providing a
consistent and comprehensive explanation of a phenomenon”. As such, this study began by identifying a theoretical model of factors influencing the perceived effectiveness of knowledge sharing in order that they may be presented for empirical testing. This model was based on an in-depth literature study as well as existing empirical findings. Relationships between the numerous factors (constructs) in the model and their possible influence on the perceived success of knowledge sharing were hypothesised, based on theoretical justification.

According to Hair et al. (1998: 592), SEM is “based on causal relationships in which the change in one variable is assumed to result in a change in another variable”. The authors further indicated that “the strength and conviction with which the researcher can assume causation between two variables lies in the theoretical justification to support the analysis, and not in the analytical methods chosen”. The theoretical justification of the model to be investigated is the foundation that underpins the method of SEM (Hair et al. 1998: 592-593).

Stage 2: Constructing a path diagram of causal relationships

A complete SEM model, comprising of measurement and structural models, is seen as complex. As such, many researchers prefer to portray their models in a convenient visual form, known as a path diagram (Hair et al., 2006: 714). The same authors, in their earlier writings (Hair et al., 1998), pointed out that a path diagram is more than just a virtual portrayal of the relationships, as it allows the researcher to present not only the predictive relationships amongst constructs (the independent-dependent variable relationships), but also the associative relationships (correlations) amongst constructs and even indicators. In constructing a path diagram of causal relationships, the hypothesised relationships amongst the constructs included in the models under investigation are portrayed.

A straight arrow depicts a direct dependence relationship between one construct and another, whereas a curved arrow denotes a correlation between constructs. A straight arrow with two heads (one head on either side) indicates a reciprocal relationship between constructs. A variable that is not predicted or ‘caused’ by another variable in the model is referred to as an exogenous construct, also known
as an independent variable. No arrows will point to these constructs from other constructs. On the other hand, a variable that is predicted or ‘caused’ by any other construct in the model is called an endogenous or dependent construct (variable). One or more arrows will point to these constructs (Hair et al., 2006: 715; Hair et al., 1998: 594-596). For the purposes of this study, the dependent variable is referred to in the model as a variable that is not predicted or ‘caused’ by any other variable. The path diagrams will be presented in Chapter 6.

Stage 3: Converting the path diagram into a set of structural and measurement equations

During this stage, formal terms by means of sets of equations are specified in the model. Hair et al. (1998:596) mentioned that “this is done, firstly, through a series of equations that define the structural equations linking the constructs; secondly, through measurement models, specifying which variables measure which constructs, and thirdly, through a set of matrices indicating any hypothesised correlations amongst constructs/variables”. They further emphasized that “the objective is to link the operational definitions of the variables to theory in order to apply to appropriate empirical tests” (Hair et al., 1998: 596). A conventional model in SEM is essentially comprised of two models, namely, the measurement model and the structural model (Hair et al., 2006: 714). Specifying the measurement model is a critical step in the development of a SEM model, which involves assigning indicator variables to the constructs they represent. Specifying the structural model, however, involves assigning relationships between constructs based on the proposed theoretical model (Hair et al., 2006: 754).

Upon proposing a theory, the SEM model is developed. This initially involves specifying the measurement theory and then ensuring that it is validated by means of a confirmatory factor analysis. After validating the measurement model, the research may begin to test the structural model (Hair et al., 2006: 848-849). According to the authors, a structural theory “is a conceptual representation of the relationships between constructs” and can be expressed via a structural model, which represents the theory with a set of structural equations. This model is usually illustrated with a diagram.
Hair et al (1998: 597) pointed out that, in the structural model, the effect of each hypothesised correlation of an exogenous (independent) construct on an endogenous (dependent) construct, or an endogenous construct on another endogenous construct, is expressed as an equation. For each equation a structural coefficient \( b \) is estimated and an error term \( E \) is included to provide for the sum of the effects of specification and random selection error (See Figure 5.2). The following (Figure 5.1) is an example of the path diagram to be converted into structural equations:

**Figure 5.1 Path Diagram Example**

![Path Diagram Example](image)

**Figure 5.2 Structural Equation Example**

![Structural Equation Example](image)
It can be seen from figure 5.1 and 5.2 that $X_1$ and $X_2$ have an effect on the endogenous (dependant) variable $Y_1$, and that provision is made for the measurement and specification error $E_1$ of the magnitude $b_1$ and $b_2$. $Y_2$, in turn, is influenced (coefficients, $b_3$ and $b_4$) by the exogenous variables $X_2$, $X_3$, and $Y_1$ and provision is made for the measurement and specification error ($E_2$). The endogenous variable $Y_3$ is influenced by endogenous variables $Y_1$ and $Y_2$, to the extent of $b_6$ and $b_7$, with an error term $E_3$ (Venter, 2002: 255). The path diagrams in this study (as discussed in Figure 5.1 and 5.2) will be converted to structural equations and measurement models by using the computer programme LISREL (Jöreskog and Sörbom, 2006).

Stage 4: Choosing the input matrix type (correlation matrix or covariance matrix) and estimating the proposed model

Once the model has been adequately specified, the data is tested to ensure that it meets the assumptions underlying SEM. Furthermore, the type of input matrix (covariances or correlations) to be used for the structural and measurement model estimation should also be tested. In their analysis of SEM, Hair et al. (1996: 737) contended that researchers have debated the use of either covariance or correlation matrix as the input matrix. They declared that, although SEM originally applied covariance matrices, many researchers proposed using correlations, which are considered a simpler form of analysis and simpler to interpret. Hair et al. (1998) stated that “for confirmatory factor analysis, either type of input matrix can be utilised; but as the objective is an exploration of the pattern of relationships across respondents, correlations are the preferred input data type. This then activates the correlation of the covariance matrix of all the indicators in the model”. In doing so, the structural coefficients would then estimate the relationships between the latent variables. Hair et al. (1996: 738) recommended the use of covariances whenever possible, as they provide the researcher with more flexibility.

After the structural and measurement models have been specified and the input data type selected, the computer programme for estimation is then selected. For purposes of this study, the software programme LISREL 8.8 (Jöreskog and Sörbom, 2006) was used. Hair et al. (1998: 619) mentioned that, because of the estimation procedure,
constructs must be made scale-invariant in order that the indicators be “standardized” to compare the constructs. Two approaches are used for this procedure: firstly, to set one of the loadings in each construct to the fixed value of 1.0 and, secondly, to estimate the construct variance directly. These authors concurred that either approach results in the same estimates, but recommended the second approach for theory testing purposes. Parameter estimation is done, for example, by comparing the actual covariance matrices, representing the relationships between variables, and the estimated covariance matrices of the best-fitting model.

Stage 5: Assessing the identification of model equations

During Step 5, the researcher assesses whether or not the software programme has produced any meaningless or illogical results in its identification of the structural model (Hair et al., 2006: 791; Hair et al., 1998: 608). In order to ascertain this, attention is given to the identification problem, which refers to the inability of the proposed model to generate unique estimates. No single rule exists that establishes the identification of a model (Hair et al., 1998: 608-609). Several guidelines are, however, available. The simplest of these is the three-measure rule, which asserts that any constructs with three or more indicators will always be identified. In the present study, no single construct has fewer than three indicators, again indicating a reduced risk of model identification problems.

The solution to an identification problem is to impose more constraints on the model in order to eliminate some of the estimated coefficients. A structured process should be followed by adding more constraints and deleting paths from the path diagram until the problem is rectified. Attempts are therefore made to achieve an over-identified model that has degrees of freedom available to provide a better estimation of the true causal relationships (Hair et al., 1998: 610).

Stage 6: Evaluating the results for goodness of fit

With the measurement model specified, sufficient data collected and the estimation technique already determined, the most fundamental question confronts the
researcher, namely “Is the measurement model valid?” The validity of the measurement model is dependent on the goodness of fit as well as construct validity (Hair et al., 2006: 745). The evaluation of the goodness of fit results is an assessment of the extent to which the data and the theoretical models meet the assumptions of SEM.

Goodness of fit, according to Hair et al. (2006: 745) is an indication of “how well the specified model reproduces the covariance matrix among the indicator items”. In previous writings, Hair et al. (1998: 610) indicated that the first step for evaluating the results is to determine offending estimates. After the model is established to provide acceptable estimates, the goodness of fit has to be established for the overall model and then separately for the measurement and the structural models.

Hair et al. (2006: 745) highlighted three types of goodness of fit measures, namely absolute fit measures, incremental fit measures, and parsimonious fit measures. An acceptable fit, by whatever criteria, does not prove the proposed model. Instead it points out that it is but one of several possible acceptable models (Hair et al., 2006: 732). Measurement model validity depends on the goodness of fit for the measurement model, and specific evidence of construct validity (Hair et al., 2006: 745). In most instances, the closer the structural model's goodness of fit comes to the measurement model, the better the structural model fit (Hair et al., 2006: 756). Model-fit criteria commonly used are the chi-squared test ($\chi^2$), the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), and the root mean square residual (RMR) (Hair et al., 1998: 633).

In this research, during this stage, an assessment was made of the overall fit of the proposed model of factors that influence perceived effectiveness of knowledge sharing for South African government agencies. Chapter 6 will provide an assessment for this purpose and will reflect on the results of the absolute fit measures based on the robust maximum likelihood estimation method, which implies that the purpose of the statistical analysis was more focused on assessing relationships than on obtaining good model fit.
Stage 7: Making the indicated modifications to the model if theoretically justified

The final stage in structural equation analysis involves modifying the proposed model in search of a better fit and an interpretation of the results. Hair et al. (2006: 758) suggested that “the final stage provides a test of how well a researcher’s theory about how constructs relate to one another really matches reality”. Hair et al. (2006) suggested that, in addition to evaluating goodness of fit statistics, researchers should also check a number of model diagnostics or diagnostic measures, such as path estimates, standardised residuals and modification indices, in order to suggest improvements to the model. The authors also suggested using a specification search, which is basically a trial and error approach in which to suggest changes in the model via SEM programmes like LISREL, which can perform automatic specification searches.

Identification of the significant causal relationship is an important step in interpreting results. In order to support a proposed structural theory, a good model fit alone is insufficient. Further verification may be required, including a ‘theory plausibility test’ which essentially attempts to confirm if the relationships make sense. A theoretical model is supported and considered valid to the extent that the parameter estimates are statistically significant and in the predicted direction (Hair et al., 2006: 758-847).

5.9 SUMMARY

The research conducted in this study was strongly influenced by the research methodology. This chapter provided insight into the activities that were carried out with a sample population of South African government agencies. Demographic information was provided, followed by a description of structural equation modeling (SEM), the statistical technique used in this research to ensure the reliability and validity of the findings. The following chapter will present detailed feedback from the statistical analysis.
CHAPTER 6

EMPIRICAL RESULTS

6.1 INTRODUCTION

The literature in Chapters 2 and 3 highlighted the factors believed to influence knowledge management in the public sector in South Africa. In Chapter 4, the various hypotheses were discussed and the conceptual model was presented. Chapter 5 presented an overview of the research design and methodology used to investigate the factors influencing knowledge management of selected government agencies in South Africa.

In this chapter the empirical results will be reported. Firstly, the Exploratory Factor Analysis (EFA) will be summarized. The aim of the EFA is to identify the underlying factors in the data. The discriminated validity of the constructs as per the theoretical model is assessed and where required, is redefined. Once the reliability of these constructs have been established by means of a Cronbach alpha coefficient analysis, the theoretical model proposed in Chapter 4 will be reconsidered, in order to reflect only those constructs that demonstrated sufficient discriminated validity and reliability. A path diagram, depicting the relationships between these factors, shall be presented and thereafter converted into a structural model, where estimations will be reported for the path coefficients in the model. An assessment of the goodness-of-fit of the theoretical model to the empirical data will then be undertaken. Finally, the chapter concludes with the testing of the relationships between the demographic data and the dependent variable, in order to establish whether the demographic data is consistent across all regions and demographic criteria.

6.2 VALIDITY OF THE RESEARCH INSTRUMENT

In order to assist the reader, Figure 6.1 below attempts to present a broad overview of the process undertaken in this chapter, i.e. prior to SEM steps which is discussed further in this chapter.
Figure 6.1: High Level Overview of Process Steps on Presenting Empirical Findings: Checking Validity & Reliability Factor Analysis Prior to SEM

Data analysis - To assess the Latent Construct for Discriminant Validity, i.e. Is data suitable for analysis?

Exploratory Factor Analysis - to ascertain whether the Latent Variables are ‘distinct’ by:
- Deciding how factors will be extracted
- What factors will assist in determining factor extraction
- Selection of rotation method
- Interpretation and Labelling

Did Latent variables measure the same thing? If alot of overlap occurred. (Yes)

Revise the Theoretical Model & Focus on confirmed reliable variables for SEM purposes.

Source: Researchers own construction
6.2.1 Exploratory Factor Analysis (EFA)

For purposes of this study, Exploratory Factor Analysis was employed to assess the discriminated validity of the measuring instrument. As a statistical method, Exploratory factor analysis is a means to reflect the data in a reduced number of concepts than the original individual variables and decreases the data by substituting the scores of each underlying dimension for the original variable (Hair et al., 1998: 90). The above is confirmed by Rietveld and Van Hout (1993), who assert that EFA is applied due to the normally large numbers of variables that are usually used for measuring a construct, which in turn can expect to make studies become rather complicated. Furthermore, it could well be that some of the variables measure different aspects of a same underlying variable. For these reasons, Rietveld and Van Hout (1993), stated that EFA had been developed.

Factor analysis attempts to bring intercorrelated variables together under more general, underlying variables. More specifically, the goal of factor analysis is to reduce “the dimensionality of the original space and to give an interpretation to the new space, spanned by a reduced number of new dimensions which are supposed to underlie the old ones” (Rietveld and Van Hout, 1993: 254). Thus, factor analysis offers not only the possibility of gaining a clear view of the data, but also the possibility of using the output in subsequent analyses (Field 2000; Rietveld and Van Hout 1993). EFA, according to Hair et al. (2006: 773), “explores the data and provides the researcher with information on how many factors are needed to represent the data.”

6.2.2 Validation Process

The initial step in the validation process was to establish whether the data was suitable for factor analysis. From a statistical perspective, the researcher must ensure that the data matrix has sufficient correlation amongst the variables in order to justify the application of factor analysis (Hair et al., 1998: 99).

The following step consisted of an exploratory factor analysis using a Maximum Likelihood Exploratory Factor Analysis, such that latent constructs contained in the
original variables could be identified. In order to determine how many factors to extract, a combination of several criteria were used namely the Eigenvalues, the percentage of variance criterion, and the screen test criterion (Hair et al., 1998: 104). During this step, it was found that there was a lot of definitional overlap between constructs, which leads one to conclude that some of the variables measured the ‘same thing’. This is however expected when respondents misinterpret or do not respond to questions appropriately. Due to a lack of discriminated validity, the theoretical model had to be adapted. Emanating from this exploratory factor analysis, the model was split and grouped into three categories of Outcome variables, namely Organisation Variables; Intervening Variables and Interpersonal Variables.

Furthermore, the dimensionality of this matrix can be reduced by “looking for variables that correlate highly with a group of other variables, but correlate very badly with variables outside of that group” (Field, 2000: 424). These variables with high inter-correlations could well measure one underlying variable, which is called a ‘factor’. The relevant sub-models (three Outcome variables) will be highlighted in tables 6.1 to 6.3 below. Only thereafter, will the individual independent and dependent variables be discussed in 6.4 accordingly.

6.2.3 Confirmatory factor analysis

During the implementation of SEM, the measurement model specifies the indicators for each construct and enables an assessment of construct validity (Hair et al., 2006:709). However, whilst the specification and estimation of the measurement model in SEM is similar to exploratory factor analysis, it differs in that the number of factors and the items loading on each factor must be known and specified prior to conducting the analysis (Hair et al., 2006: 772). As a consequence, it is deemed to be a conduct of confirmatory rather than exploratory factor analysis. Confirmatory factor analysis cannot be conducted appropriately unless the researcher can specify both the number of constructs that exist within the data to be analysed, and which specific measures should be assigned to each of these constructs. In contrast, exploratory factor analysis is conducted without knowledge of either of these things (Hair et al., 2006: 834). In order to pursue and allow this specification of measures to constructs in the measurement model, an exploratory factor analysis was undertaken.
using SPSS 15 for Windows prior to assessing the measurement model and implementing SEM. With regards to the relationship between sample size and factor analysis, various recommendations have been made. According to Hair et al. (2006: 113) one should pursue between 5 and 10 observations per latent variable, with an absolute minimal sample size of 50 observations. Gorsuch (1983) recommends 5 observations per item, with a minimum of 100 subjects, regardless of the number of items, whereas Cattel (1978) recommends 3 to 6 observations per item, with a minimum of 250 responses. In the present study the sample size amounted to 320 and the measuring instrument contained 61 survey items. Based on the \( N:p \) ratio recommended by Gorsuch (1983) and Cattel (1978), the entire matrix of responses in the present study could thus not be subjected to a single exploratory factor analysis without some degree of risk. Consequently, the model was split into 3 sub-models or Outcome variables, with each Outcome variable being individually factor analysed.

6.2.4 Rules of Thumb for Exploratory Factor Analysis

In order to assess the adequacy or the suitability of the respondent data for factor analysis, the software programme SPSS includes Bartlett’s Test of Sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO). The KMO index ranges from 0 to 1, with 0.50 being considered suitable for factor analysis (Williams, Onsman and Brown, 2010). It is suggested Kaiser (1974) that a KMO near 1 supports a factor analysis and that anything less than 0.5 does not. According to Kaiser (1974), KMO’s in their 0.70s are considered as “middling”, whereas values below 0.70 are considered as “mediocre”, “miserable” or “unacceptable”. Consequently for the purpose of this study, data with KMO’s of >0.7 (\( p<0.05 \)) are considered factor-analysable.

Eigenvalues, are used to explain the variance captured by the factor. Eigenvalues greater than 1 are considered significant, whereas all factors with latent roots or Eigenvalues less than 1 are considered insignificant and are discarded (Hair et al., 2006: 120). During a factor analysis, a number of values are generated. These values are the correlations between each variable and each factor, and are known as factor loadings. Data items measuring a similar aspect would have high loadings on (correlations with) one specific factor and low loadings on another. According to Hair
et al. (2006: 128) factor loadings of 0.30 and 0.40 are considered significant for sample sizes of 350 and 200 respectively. In this study, items that display no cross-loadings, that load to a significant extent on one factor only, and have factor loadings of ≥ 0.35, are considered significant (Hair et al., 1995: 385) and will be regarded as evidence of discriminated validity.

In Tables 6.1 to 6.3, the extraction and rotation method, as well as Bartlett’s Test of Sphericity will be reported for each outcome variable. In addition, the Eigenvalues, the Percentage of Variance explained, as well as the individual factor loadings for each construct, extracted by way of the exploratory factor analysis, for each outcome variable, will be elaborated on in Section 6.4 below.

The interpreting of a factor loading matrix may be summarised in a sequence of process steps as highlighted by Hair et al (2006: 130) as follows:

- Step 1: Examine the Factor Matrix of loadings
- Step 2: Identify the significant loading (s) of each variable
- Step 3: Assess the communalities of the variables
- Step 4: Respecify the factor model if needed

This generic process is a summation of the points mentioned above and will be discussed in more detail below.

6.2.5 Analysis of Outcome (Grouped) Variables

In the exploratory factor analysis, the initial numbers of factors to be extracted were not specified. However, the Eigenvalues determined the number of factors to be used (highlighted in the relevant tables 6.2 to 6.4 below). A process of deleting items that do not demonstrate sufficient discriminated validity ensued whilst further re-running the Exploratory Factor Analysis until all the remaining items loaded to a significant extent (p > 0.35) with no cross-loadings (i.e. loaded on only one factor). The most interpretable factor structures are presented in the tables. All items with loadings < 0.35 were deleted.
The exploratory factor results of the three outcome variables (sub-models), namely Organisation Variables; Intervening Variables and Interpersonal Variables shall be discussed.

6.2.5.1 Sub model: Organisation Variables

The first sub model of organisation variables consisted of four factors, namely Learning Organisation (LO), Netcentricity (NETC), Subject Matter Expert (EXPERT) and Organisation Culture (CULT). For the analysis presented in the tables below, the Principal Axis Factoring was used as the Extraction Method and the Direct Quartemin Oblique with Kaiser Normalization was specified as the Rotation Method.

Pertinent to the organisation variables, all loadings highlighted in red in table 6.1 below are regarded as significant loadings ($p \geq 0.35$)

<table>
<thead>
<tr>
<th>Table 6.1: ROTATED FACTOR LOADINGS: ORGANISATIONAL VARIABLES.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTORS</td>
</tr>
<tr>
<td>1 Learning Org (LO)</td>
</tr>
<tr>
<td>LO 4  .792</td>
</tr>
<tr>
<td>COP 4  .745</td>
</tr>
<tr>
<td>CULT 5 .687</td>
</tr>
<tr>
<td>ICO 5  .566</td>
</tr>
<tr>
<td>LO 3   .501</td>
</tr>
<tr>
<td>LEAD 4 .451</td>
</tr>
<tr>
<td>ICO 3  .030</td>
</tr>
<tr>
<td>LO 2   -.037</td>
</tr>
<tr>
<td>LO 7   -.032</td>
</tr>
<tr>
<td>LEAD 6 .264</td>
</tr>
<tr>
<td>CULT 7 .139</td>
</tr>
<tr>
<td>CULT 2 .030</td>
</tr>
<tr>
<td>CULT 3 -.035</td>
</tr>
<tr>
<td>CULT 4 -.003</td>
</tr>
<tr>
<td>LEAD 2 .309</td>
</tr>
<tr>
<td>LEAD 1 .277</td>
</tr>
<tr>
<td>CULT 1 .194</td>
</tr>
<tr>
<td>CULT 6 .272</td>
</tr>
<tr>
<td>EIGENVALUE 8.319</td>
</tr>
</tbody>
</table>

Although the Eigenvalue of greater than 1 is generally accepted, the value of 0.941 for factor 4 was deemed as acceptable in this instance as it was interpretable.
Table 6.1 indicates that a total of 18 organisational items were loaded on four factors, and explain a total of 62.1% of the variance in the data.

### 6.2.5.2 Sub-model: Intervening Variables

The second sub-model of intervening variables produced three factors, namely Knowledge Management (KM), Collaboration and Information Sharing. For the analysis presented in table 6.2 below, the Principal Axis Factoring was used as the extraction method and the Direct Quartemin Oblique with Kaiser Normalization was used for the rotation method.

Pertinent to the intervening variables, all loadings highlighted in red in table 6.2 below are regarded as significant loadings (p≥0.35)

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>1 Knowledge Management (KM)</th>
<th>2 Collaboration</th>
<th>3 Info Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUCC 1</td>
<td>.839</td>
<td>-.052</td>
<td>-.052</td>
</tr>
<tr>
<td>KNOW 1</td>
<td>.797</td>
<td>-.022</td>
<td>-.040</td>
</tr>
<tr>
<td>SUCC 2</td>
<td>.766</td>
<td>.052</td>
<td>-.080</td>
</tr>
<tr>
<td>KNOW 2</td>
<td>.695</td>
<td>-.097</td>
<td>.026</td>
</tr>
<tr>
<td>SUCC 5</td>
<td>.674</td>
<td>.028</td>
<td>-.003</td>
</tr>
<tr>
<td>KNOW 3</td>
<td>.653</td>
<td>.039</td>
<td>.070</td>
</tr>
<tr>
<td>KNOW 4</td>
<td>.599</td>
<td>.061</td>
<td>.208</td>
</tr>
<tr>
<td>SUCC 3</td>
<td>.504</td>
<td>.125</td>
<td>.145</td>
</tr>
<tr>
<td>NETC 10</td>
<td>.007</td>
<td>.762</td>
<td>-.026</td>
</tr>
<tr>
<td>KNOW 5</td>
<td>-.084</td>
<td>.752</td>
<td>.118</td>
</tr>
<tr>
<td>SUCC 6</td>
<td>-.080</td>
<td>.692</td>
<td>-.048</td>
</tr>
<tr>
<td>KNOW 6</td>
<td>.188</td>
<td>.548</td>
<td>.089</td>
</tr>
<tr>
<td>NETC 9</td>
<td>.020</td>
<td>.441</td>
<td>.066</td>
</tr>
<tr>
<td>SUCC 4</td>
<td>.209</td>
<td>-.021</td>
<td>.723</td>
</tr>
<tr>
<td>NETC 8</td>
<td>-.042</td>
<td>.015</td>
<td>.364</td>
</tr>
<tr>
<td>EIGENVALUE</td>
<td>5.081</td>
<td>2.394</td>
<td>1.175</td>
</tr>
</tbody>
</table>

Table 6.2 indicates that a total of 15 items measuring the intervening variables were grouped into three factors, and explain a total of 57.6% of the variance in the data. Out of the three factors identified, the factor Information Sharing was removed due to
poor construct validity. The interpretation of the EFA, identification and discussion of the identified factors and the operationalisation of the newly identified factor – Collaboration shall be comprehensively later in this chapter.

6.2.5.3 Sub-Model: Interpersonal Variables

The third and final sub-model of interpersonal variables produced three factors, namely Internal Communities of Practice, Trust and External Communities of Practice. For the analysis presented in table 6.3 below, the Principal Axis Factoring was used as the extraction Method and the Direct Quartemin Oblique with Kaiser Normalization was used for the rotation Method.

Pertinent to the interpersonal variables, all loadings highlighted in red in table 6.3 below are regarded as significant loadings (p≥0.35)

<table>
<thead>
<tr>
<th>Table 6.3: ROTATED FACTOR LOADINGS: INTERPERSONAL VARIABLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
</tr>
<tr>
<td>COP 3</td>
</tr>
<tr>
<td>COP 5</td>
</tr>
<tr>
<td>COP 4</td>
</tr>
<tr>
<td>TRUST 6</td>
</tr>
<tr>
<td>TRUST 4</td>
</tr>
<tr>
<td>TRUST 5</td>
</tr>
<tr>
<td>TRUST 3</td>
</tr>
<tr>
<td>COP 2</td>
</tr>
<tr>
<td>COP 6</td>
</tr>
<tr>
<td>TRUST 2</td>
</tr>
<tr>
<td>COP 7</td>
</tr>
<tr>
<td>EIGENVALUE</td>
</tr>
</tbody>
</table>

Table 6.3 indicates that a total of 11 items measuring the interpersonal variables loaded on three factors, namely internal communities of practice, trust and external communities of practice and explain a total of 63.3% of the variance in the data. Whilst two of the initial 6 items loaded onto Trust, 2 of the remaining four (TRUST2 and TRUST6) loaded onto the Communities of Practice factors. With regards to both
Internal and external communities of practice factors, all of the 7 items loaded, with the exception of COP1.

As will be discussed later in this chapter, the variables of internal communities of practice and external communities of practice, combined such that they merged with the variable learning organisation, whilst the initially identified independent variable of Trust was deemed as the appropriate variable when all three factors merged.

The interpretation of the EFA indicates that the items and constructs (factors) remaining in the data demonstrate sufficient evidence of discriminated validity.

The identification and discussion of the identified factors and the operationalisation of the newly identified factors shall be comprehensively discussed in Section 6.4 below, after the reliability of the research instrument, which will be discussed next.

6.3 RELIABILITY OF THE RESEARCH INSTRUMENT

Reliability refers to the ability of an instrument to measure consistently (Tavakol, Mohagheghi and Dennick, 2008). It should be noted that the reliability of an instrument is closely associated with its validity. Tavakol, and Dennick (2011:53), said that it is “possible to objectively measure the reliability of an instrument” and pointed out that the Cronbach alpha is the most widely used objective measure of reliability.

According to Hair et al.; (1998:118), the generally agreed lower limit for the Cronbach alpha coefficient is 0.70, but it can be decreased to 0.60 in the case of exploratory research. For purposes of this study, the software application IBM SPSS Version 19.0 for Windows was used to measure the Cronbach alpha for each of the identified factors. Furthermore, a Cronbach alpha of greater than 0.70 was applied in order to regard a score as reliable.

From the exploratory factor analysis, six factors measuring the dependent and independent variables emerged. Cronbach alpha values of more than 0.70 were
calculated and recorded all for six factors. The Cronbach alpha coefficients as well as the item-total correlation for each factor will be discussed next.

6.4 FACTORS INFLUENCING KNOWLEDGE MANAGEMENT FOR GOVERNMENT AGENCIES IN SOUTH AFRICA

In the sections that follow, the measures of factor – analysability, discriminated validity and reliability will be reported for the various sub-models

The first step in assessing the validity of the data was done by performing factor analysis on the data. Subsequently, five factors were identified from the exploratory factor analysis of the independent variables, nil factors from the intervening variables, and one factor formed the dependable factor. The nature of the six factors, split between the Independent and dependent variables and their internal consistency will be discussed individually in the next sections.

6.4.1 Independent Variables

6.4.1.1 Independent Variable 1: Organisational Culture

Out of the seven items used to measure the construct Organisational Culture, four loaded to a significant extent on independent variable 1 namely (CULT1, CULT2, CULT4, and CULT6). With regards to the remaining three items, namely (CULT3, CULT5 and CULT7), only CULT3 did not load on any factor and was deleted. Item (CULT5) loaded on the factor of a learning organisation, whilst item (CULT7) loaded on the factor subject matter expert. Two items (LEAD 1 and LEAD 2), which were intended to measure the perception of leadership in a knowledge based organisation, understandably also loaded on this factor.

The six items measuring the latent variable Organisational Culture, the Cronbach alpha, the Eigenvalues and the time-to-total correlations are shown in Table 6.4 below.
**Table 6.4 INDEPENDENT VARIABLE 1: ORGANISATIONAL CULTURE**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUESTION</th>
<th>FACTOR LOADING</th>
<th>ITEM-TOTAL CORRELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CULT1</td>
<td>In my organisation failure is considered an opportunity to learn</td>
<td>0.438</td>
<td>0.541</td>
</tr>
<tr>
<td>CULT2</td>
<td>My organisation gives all promising ideas thorough consideration, no matter who they come from.</td>
<td>0.750</td>
<td>0.737</td>
</tr>
<tr>
<td>CULT4</td>
<td>In my organisation, employees have a say in what happens to their ideas they share with others</td>
<td>0.571</td>
<td>0.604</td>
</tr>
<tr>
<td>CULT6</td>
<td>My organisation tries to remove barriers to knowledge sharing</td>
<td>0.396</td>
<td>0.664</td>
</tr>
<tr>
<td>LEAD1</td>
<td>Management in my organisation understands the importance of knowledge sharing amongst staff</td>
<td>0.510</td>
<td>0.687</td>
</tr>
<tr>
<td>LEAD2</td>
<td>Members of my senior management team frequently talk about knowledge management when reporting on the state of the organisation</td>
<td>0.527</td>
<td>0.734</td>
</tr>
</tbody>
</table>

*Source: Researcher's Own Construction*

Because two of the original items measuring *Organisational culture* did not load on this factor, as well as the fact that two items from the *Leadership* variable was loaded, the operationalisation (definition) as per Chapter 4, was adapted slightly.
Therefore, in addition and for the purposes of this study, Organisational Culture refers to the extent to which the leader(s) in the organisation drive, influence and lead knowledge sharing initiatives.

As reflected in Table 6.4 above, all 6 items intended to measure the Cronbach alpha value for this variable is 0.866 (>0.7), and is therefore considered a reliable measuring instrument to measure the latent variable Organisational Culture.

6.4.1.2 Independent Variable 2: Learning Organisation

Of the initial seven items on the measuring instrument used to measure the construct Learning Organisation, only two items (LO3 and LO4) loaded significantly. The remaining items comprised of items from other independent variables, namely communities of practice (COP4), organisational culture (CULT5 – highlighted above), Information and communication (ICO5) and leadership (LEAD 4).

The six items measuring the latent variable Learning Organisation, the Cronbach alpha, the Eigenvalues and the time-to-total correlations are reflected in Table 6.5 below.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUESTION</th>
<th>FACTOR LOADING</th>
<th>ITEM-TOTAL CORRELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO3</td>
<td>My organisation provides training related to knowledge management practices</td>
<td>0.501</td>
<td>0.618</td>
</tr>
<tr>
<td>LO4</td>
<td>My organisation uses formal mentoring practices to enhance knowledge sharing</td>
<td>0.792</td>
<td>0.672</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>COP4</td>
<td>CULT5</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>COP4</td>
<td>In my organisation workers share knowledge or information by preparing written documentation (such as lessons learned, training manuals, good work practices, articles for publication).</td>
<td>0.745</td>
<td>0.665</td>
</tr>
<tr>
<td>CULT5</td>
<td>Effective knowledge sharing behaviour is built into our performance appraisal system</td>
<td>0.687</td>
<td>0.692</td>
</tr>
<tr>
<td>ICO5</td>
<td>My organisation provides incentives (recognition, awards, monetary rewards etc.) for the use of technologies by employees for knowledge management purposes</td>
<td>0.566</td>
<td></td>
</tr>
<tr>
<td>LEAD4</td>
<td>Management has made knowledge sharing an explicit criterion for assessing worker performance</td>
<td></td>
<td>0.451</td>
</tr>
</tbody>
</table>

Source: Researcher's Own Construction

As reflected in Table 6.5 above, only two from the original six items measuring the latent variable *Learning organisation* loaded, as well as a combination or merging of other initially identified independent variables namely (Communities of Practice, Organisational culture, Information and Communication technology and leadership). Due to this, the operationalisation (definition) as per Chapter 4 was adapted slightly. Therefore, in addition and for the purposes of this study, Learning Organisation refers to the extent to which the leader(s) in the organisation instil a continuous learning
culture in which formal and informal means to learn and share knowledge are actively pursued.

The Cronbach alpha value for this factor is 0.860, and it is therefore considered a reliable measuring instrument with which to measure the latent variable Learning Organisation.

6.4.1.3 Independent Variable 3: Subject Matter Expert

Of the initial items expected to measure the various independent variables in the theoretical model in chapter four, a new factor named Subject Matter Expert emerged. The three items measuring the latent variable Subject Matter Expert, the Cronbach alpha, the Eigenvalues and the time-to-total correlations are reflected in Table 6.6 below.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUESTION</th>
<th>FACTOR LOADING</th>
<th>ITEM-TOTAL CORRELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO7</td>
<td>My organisation encourages workers to participate in cross-functional project teams with external experts</td>
<td>0.920</td>
<td>0.650</td>
</tr>
<tr>
<td>LEAD6</td>
<td>My management has initiated strategic alliances with other relevant government departments in order to ensure knowledge sharing across departments</td>
<td>0.415</td>
<td>0.469</td>
</tr>
<tr>
<td>CULT7</td>
<td>The retention of highly experienced staff is a top</td>
<td>0.360</td>
<td>0.475</td>
</tr>
</tbody>
</table>
The Cronbach alpha value for this factor is 0.708 and is therefore considered a reliable measuring instrument to measure the latent variable Subject Matter Expert. Due to this new latent variable emerging, an operationalisation (definition) was necessary. For the purposes of this study, Subject Matter Expert refers to the extent to which organisations can access already identified experts or knowledgeable/skilled persons who may be used to share their intellectual and tacit knowledge with others in the organisation in order to resolve problems.

6.4.1.4 Independent factor 4: Collaboration

Of the initial items expected to measure the various independent variables in the theoretical model in chapter four, a further new factor named Collaboration emerged. The five items measuring the item, the Cronbach alpha, the Eigenvalues and the time-to-total correlations are reflected in Table 6.7 below.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUESTION</th>
<th>FACTOR LOADING</th>
<th>ITEM-TOTAL CORRELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNOW5</td>
<td>The need for collaboration amongst government agencies will improve the knowledge effort of government as a whole.</td>
<td>0.752</td>
<td>0.658</td>
</tr>
<tr>
<td>KNOW6</td>
<td>An important component of an effective knowledge management process is in knowing whom to</td>
<td>0.548</td>
<td>0.502</td>
</tr>
</tbody>
</table>
The sharing of confidential information electronically is risky if any employee is allowed to access the relevant information.

The collaboration and electronic connectivity between government departments will enhance decision making.

My organisation ensures that sufficient time is made available for employees to mutually discuss information in order to resolve problems.

Source: Researcher's Own Construction

The Cronbach alpha value for this factor is 0.771 and is therefore considered a reliable measuring instrument to measure the latent variable of Collaboration.

Due to this further new latent variable emerging, an operationalisation (definition) was also necessary. For the purposes of this study, Collaboration refers to the extent to which organisations willingly and co-operatively work together on joint projects, which allows the sharing of information both internally and externally with the appropriately acknowledged stakeholders.

6.4.1.5 Independent Variable 5: Trust

Out of the original six items used to measure the construct of Trust, only two loaded to a significant extent, namely (TRUST4 and TRUST5). With regards to the remaining four items, all four items loaded onto both internal and external
communities of practice (COP), which were an independent variable included in the research instrument, namely (TRUST2, TRUST3 and TRUST6). Due to the above four items loading in both trust and communities of practice factors, (TRUST 1, TRUST4 and TRUST5), which did not load on any factor was deleted due to poor discriminated validity.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUESTION</th>
<th>FACTOR LOADING</th>
<th>ITEM-TOTAL CORRELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUST4</td>
<td>We voluntarily share information with other government agencies as we trust them</td>
<td>0.831</td>
<td>0.840</td>
</tr>
<tr>
<td>TRUST5</td>
<td>We trust the recipients of other government agencies who are provided with our information</td>
<td>0.385</td>
<td>0.779</td>
</tr>
</tbody>
</table>

The Cronbach alpha value for this factor is 0.771 and is therefore considered a reliable measuring instrument to measure the latent variable of Trust. All the independent variables presented above are considered reliable due to the Cronbach alpha measuring ≥0.7.

### 6.4.2 Dependant Variable: Perceived Effectiveness of Knowledge Management

The initial proposed model considered knowledge sharing as the dependent variable and knowledge management the initial intervening variable. However, following the
factor analysis, when knowledge management (KNOW) was combined and loaded into the factor analysis with knowledge sharing (SUCC), it (Knowledge Management) became the evidently sound dependent variable. The four individual items (SUCC1, SUCC2, SUCC3 and SUCC5), out of the initial five items for the factor knowledge sharing and four items (KNOW1, KNOW2, KNOW3 and KNOW4) of the six initial items for the factor knowledge management, now combined to form the dependent variable of *knowledge management*.

**Table 6.9 DEPENDENT VARIABLE: KNOWLEDGE MANAGEMENT**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUESTION</th>
<th>FACTOR LOADING</th>
<th>ITEM-TOTAL CORRELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNOW1</td>
<td>The practice of knowledge management is clearly understood in my organisation</td>
<td>0.797</td>
<td>0.716</td>
</tr>
<tr>
<td>KNOW2</td>
<td>The use of knowledge management is a strategic tool in my organisation</td>
<td>0.695</td>
<td>0.610</td>
</tr>
<tr>
<td>KNOW3</td>
<td>My organisation believes that knowledge management is everybody’s business</td>
<td>0.653</td>
<td>0.650</td>
</tr>
<tr>
<td>KNOW4</td>
<td>In my organisation, we have been practicing knowledge management for some time without calling it knowledge management</td>
<td>0.599</td>
<td>0.629</td>
</tr>
<tr>
<td>SUCC1</td>
<td>My organisation encourages employees to share knowledge by appropriately rewarding those who share their</td>
<td>0.839</td>
<td>0.746</td>
</tr>
</tbody>
</table>
The dependent variable, Knowledge Management, returned an Eigenvalue of 5.081 and Cronbach alpha of 0.887 (>0.7) as displayed in Table 6.9 above.

After considering all the variables, including the newly formed ones highlighted above (collaboration and subject matter experts), the operationalisation of the dependent variable knowledge management needed to be revised. Therefore, for purposes of this study, knowledge management refers to the extent to which leaders create a collaborative sharing culture, in which a learning environment is installed that is conducive to the right information being shared with the right persons for the purposes of resolving organisational problems.
6.5 REVISED THEORETICAL MODEL

In Chapter 4, the proposed theoretical model, based on the current literature was outlined, and graphically illustrated in (Figure 4.1). From the originally proposed independent variables, one of them (Policy and Legislation) was removed as it did not demonstrate sufficient discriminate validity during the initial data analysis process. A further five variables were removed from the model as the exploratory factor analysis conducted was unable to confirm adequate discriminant validity amongst all the latent variables. Noticeably, some items from the deleted variables did, however, load on other factors in the exploratory factor analysis.

The following variables were removed from the proposed theoretical model due to poor discriminated validity:

- Leadership
- Information and communication technology
- Communities of practice
- Netcentricity
- Knowledge sharing

Some of the items from these 'removed' variables did however load onto other factors in the exploratory factor analysis. One item expected to measure the variable Leadership (L6) loaded with items ICO3, Cult7 and LO7 to form a newly identified latent variable termed Subject Matter Expert. The item (NETC10) loaded with other items NETC9, SUCC6, KNOW5 and KNOW6 to form a variable termed Collaboration. In essence, although the above terms were removed via the exploratory factor analysis, these items were instrumental in forming new variables.

It is equally important to report that the latent variable of Leadership, which did not demonstrate discriminate validity following the EFA process, did however demonstrate reliability when only the factors for leadership were measured. As a result, the 'individual' analysis on Leadership will be reported separately in 6.15.1 below. The latent variable of knowledge sharing, which was first proposed as the
dependent variable, loaded together with the initial intervening variable (knowledge management). The analysis then combined the two variables (knowledge sharing and knowledge management), which subsequently reflected knowledge management as the dominant dependent variable. As such, both intervening variables (knowledge sharing and netcentricity) were removed due to poor discriminated validity.

As a result of the factor analysis, the original theoretical model depicted in Figure 4.1 and the hypotheses formulated in Chapter 4, were revised. Figure 6.2 further below portrays the revised theoretical model. This revised theoretical model and subsequent hypotheses are subjected to further testing in the remainder of the study. The hypotheses originally formulated in Chapter 4 are revised and summarized in Table 6.10 below.

6.6 REFORMULATION OF THE HYPOTHESIS

The following are the new hypotheses that will be discussed in the remainder of this study:

<table>
<thead>
<tr>
<th>Table 6.10 REVISED HYPOTHESIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₁</td>
</tr>
<tr>
<td>H₂</td>
</tr>
<tr>
<td>H₃</td>
</tr>
<tr>
<td>H₄</td>
</tr>
<tr>
<td>H₅</td>
</tr>
</tbody>
</table>

Source: Researcher’s Own Construction
After the discriminated validity and reliability of all the variables remaining in the empirical model had been confirmed, the statistical technique Structural Equation Modeling (SEM) was employed in order to test the series of relationships of the revised model. The results of the above hypotheses will be discussed in the remainder of this chapter.

6.7 EMPIRICAL RESULTS AND INTERPRETATIONS OF THE STRUCTURAL EQUATION MODELING ANALYSIS

In the previous chapter, the initial step of the structural equation modeling (SEM) analysis was conducted in order to ensure a scientific and theoretically justified model. Furthermore, the model was revised through an exploratory factor analysis. The first of the seven stages of SEM, namely the development of a theoretical model from literature were presented in Chapter 4. The remainder of the stages will be discussed in this chapter and includes:

2. Constructing the path diagram of causal relationships;
3. Converting the path diagram into measurement and structural models;
4. Choosing the input matrix type and estimating the proposed model;
5. Assessing the identification of the structural model;
6. Evaluating the goodness-of-fit results; and
7. Making theoretically justified modifications to the model (Hair, et al., 1998).

Structural equation modeling (SEM) is a tool for analysing multivariate data that has been acknowledged to be especially appropriate for theory testing (e.g., Bagozzi, 1980). Furthermore, SEM is a statistical tool which combines techniques such as multiple regression and factor analysis, in order to estimate a series of interrelated dependence relationships simultaneously. SEM also offers some important, additional benefits over these techniques, including an effective way to deal with multicollinearity, and methods for taking into account the unreliability of response data.

The factor analysis conducted resulted in five independent variables namely Organisation Culture, Learning Organisation, Subject Matter Expert, Collaboration
and Trust, and one dependent variable, namely, Knowledge Management. These six outcome variables constitute the model to be empirically assessed using SEM.

In this study, the model was subjected to empirical assessment using SEM. The software programme LISREL 8.8 (Jöreskog and Sörbom, 2006) was used for this purpose. The various steps involved in performing SEM were described in the previous chapter and the application thereof in the present study is discussed below. In the initial step, the theoretical model was revised and the redefined hypothesised relationships were shown in table 6.10 above. Each theoretically proposed relationship is represented by means of a hypothesis. These hypotheses were reformulated after the exploratory factor analysis.

6.8 STEP 2: CONSTRUCTING THE PATH DIAGRAM OF CAUSAL RELATIONSHIPS

As many researchers find it more convenient to portray a model in visual form, a path diagram is normally used (Hair et al., 2006:714). The purpose of this step is to highlight the relationships. A path diagram is viewed as a method of presenting causal relationships among constructs where each theoretically proposed relationship is described by means of a hypothesis (Hair et al., 2006). Figure 6.2 below describes the path diagram of causal relationships on the revised model.
In order to make the path diagram easier to comprehend as well as more interpretable, the following were highlighted in Figure 6.2: all the independent variables are depicted in blue shaded rounded blocks with black font, which surround the dependent variable, depicted in the black block in the centre. The single-headed arrows indicate the dependence relationships. The constructs with no points to them are called the exogenous variables (independent variables) and are not caused by any other variable in the model. The constructs with arrows pointed to them are called endogenous variables (dependent variables). The factor *ORGANISATIONAL CULTURE* is an example of an exogenous variable in the path diagram as it is causally related to the endogenous variable *KNOWLEDGE MANAGEMENT*.

As a norm, structural equation modeling requires a larger sample relative to other multivariate approaches. In fact, Hair *et al.* (2006) suggested that a generally accepted ratio of respondents to parameters to minimize problems with deviations
from normality is 15 respondents for each parameter estimated in the model. Although no theoretical limit on the number of variables in the models exists, practical concerns occur even before the limits of most computer software applications are met. Most often, the interpretation of the results, particularly statistical significance, becomes quite difficult as the number of concepts becomes large (exceeding 20 concepts) (Hair, *et al.* 2006). The researcher should never omit a concept solely because the number of variables is becoming large, but should recognize the benefits of parsimonious and concise theoretical models (Hair *et al.*, 1998). As indicated, the path diagram above in Figure 6.2 is based on the revised model and the measurement model and structural model using SEM shall be based on this revised model accordingly.

The next step (3) applied to the model was to specify the measurement and structural models. For the purpose of this study, a covariance matrix was used as the input matrix. The software programme LISREL 8.8 (Jöreskog and Sörbom, 2006) was used to obtain the estimates of free parameters from the observed data, for both the measurement and the structural model. As the data in the present study showed evidence of non-normality, the Robust Maximum Likelihood, which compensates for non-normality of the data, was used for obtaining estimates of the free parameters for the revised model (Satorra and Bentler, 1994). The measurement model was used to assess the measurement properties of the scale, and provides evidence of construct validity. In the final step, the relationships in the structural model (relationships between the constructs) of the model were identified and the extent to which the proposed models represent an acceptable approximation of the data was established.

Indicator loadings for both the measurement and the structural models were evaluated for significance by ensuring that the p-value associated with each loading exceeded the critical value for the 5 per cent (critical value 1.96) significance level, as well as the 1 % (critical value 2.58) significance level (Reisinger and Turner, 1999). To establish the extent to which the proposed models represent an acceptable approximation of the data, various fit indices were considered, namely the Satorra-Bentler scaled Chi-square ($\chi^2$), the normed Chi-square, in other words, the ratio of Chi-square to degrees of freedom ($\chi^2$/df), the Root Mean Square Error of
Approximation (RMSEA), as well as the 90% confidence internal for RMSEA. Table 6.18 further below summarizes the criteria against which the fit indices used and reported for the revised model being tested.

6.9 STEP 3: THE STRUCTURAL MODEL

Upon developing the path diagram of causal relationships in the revised theoretical model in Figure 6.2, the model had to be specified in more formal terms through a series of structural equations linking constructs of the measurement model, by indicating which item measured which construct (Hair, et al., 2006).

In SEM terminology, a conventional model basically consists of two parts, namely the measurement model and the structural model (Hair et al., 2006). Specification of the measurement model involves assigning indicator variables (questionnaire items) to the latent constructs they represent, whereas specifying the structural model involves assigning relationships between the latent constructs based on the proposed theoretical model (Hair et al., 2006). The SEM model is developed upon proposition of a theory, which necessitates specification of the measurement theory and thereafter validation by means of confirmatory factor analysis. Once the measurement model is considered sufficiently valid, the researcher can proceed in testing the structural model (Hair et al., 2006).

The relationships depicted in Figure 6.2 in the path diagram had to be converted into structural equations. For each hypothesized effect, a structural coefficient ($b_j$) would be estimated and an error term ($e_1$) included. An example of a structural equation is:

$$\text{KNOWLEDGE MANAGEMENT} = b_1 \ast \text{TRUST} + b_2 \ast \text{ORGANISATIONAL CULTURE} + b_3 \ast \text{LEARNING ORGANISATION} + b_4 \ast \text{SUBJECT MATTER EXPERTS} + b_5 \ast \text{COLLABORATION} + e_1$$
Table 6.11 below is a summary of all the endogenous and predictor variables (structural equations) used as inputs for the LISREL program.

<table>
<thead>
<tr>
<th>ENDOGENEOUS VARIABLES</th>
<th>PREDICTOR VARIABLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNOWLEDGE MANAGEMENT</td>
<td>ORGANISATION CULTURE, LEARNING ORGANISATION, SUBJECT MATTER EXPERTS, COLLABORATION, TRUST</td>
</tr>
</tbody>
</table>

Source: Researcher’s Own Construction

In order to develop the specifications for the structural model, the researcher must make the transition from factor analysis, in which there is no control over which variable defines a factor, to a more confirmatory analysis in which the researcher specifies which variables define each factor (Hair et al., 2006). In the structural model, in order to highlight and measure the latent factors (constructs), the researcher has to use the questionnaire items. These manifest variables are termed as ‘indicators’ in the measurement model, due to them being used to measure or indicate the latent constructs.

Once the specifications are developed and the variables are defined, reliability of all the indicators has to be confirmed by the researcher. This is done through an empirical estimation approach by which the researcher specifies the loading matrix along with an error term for every indicator or variable. During the measurement model estimation process, the loading coefficients provide an estimation of the reliabilities for the indicators and the over-all construct. In this approach, researchers have no impact on the reliability value of the estimation process, except through the inclusion of the set of indicators. All the specifications of the structural model are
identified in Table 6.12 and consist of the constructs identified during the exploratory factor analysis.

<table>
<thead>
<tr>
<th>INDEP VARIABLES</th>
<th>MANIFEST VARIABLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Organisation</td>
<td>LO4, COP4, CULT5, ICO5, LO3, LEAD4, COP3, COP5, TRUST6</td>
</tr>
<tr>
<td>Subject Matter Expert</td>
<td>LO7, LEAD6, CULT7, ICO3</td>
</tr>
<tr>
<td>Organisational Culture</td>
<td>CULT2, CULT3, CULT4, LEAD2, CULT1, CULT6, TRUST3, COP2, COP6, COP7, TRUST2</td>
</tr>
<tr>
<td>Trust</td>
<td>TRUST4, TRUST5</td>
</tr>
<tr>
<td>Collaboration</td>
<td>ICO3, LO2, NETC10, KNOW5, SUCC6, KNOW6, NETC9</td>
</tr>
<tr>
<td>DEPENDENT VARIABLE</td>
<td>MANIFEST VARIABLES</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>SUCC1, KNOW1, SUCC2, KNOW2, SUCC5, KNOW3, KNOW4, SUCC3</td>
</tr>
</tbody>
</table>

Source: Researcher's Own Construction

6.10   STEP 4: INPUT MATRIX AND MODEL ESTIMATION

In this stage of structural equation analysis, the selection of the input matrix type and estimation of the proposed model is considered. Structural equation analysis then uses the covariance or correlation matrix as its input data.
The focus of structural equation analysis is not on individual observations, but on the pattern of relationships across respondents (Hair *et al*., 1998). Thereafter, the measurement model specifies which manifest variables (indicators) correspond with each latent variable. Structural coefficients are then estimated for the relationships between the latent variables.

Version 8.80 of the LISREL (Linear Structural Relations) program (Jöreskog and Sörbom, 2006) was used for the structural equation. The input was raw data, but LISREL 8.80 analyses the co-variance matrix.

### 6.10.1 Estimation of the Structural Model

When implementing SEM, the distributional nature of the data influences the estimation procedure. If the data report were to reflect sufficient evidence of normality then Maximum Likelihood Estimation method (ML) should be used. However, if the data does not demonstrate sufficient evidence of normality, then Robust Maximum Likelihood (RML) or Satorra-Bentler is recommended to estimate the parameters. Robust Maximum Likelihood compensates for the non-normality of the data (Hoogland and Boomsma, 1998; Satorra and Bentler, 1994).

To assess the multivariate normality of the data the following null hypothesis was considered:

\[ H^0: \text{The data distribution is a multivariate normal distribution} \]

The results of the Chi square test are shown below:

<table>
<thead>
<tr>
<th>Table 6.13 Chi Square Test: Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
</tr>
<tr>
<td>Z-Score</td>
</tr>
<tr>
<td>P-Value</td>
</tr>
</tbody>
</table>
Table 6.14 Chi Square Test: Kurtosis

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>2076.977</td>
</tr>
<tr>
<td>Z-Score</td>
<td>23.765</td>
</tr>
<tr>
<td>P-Value</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 6.15: Chi Square Test: Skewness and Kurtosis

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>3551.186</td>
</tr>
<tr>
<td>P-Value</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The value for the Chi-square test statistic was 3551.186 and the associated p-value is smaller than 0.001. Due to the high Chi-square and low p-value, the null hypothesis was rejected. In other words, the data was not normally distributed. For this reason, the Satorra-Bentler estimation method was used.

6.10.2 Fit Indices of Measurement Model

Before presenting the structural model estimation, the measurement model’s fit indices shall first be reported. As such, the fit indices of the first and second measurement models shall be shown in Tables 6.16 and Table 6.17 below:

Table 6.16 First Measurement Model Fit Indices

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees of Freedom</td>
<td>741</td>
</tr>
<tr>
<td>Satorra-Bentler Scaled Chi-Square</td>
<td>1364.607</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>0.0514</td>
</tr>
<tr>
<td>90 % Confidence Interval for RMSEA</td>
<td>(0.0471; 0.0556)</td>
</tr>
</tbody>
</table>

Table 6.17 Second Measurement Model Fit Indices

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees of Freedom</td>
<td>702</td>
</tr>
<tr>
<td>Satorra-Bentler Scaled Chi-Square</td>
<td>1234.983</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>0.0488</td>
</tr>
<tr>
<td>90 % Confidence Interval for RMSEA</td>
<td>(0.0443; 0.0556)</td>
</tr>
</tbody>
</table>
From the fit indices of the measurement models presented above, the first measurement model presented in Table 6.16 returned a RMSEA of 0.0514, which represents a reasonable fit. Based on modification indices, the item LEAD1 was deleted from the model. Subsequently, after item LEAD1 had been deleted, the model fit improved and RMSEA as reported in Table 6.17 above was 0.0488, which represents a close fit.

6.10.3 Structural Model Estimation

The results for the structural model estimation are presented in Figure 6.3 and each factor’s relationship discussed thereafter.

---

**Figure 6.3: STRUCTURAL MODEL ESTIMATION**

- **Learning Organisation**
  - Path co-efficient = 0.308
  - Value = 2.793
  - (P<0.05)

- **Subject Matter Expert**
  - N.S.

- **Organisational Culture**
  - Path co-efficient = 0.788
  - Value = 6.899
  - (P<0.01)

- **Trust**
  - N.S.

- **Collaboration**
  - N.S.

Source: Researchers own construction
6.10.3.1 Learning Organisation

As depicted in figure 6.3 above, the acknowledgement and characteristics of a Learning Organisation is positively related (point estimate = 0.308, p < 0.005, t = 2.793) to the perceived effectiveness of Knowledge Management. (Hypothesis H\(^1\)) suggests that there is a positive relationship between a learning organisation and the perceived effectiveness of knowledge management. As such, hypothesis H\(^1\) is thus accepted. This empirical result is supported by prior literature and research conducted by Goh (2002), Loermans (2002), Malhotra (1998), Berce, Lanfranco and Vehovar (2008), Akgün, Byrne, Lynn and Keskin (2007) and Cranfield and Taylor (2008).

6.10.3.2 Organisation Culture

Figure 6.3 above further points out that a positive relationship (point estimate = 0.788, p < 0.001, t = 6.899) exists between the Organisational Culture and Knowledge Management. Hypothesis H\(^3\) suggests that there is a positive relationship between a sharing organisational culture to the perceived effectiveness of knowledge management. As such, Hypothesis H\(^3\) is accepted. This empirical finding is supported by prior research and literature by Cranfield and Taylor (2008), Lopez et al. (2004), Park, Ribiere, and Schulte (2004), Krietner, Kinicki and Buelens (1999), Hellriegel, Jackson and Slocum (1999).

6.10.3.3 Subject Matter Expert (SME)

As indicated earlier, the items combined to form a new latent variable Subject Matter Expert (SME). This new independent variable, as shown in Figure 6.3 does not have a significant relationship with the dependent variable (knowledge management), for this sample study. Hypothesis H\(^2\) suggests that there is a positive relationship between a Subject Matter Expert toward the perceived effectiveness of knowledge management. As such, Hypothesis H\(^2\) is rejected. Whilst the findings in this study rejects the hypothesis, it should not be overlooked that the relevance and importance of this variable to knowledge management is supported in prior literature research by Maracine, Landoli, Scarlat, and Nica (2012); Lehner and Haas (2010); Abril (2007); Weber (2007).
6.10.3.4 Collaboration

As indicated earlier, the items combined to form a new latent variable - Collaboration. This new independent variable, as shown in Figure 6.3 does not have a significant relationship with the dependent variable (knowledge management), for this sample study. Hypothesis H⁵ suggests that there is a positive relationship between Collaboration and the perceived effectiveness of knowledge management. As such, Hypothesis H⁵ is rejected. The relevance and importance of this latent variable to knowledge management is supported in prior literature research conducted by Bhandar (2010) and Garcia-Perez and Ayres (2009), although the variable (collaboration) having been rejected in terms of the hypothesis tested.

6.10.3.5 Trust

As indicated earlier, the items combined to form a new latent variable - Trust. This new independent variable, as shown in Figure 6.2 does not have a significant relationship with the dependent variable (knowledge management), for this sample study. Hypothesis H⁴ suggests that there is a positive relationship between Trust and the perceived effectiveness of knowledge management. As such, Hypothesis H⁴ is rejected. Whilst this hypothesis is rejected through this study, it should be pointed out that the relevance and importance of this latent variable to knowledge management is supported in prior literature, especially in the public or government sector through prior research conducted by Cloete (2007); Yuen (2007); Joon (2007) and Riege (2005).

6.11 STEP 5: ASSESSING THE IDENTIFICATION OF THE STRUCTURAL MODEL

Step five in the Structural Equation Modeling (SEM) process involves assessing the identification of the structural model. During the estimation process, the most probable cause of the computer programme (LISREL) producing meaningless or illogical results would be a problem in the identification of the structural model. Simply put, an identification problem is when the proposed model is incapable of producing unique estimates (Hair et al., 1998: 608). In terms of identification of the model, the researcher
must be concerned with the size of the covariance matrix, relative to the number of estimated coefficients. According to Hair et al., the difference between the number of covariances and the actual number of coefficients in the proposed model is termed “degrees of freedom”.

The authors (Hair et al.) point out that there is no particular rule that confirms the identification of a model and instead propose two rules of thumb, namely rank and order conditions. An order condition is that the model's degree of freedom should be equal than or greater to zero. A just-identified model has exactly zero degrees of freedom, whereas an over-identified model has a positive number of degrees of freedom (Hair et al., 1998: 608). The authors contended that an over-identified model is the goal of all structural equation models and that these should have more information in the data matrix than the number of parameters to be estimated. This implies that the larger the degrees of freedom are, the more identified the model will be. The final results are presented next.

6.12 STEP 6: EVALUATING THE GOODNESS OF FIT (GOF) RESULTS

The overall model must be assessed for goodness-of-fit, which according to Hair et al. (2006:745), “indicates how well the specified model reproduces the covariance matrix among the indicator items”. By using several tests of goodness-of-fit, the proximity of fit between the data and the structural model can be assessed. The model fit criteria commonly used are the chi-square ($\chi^2$), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), and root-mean-square residual (RMR). Because the data used in this study did not demonstrate sufficient multivariate normality, the Robust Maximum Likelihood estimation was used to estimate the parameters in the model. For this reason, the Satorra Bentler Chi-square statistic will be reported in addition to the Root Mean Square error of Approximation (RMSEA).

The following Table 6.18 outlines the commonly used criteria for assessing model fit for both the measurement and the overall model fit will be presented.
Chi-square ($\chi^2$) is the primary measure used in SEM to quantify the differences between the observed and estimated covariance matrices.

The overall model fit provided by the chi-square ($\chi^2$) value is often used as the first step in evaluating model acceptance or rejection. However, the $\chi^2$ statistic in isolation is not a meaningful statistic without also taking into account the degrees of freedom (df) of a model. The degrees of freedom represent “the amount of mathematical information available to estimate model parameters” (Hair et al., 2006: 745). A significant chi-square ($\chi^2$) value relative to the degrees of freedom would indicate that the observed and estimated matrices differ, probability due to sampling variation. A non-significant chi-square ($\chi^2$) value would indicate that the two matrices are not statistically different and that the model is a good approximation of the data. The $\chi^2$ criterion is, however, sensitive to sample size. If the sample size increases (generally above 200), the $\chi^2$ test has a tendency to indicate a significant probability level indicating poor fit (Hair et al., 2006). In such cases, such as with the current study

<table>
<thead>
<tr>
<th>CRITERION</th>
<th>CRITICAL VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normed Chi-square ($\chi^2$/ degrees of freedom [df])</td>
<td>$\leq 2.0$</td>
</tr>
<tr>
<td>P-Value</td>
<td>$\geq 0.05$</td>
</tr>
<tr>
<td>Root mean square error of approximation (RMSEA)</td>
<td>0.05 – 0.08 Indicates an acceptable reasonable fit</td>
</tr>
<tr>
<td>90% Confidence interval for RMSEA</td>
<td>$\leq 0.05$</td>
</tr>
<tr>
<td>SRMR</td>
<td>$\leq 0.05$</td>
</tr>
<tr>
<td>GFI</td>
<td>$\geq 0.9$</td>
</tr>
<tr>
<td>AGFI</td>
<td>$\geq 0.9$</td>
</tr>
<tr>
<td>CFI</td>
<td>$\geq 0.97$</td>
</tr>
</tbody>
</table>
where the sample size is 320, the chi-square test's sensitivity could lead to a trivial rejection, so it is considered prudent to examine other measures of fit (Bagozzi and Heatherton, 1994: 45; Ferrara, 2000: 106). Thus, a comparison of the GFI, AGFI, and RMR measures, which are independent of sample size, were performed in this research to assess the model's fit.

The Goodness-of-fit (GFI) was an attempt to produce a fit statistic that was less dependent on sample size (Hair et al., 2006). The GFI is based on a ratio of the sum of the squared differences between the observed and reproduced matrices to the observed variances (Hair et al., 2006:747). The Adjusted Goodness-of-fit (AGFI) adjusts the GFI index for the degrees of freedom of a model relative to the number of variables. The advantage of GFI and AGFI is that they are scales between zero (poor fit) and 1 (perfect fit), and are not a function of sample size. One rule-of-thumb is that the possible range of GFI values is 0 to 1, with higher values indicating better fit. Previously, GFI values of >0.90 were considered good, whilst others argue that 0.95 should be used (Hair et al., 2006). As such, for a good fit, GFI should exceed 0.95, and for an acceptable fit, GFI should exceed 0.90. Similarly, a model with a good fit should have an AGFI value greater than 0.80. These indices (GFI and AGFI) are, however, only appropriate when Maximum Likelihood is used as the estimation method.

The Root-mean-square residual (RMR) index uses the square root of the mean of the squared residuals which is an average of the residuals between observed and estimated input matrices. Ideally, RMR should be near zero for a good model fit (Ferrara, 2000:106). Values of 0.05 or less are regarded as indicative of a model that fits the data well (Grimm and Yarnold, 2000:270).

Root mean square error of approximation (RMSEA) is thus a further measure that attempts to correct for the tendency of the chi-square statistic to reject any specified model with a large sample (Hair et al., 1998:656). RMSEA expresses the difference between the observed and estimated covariance matrices in terms of degrees of freedom of the model, and is a fit index that focuses on estimated population fit. An empirical examination of several measures has found that the RMSEA was best suited for use in a confirmatory strategy with larger samples (Hair et al., 1998:656). Although rarely encountered, RMSEA values below 0.01 would indicate a model that fits the
data exceptionally well, since values approaching zero are desired. Different RMSEA cut-off values have been suggested: some consider values below 0.05 to indicate a very good fit; others indicate that values between 0.05 and 0.08 are indicative of acceptable fit (Hair *et al.*, 1998: 656; Grimm and Yarnold, 2000: 271). Hu and Bentler (1999: 1) suggested a cut-off value close to 0.06 for RMSEA before one can conclude that there is a relatively good fit.

The indices of fit for the structural model depicted in Figure 6.3 above are shown in Table 6.19 below. It must be emphasized, however, that the objective of this study was not to establish a well-fitting model, but rather to use structural equation modeling to empirically test the strength of relationships amongst the latent variables in the theoretical model.

<table>
<thead>
<tr>
<th></th>
<th>Sample Size</th>
<th>Degrees of Freedom</th>
<th>Minimum Fit Function Chi-Square</th>
<th>Normal theory weighted least square chi-square</th>
<th>Satorra-Bentler scaled chi-square</th>
<th>Root Mean Square Error of Approximation (RMSEA)</th>
<th>90 % Confidence Interval for RMSEA</th>
<th>P-Value for test of Close Fit (RMSEA 0.05)</th>
<th>Expected Cross-Validation Index (ECVI)</th>
<th>90 % Confidence Interval for ECVI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1740.106 (P=0.00)</td>
<td>1755.571 (P=0.00)</td>
<td>1319.389 (P=0.00)</td>
<td>0.0508</td>
<td>(0.0464 ; 0.0551)</td>
<td>0.380</td>
<td>4.738</td>
<td>(4.431 ; 5.069)</td>
</tr>
</tbody>
</table>
For the revised empirical model, the degree of freedom is 724, which is significantly greater than zero. These indicators prove that there is little danger that the proposed theoretical model would produce illogical or meaningless results when generating unique estimates. For this study, as indicated earlier, the data was not normally distributed. As a result and as recommended by Jöreskog and Sörbom (2003), the Robust Maximum Likelihood was used as the estimation method instead of the Maximum Likelihood estimation process. Furthermore, due to the non-normality distribution, the adjusted goodness-of-fit (AGFI) and the goodness-of-fit index (GFI) were not used to assess model fit. This is in line with the purpose of the statistical analyses, which were more focused on assessing relationships rather than on pursuing a good model fit.

### 6.13 MODEL RE-SPECIFICATION

The seventh step in the SEM analysis requires the interpretation and modification of the proposed theoretical model. Hair et al. (1998: 614) stated that once the model is considered acceptable, the researcher should examine how well the results correspond to the proposed theory. The authors further suggested that once the model interpretations are complete, the researcher should consider ways to improve or enhance model fit and/or its correspondence to the underlying theory. Model re-specification is the process of adding or deleting estimated parameters from the original model in an attempt to obtain a better goodness-of-fit result. However, such modifications may only be made if they are substantiated by theoretical justification for what is empirically deemed significant (Hair et al., 1998: 615).
Over and above the modification indices, LISREL calculates modification indices for every non-estimated relationship in the structural model. These index values correspond approximately to the reduction in the chi-square value that would occur if the coefficient were estimated in the structural model.

The final phase in the data analysis of this research was to test and report the hypotheses, all of which are either accepted or rejected. Table 6.20 has been constructed to summarize all the hypotheses, in order to improve the readability of this section.

**Table 6.20: SUMMARY OF THE HYPOTHESES TESTED IN THE REVISED MODEL**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Accepted or Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>H^1</td>
<td>There is a positive relationship between a learning organisation and the perceived effectiveness of knowledge management</td>
</tr>
<tr>
<td>H^2</td>
<td>There is a positive relationship between subject matter experts and the perceived effectiveness of knowledge management</td>
</tr>
<tr>
<td>H^3</td>
<td>There is a positive relationship between organisational culture and the perceived effectiveness of knowledge management</td>
</tr>
<tr>
<td>H^4</td>
<td>There is a positive relationship between trust and the perceived effectiveness of knowledge management</td>
</tr>
<tr>
<td>H^5</td>
<td>There is a positive relationship between collaboration and the perceived effectiveness of</td>
</tr>
</tbody>
</table>
The revised hypothesis listed in Table 6.20 above is based on the relationships identified in Figure 6.3. As noted in the above Table (6.20), out of the total five (5) hypotheses listed as per the identified factors mentioned above, only two of the five independent variables were seen as significant when the relationship between the 5 independent variables and the dependent variable knowledge management were analyzed. As such, only two of the five hypotheses were accepted.

6.14 AN ANALYSIS OF THE INFLUENCE OF INDEPENDENT VARIABLES (ANALYZED INDEPENDENTLY) AND DEMOGRAPHIC VARIABLES ON KNOWLEDGE MANAGEMENT

Although the primary objective of the present study was to identify the factors that influence the effectiveness of knowledge sharing/knowledge management of identified agencies within the public sector in South Africa, an analysis was performed to assess the possible influence that demographic data could have on the effectiveness of knowledge management as well. Furthermore, a separate analysis was conducted on two independent variables which were removed due to poor discriminated validity, but are still believed to be of value to knowledge management. These will be discussed first, after which the demographic data will be analysed.

On comparing the original list of independent variables identified in the theoretical model in chapter 4 to the now reconfigured model, it should be mentioned that the revisions were primarily due to the following:

- The exploratory factor analysis established that a high degree of overlap existed between the independent variables including between communities of practice and organisational culture. Some combined to form newly identified variables like subject matter experts and collaboration. In addition, the modification indices of the measurement model suggested that these two independent variables were not adequately measured.
• Two other factors, namely leadership and policy were removed from the model during the analysis of the fit indices of the measurement model. In addition, the modification indices of the measurement model suggested that these two independent variables were not adequately measured. However, it must be reported that in the independent Two-Way ANOVA\(^2\) analysis on each of these variables, both were proven to be significant for knowledge management, although it must be stressed that this analysis was done independently of SEM. Again, this proves that the variables may not be viewed as totally insignificant factors for knowledge management, but perhaps not clearly distinguished by the respondents. The results from the Analysis of Variance (ANOVA) shall be discussed below, after which that of the demographic variables shall be elaborated upon.

6.14.1 Separate Analysis of Independent Variables

Again, although Policy and Leadership had to be deleted due to poor discriminated validity, they are still believed to be of value in understanding Knowledge Management. As such, they were analysed separately from SEM. Although the results should be treated with circumspection, they still provide insights into Knowledge Management and are therefore reported below.

Table 6.21 below lists the items used to measure the variable Leadership on knowledge management.

\(^2\) Annova is a statistical method that stands for analysis of variance. The Two –Way ANOVA is conducted when two independent variables are analysed in relation to the dependent variable.
The Cronbach alpha for this factor (Leadership) as per the reliability analysis is 0.767, and it is therefore considered a reliable measuring instrument. Next, the correlation analysis of leadership on knowledge management will be analysed.

| Table 6.21: RELIABILITY STATISTICAL ANALYSIS OF LEADERSHIP ON KNOWLEDGE MANAGEMENT |
|---------------------------------|--------------------------------------------------------------------------------|
| LEAD 1                          | Management in my organisation understands the importance of knowledge sharing amongst staff. |
| LEAD 2                          | Members of the senior management team frequently talk about knowledge management when reporting on the state of the organisation. |
| LEAD 4                          | Management has made knowledge sharing an explicit criterion for assessing worker performance. |
| LEAD 6                          | My management has initiated strategic alliances with other relevant government departments in order to ensure knowledge sharing across departments. |
| Cronbach Alpha                  | = .767 |

The Correlation Analysis is based on the following null hypothesis:

| Table 6.22: CORRELATION ANALYSIS OF LEADERSHIP ON KNOWLEDGE MANAGEMENT |
|---------------------------------|---------------------------------------------------------------------|
| LEADER Pearson Correlation      | KNOWMAN Pearson Correlation |
| Sig. (2-tailed)                 | N                        | Sig. (2-tailed) | N |
| 1                               | .856                     | .000           | 320 |
| 320                             | .000                     | 320            | 320 |

The Correlation Analysis is based on the following null hypothesis:
H₀: There is no relationship between perceptions of leadership on the effectiveness of knowledge management

H₁: There is a positive relationship between perceptions of leadership on the effectiveness of knowledge management

From Table 6.22 above, the p value of 0.00 is <0.05, which indicates that there is a statistically significant relationship. In addition, the correlation co-efficient of 0.856 is also strongly positive. As such, the null hypothesis above must be rejected in favour of the alternative hypothesis. This result means that as visionary and actionable Leadership increases, so too would the effectiveness of knowledge management.

Next, Table 6.23 below lists the items used to measure the variable Policy and Legislation on Knowledge Management.

<table>
<thead>
<tr>
<th>Table 6.23: RELIABILITY STATISTICAL ANALYSIS OF POLICY AND LEGISLATION ON KNOWLEDGE MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLICY 1</td>
</tr>
<tr>
<td>POLICY 2</td>
</tr>
<tr>
<td>POLICY 3</td>
</tr>
<tr>
<td>CRONBAGH ALPHA</td>
</tr>
</tbody>
</table>

The Cronbach alpha for this factor (Policy and Legislation) as per the reliability analysis is 0.716, and as with leadership above, is also considered a reliable measuring instrument. Next, the correlation between policy and legislation and knowledge management will be analysed.

Table 6.24 Correlation Analysis of Policy and Legislation on Knowledge Management
Table 6.24  CORRELATION ANALYSIS OF POLICY AND LEGISLATION ON KNOWLEDGE MANAGEMENT

<table>
<thead>
<tr>
<th></th>
<th>POLICY</th>
<th>KNOWMAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEADER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.739</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>320</td>
<td>320</td>
</tr>
<tr>
<td>KNOWMAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.739</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>320</td>
<td>320</td>
</tr>
</tbody>
</table>

The Correlation Analysis addresses the following null hypothesis:

H^0: There is no relationship between policy and legislation on the effectiveness of knowledge management

H^1a: There is a positive relationship between policy and legislation on the effectiveness of knowledge management

From Table 6.24 above, the p value of 0.00 is <0.05, which indicates that there is a statistically significant relationship. Furthermore, the correlation coefficient of 0.739 is also strongly positive. As such, the null hypothesis above must be rejected in favour of the alternative hypothesis.

Based on the separate analysis of the two variables above, it may be concluded that positive relationships do exist between both originally identified independent variables, namely Leadership and Policy and legislation and effective Knowledge Management.
6.14.2 Results of the Analysis of Variance for Demographic Variables

In order to assess the influence of demographic variables on the dependent variable in the present study, an Analysis of Variance (ANOVA) was performed on scales of a nominal nature and Multiple Linear Regression analysis (MLR) was performed on scales of an ordinal nature. A t-test assesses whether the mean score for a variable is significantly different for two independent samples (Zikmund 2003:524). T-tests were used to test for differences in the mean scores of the demographic variables of Age and Tenure and Region as well as Position within the organisation with regard to the dependent variable. The results of these analyses are tabled and discussed in the sections below.

A multiple regression analysis was performed in order to establish whether the ordinarily scaled demographic characteristics of respondents exert an influence on the perceived effectiveness of knowledge management in public sector organisations in South Africa. This analysis revealed that the tenure and age group in the relevant government agency did exert an influence on the dependent variable (knowledge management).

6.14.2.1 Influence of Age and Tenure on Knowledge Management

The table (6.25) below tests the analysis of the demographic variables of (tenure and age) and is based on the following null hypothesis:

H₀¹: There is no relationship between tenure and perceptions of knowledge management

H₀¹ᵃ: There is a relationship between tenure and perceptions of knowledge management

H₀²: There is no relationship between age and perceptions of knowledge management
H_{02a}: There is a relationship between age and perceptions of knowledge management

<table>
<thead>
<tr>
<th>Model</th>
<th>Standard Coefficients</th>
<th>T</th>
<th>Sig. (p)</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td></td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>14.997</td>
<td>.000</td>
<td>1.353</td>
</tr>
<tr>
<td></td>
<td>Tenure</td>
<td>- .205</td>
<td>-3.194</td>
<td>.002 \</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.154</td>
<td>2.394</td>
<td>.017 \</td>
</tr>
</tbody>
</table>

The multi-collinearity statistics (Tolerance and VIF <10) suggest that multi-collinearity was not a concern in this multiple regression analysis.

**Tenure:**

Because the p-value of Tenure is smaller than 0.05, it shows there is a significant relationship between Tenure and Knowledge Management. The null hypothesis must thus be rejected in favour of the alternate hypothesis. The relationship is, however negative. Thus, respondents with longer tenure, rate the effectiveness of knowledge management lower than those with shorter tenures. This may be attributable to the fact that government organisations may not have properly utilised more experienced staff nor implemented skills retention policies especially for those who have served the organisation for a longer number of years.

**Age:**

Because the p-value (sign SPSS language) of Age is below 0.05, it means that there is a significant, positive relationship between Age and Knowledge Management. The null hypothesis must thus be rejected. Thus, the older the respondent, the more favourable the KNOWMAN (knowledge management)
rating. As such, although older employees acknowledge the importance of knowledge, it was viewed negatively (as per tenure above) due to the perception that they (experienced) employees are probably not utilised effectively for knowledge purposes.

**Region:**

With regards to this demographic variable (REGION), a one-way ANOVA test was done to address the following null hypothesis:

$H_{01}^0$: The knowledge management effectiveness scores of all regions are equal.

$H_{01}^a$: The knowledge management scores of all regions are NOT equal

<table>
<thead>
<tr>
<th>Demographic Variable: REGION</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>21.112</td>
<td>8</td>
<td>2.639</td>
<td>1.639</td>
<td>.113</td>
</tr>
<tr>
<td>Within Groups</td>
<td>500.625</td>
<td>311</td>
<td>1.610</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>521.737</td>
<td>319</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As the significance level of the F-Value is $> 0.05 \ (p>0.05)$, the null hypothesis is accepted. It may thus be concluded that ALL respondents perceive knowledge management the same, irrespective of which region they come from.

**Position:**

With regards to this demographic variable position, a one-way ANOVA test was to address the following null hypothesis:
H₀¹: The effectiveness of knowledge management scores of respondents are equal irrespective of the positions they occupy (implies the mean scores are equal).

H₀¹ᵃ: The knowledge management scores of respondents are influenced by the positions they occupy

<table>
<thead>
<tr>
<th>Table 6.27</th>
<th>Influence of Position in Organisation on Knowledge Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Variable: POSITION</td>
<td>Sum of Squares</td>
</tr>
<tr>
<td>Between Groups</td>
<td>20.426</td>
</tr>
<tr>
<td>Within Groups</td>
<td>501.311</td>
</tr>
<tr>
<td>Total</td>
<td>521.737</td>
</tr>
</tbody>
</table>

As the significance level (p) is smaller than 0.05 (p>0.05), given the F-Value, the null hypothesis is rejected. This implies that the means are not equal. The post –hoc (Sheffe’) showed that group 5 which pertains to those in the position of ‘team member’ (mean score of 3.6864) for knowledge management differs significantly (p<0.01) from that of group 2 which pertains to those in a middle management position (mean score of 4.3250). This indicates that those in position 2 (Middle Management) rate knowledge management much lower than those in position 5 (team members).

From the ANOVA and the multiple linear Regression analysis, it is evident that various demographic variables have a significant influence on the dependent variable in the present study.
6.15 SUMMARY

In this chapter, the empirical results of the research were presented. Firstly, the validity and reliability of the measuring instrument were assessed and reported on. This resulted in the identification of five factors (see Figure 6.2) that potentially influence the effectiveness of knowledge management in the public sector, namely: Organisational culture; Learning organisation; Subject matter experts; Trust and Collaboration.

After testing for the normality of the data, the proposed theoretical model was empirically tested by means of applying the structural equation modeling technique. The theoretical model was revised and the redefined hypothesized relationships were portrayed in path diagrams. The structural and measurement models were specified and the reliability of the indicators confirmed. The relationships in the model were identified, and various fit indices were considered to establish the extent to which the proposed model represented an acceptable approximation of the data. In addition, the relationships identified by the empirical results were assessed against the formulated hypotheses, and also against previous research findings.

Lastly, the influence of demographic variables on knowledge management was tested by means of ANOVA, or Multiple Linear Regression analysis. In the final chapter, a summary of the research will first be presented. This will be followed by an interpretation of the empirical results presented in Chapter 6, with particular emphasis on the implications and recommendations for knowledge management in the public sector. Lastly, the contributions and limitations of the present study, as well as recommendations for future research, will be elaborated upon.
CHAPTER 7

SUMMARY, RECOMMENDATIONS AND CONCLUSION

7.1 INTRODUCTION

An overview of the research and its most significant findings will be discussed in this final chapter of the study. The findings as presented in Chapter 6 will be interpreted and the related implications to the knowledge management discipline, specifically those pertaining to government agencies, will be highlighted. Recommendations will be put forward, based on the empirical findings as well as the experience of knowledge management by employees in government agencies. Finally, the contributions of this study will be highlighted, limitations will be addressed, and future areas for research will be recommended.

7.2 OVERVIEW OF THE RESEARCH

Globally, the need for governments to resolve issues of increasing unemployment, increasing crime levels and poor service delivery is common knowledge. The current global financial crisis has affected even ‘developed’ countries like the United States and ostensibly stable countries in Europe. On the issue of crime prevention and the lack of co-ordination between government agencies, one needs only to note the findings after the infamous ‘9/11’ terrorist attacks in the United States to acknowledge the silo mentality that is apparent in many governments’ departments.

In South Africa, it is safe to say that, since achieving democracy in 1994, the government has received its fair share of criticism for increasing income disparities, unemployment and overall lack of improvement in service delivery to an ever-increasing population. Given the challenges facing government agencies, the purpose of this study was, firstly, to contribute towards a more collaborative knowledge sharing approach that could assist agencies in resolving problems and, ultimately, improve service delivery. Furthermore, this study can contribute to the body of knowledge in terms of the knowledge management discipline and its
application in the public sector (government agencies) in developing countries like South Africa.

Having indicated the purpose of this study, it is equally imperative to specify the primary objective, which was to identify, investigate and empirically test the impact of and between independent variables, as identified in the literature, on the perceived effectiveness of knowledge management in government agencies. Accordingly, the ‘platform’ in embedding the knowledge management discipline amongst the relevant variables was investigated. In order to support the primary objective, the following secondary objectives were acknowledged:

- The development of a conceptual model, inclusive of relevant hypotheses and a path diagram depicting relationships between the independent variables and the dependent variable;
- The development of a measuring instrument in order to empirically test the relationships as per the conceptual model;
- The testing of the relevant hypotheses and the conceptual model by gathering and analysing key data from appropriately identified government agencies in South Africa, specifically those normally associated with resolving crime;
- Recommendations based on the statistical analysis and findings.

This study attempted to integrate previous theories and literature findings on knowledge management, which mainly relate to private sector organisations, in order to formulate a conceptual model that could be tested to ascertain whether those same findings could be incorporated and applied in public sector organisations too.

A review of the available literature highlighted a number of pertinent variables that influence knowledge management. Seven independent variables and two intervening variables (knowledge management and netcentricity) were identified, which could potentially influence the originally identified dependent variable: knowledge sharing in selected South African government agencies. Knowledge sharing is a critical component in the discipline of knowledge management. Definitions were developed for these variables so that they could be operationalized using previously validated measuring instruments as well as self-generated items based on secondary sources.
Hypotheses were formulated and the relationships described in the conceptual model, between the independent variables and the dependent variable, were empirically tested in order to achieve the first two ancillary objectives.

In this study, the positivistic research paradigm was adopted due to the nature of the problem statement as well as the research objectives posed. A questionnaire was developed and a pilot study was conducted to test the proposed theoretical model. On receipt and analysis of the pilot test, minor alterations were made and the questionnaire was distributed amongst the selected government agencies in South Africa. The snowball sampling technique used in this study achieved a usable 320 completed questionnaires for statistical analysis of the data. In this way, another secondary objective was attained.

Statistical analysis was conducted on the data obtained from the questionnaires. Furthermore, in order to confirm discriminant validity and identify unique factors in the data, an exploratory factor analysis was conducted. Through this analysis, five of the six variables that were included in the initial theoretical model were altered in order to accurately reflect the combination of items that loaded together. The original dependent variable (knowledge sharing) and the intervening variable (knowledge management) combined to form the new dependent variable: knowledge management.

In order to confirm the reliability of the measuring instrument, Cronbach alpha coefficients were calculated for each of the factors identified during the exploratory factor analysis. Cronbach alpha values higher than 0.70 (the acceptable level) were recorded for all the factors, indicating that the measuring instruments used in this study were reliable. As a result of the exploratory factor analysis, the original theoretical model and the related hypotheses had to be revised and subjected to further statistical analysis.

In order to test the significance of the relationships hypothesized between the various independent variables (organisational culture, learning organisation, subject matter experts, collaboration and trust) and the dependent variable (knowledge management), structural equation modeling (SEM) was employed as the main
The results of the structural model, relevant to the factors identified above, are discussed in detail in Section 6.11.3.
7.3 INTERPRETATIONS OF THE EMPIRICAL RESULTS AND RECOMMENDATIONS

The various independent variables, which were considered ‘important determinants’ in assessing the perceived effectiveness of knowledge management in South African government agencies, shall now be discussed. The subsequent sections will interpret these relationships and put forth relevant recommendations.

‘Organisational culture’ and ‘learning organisation’ have been examined as variables with the most significant influence on the effectiveness of knowledge management. Furthermore, these significant factors, once in place, are integral in increasing the significance of other factors identified, such as ‘subject matter experts’ (SME), ‘collaboration’ and ‘trust’, on knowledge management, as has already been identified in the reviewed literature. It is thus critical to point out that whilst only two of the five factors were significant or for which the hypothesis was accepted, it is equally appropriate to assert that the other three factors, although not significant, are important for knowledge sharing as will be discussed. Furthermore, it is integral to note, as confirmed in the literature and in this study, that these factors are all interconnected in some way – as will also be elaborated upon further in this chapter.

7.3.1 Organisational Culture

The empirical findings indicated that the culture of an organisation is viewed as having a significant and direct relationship with the dependent variable, knowledge management. As such, culture is deemed to be a key factor in influencing the perceived effectiveness of knowledge management. Various authors have indicated or confirmed the importance of organisational culture on knowledge management. The undermentioned are but a few, over and above those mentioned in Chapter 2:

- Campbell (2009) conducted a study with the sole purpose of identifying organisational cultural factors which impact on knowledge sharing. Campbell stressed that, in organisations that instil or cultivate a sharing work environment by allowing employees to share naturally, six key social factors emerge which impact on knowledge sharing: trust, autonomy, power politics,
care, competence leverage and collaboration. It is important to mention that two factors (trust and collaboration) identified in Campbell’s study, are similar to those identified in this study.

- Although these two factors were found to be not significant in this study, the researcher supports Campbell’s findings, as they (trust and collaboration) are important in defining the overall organisational culture. The possible reasoning for this study rejecting the hypothesis will be discussed in Section 7.3.3 and 7.3.5. One can emphatically conclude from Campbell’s study that knowledge sharing in an organisation is a complex process.

- Vazquez, Fournier and Flores (2009), in their analysis of barriers to innovation and knowledge sharing, identified several cultural barriers that can influence knowledge sharing on the employees’ level, such as organisational environment, emotional intelligence and managers' commitment. They also emphasized the need to develop a suitable environment for knowledge production and sharing. From the barriers indicated by Vazquez et al., the researcher affirms the commitment by leaders towards embedding a knowledge culture as being an important barrier which can prevent knowledge sharing.

- Leidner and Alavi (2006) used a case study approach to compare and contrast the cultures and knowledge management approaches of two organisations. Through their study, ways in which organisational culture influences knowledge management initiatives and evolution of knowledge management in organisations were suggested. Their study revealed that, in one organisation, the knowledge management effort became little more than an information repository. In the second organisation, the knowledge management effort evolved into a highly collaborative system fostering the formation of electronic communities. In this study, the findings suggest that more focus should be on people rather than on technology. This is perhaps due to the government sector not embracing the benefits of technology and will be discussed in the recommendations for future studies accordingly.
• Viriyakul and Rajanagarinda (2011), whose study focused on a national manufacturing concern in Thailand, concluded through his research that organisational culture is significantly related to knowledge management. In addition, they found knowledge management to be moderately related to organisational effectiveness, whilst the organisational culture was found to be highly related to an organisation’s effectiveness. With respect to multiple regression analysis, organisational effectiveness was found to be influenced by the organisational culture in terms of participation, development, command and marketing, as is knowledge management, in aspects of acquisition and transfer.

These findings are but a selected few from the plethora of literature on research conducted globally. From those authors mentioned above, a common theme emerges that highlights the under-researched, and at times neglected, probing issue of the latent variable that is organisational culture. This common theme is one of collaboration instead of competition, which suggests that a collaborative knowledge sharing culture instilled in any organisation is the ultimate platform for effective knowledge management. Although most of the research literature was found to be most pertinent to the private sector, it has been assumed in this study that the research is also applicable to public sector organisations.

In examining the empirical results of this study, and specifically those items (questions in the questionnaire) that loaded on the factor of organisational culture, it is important to note that although leadership was removed as an initial independent variable, two of the questionnaire items which queried the perception of the factor (independent variable) leadership on knowledge management loaded under the organisational culture factor influencing knowledge management. This suggests either that respondents are unsure whether leaders themselves understand the importance of knowledge management or that leaders in general do not create an organisational culture conducive to knowledge sharing. On further examination of these specific items (discussed in Section 6.4.1), the following may be deduced:

• In the first item (CULT1), which probed whether employees are given a chance to fail as a basis for improvement and overall learning, 48% of
respondents disagreed, from the total pool of 68% (disagree and neutral), indicating that they were not given a chance to make mistakes, in order to learn or share amongst each other. This suggests that an autocratic, demanding organisation is at play, where leaders demand perfection and possibly initiate punitive measures towards employees who wish to try alternate methods of doing things. As such, a learning culture would be inhibited in this organisation. Employees are not being empowered sufficiently and, in most likelihood, feel that they are not trusted. It is apparent that based on the responses, the issue of trust was viewed negatively and thus found not significant, although it is blatantly seen as an inhibiting factor for knowledge management.

- The item (CULT4) attempted to test whether the relevant government agency listens to, empowers and possibly rewards ideas coming from employees. Results here showed a similar percentage of negative responses to that of CULT1, above. This suggests an organisational culture in which employees are neither heard nor empowered, and a top-down, autocratic leadership style that does not reward or incentivise employees.

- Furthermore, the fact that leadership items loaded on the organisational culture factor, also suggests that the respondents perceive their leaders as generally operating in an autocratic, top-down style. Respondents may thus perceive there to be an overall non-collaborative culture embedded in their organisation, due to a lack of visionary leadership. It follows thus that, if the organisational culture of each agency is not collaborative, attempts to share knowledge with another agency would most certainly be even more difficult.

As stated in Chapter 1, research of knowledge sharing between different agencies is extremely limited, especially in the government sector. This study adds value to the current body of knowledge in that it ascertains challenges and focus areas for leaders in looking at the importance of organisational culture and its impact on knowledge management. Individual agencies that improve the collaborative nature of their own organisational culture will inspire and create a better platform for other agencies to share knowledge, both internally and within government collectively. This
study has also identified the information and technology challenges of internet access and usage in Agency B. In a developing country such as South Africa, these challenges are indeed something to be looked at, but it is suggested that organisational culture should be the main focus.

In order to understand the impact of this culture on knowledge management, it is critical to identify potential barriers that can prevent a knowledge sharing culture. The key ingredient for a successful knowledge management strategy is a collaborative, sharing and learning culture, which should be driven by the leaders in the organisation. If leaders inspire and create a collaborative culture, in which sharing of information and knowledge is the norm, then knowledge management can be successfully implemented. The culture in this instance is the driving force which inspires the intent and trigger for employees in an organisation to endorse a sharing culture. If this culture is not embedded throughout the organisation then the individual employees who make up the collective organisation will not be driven by the required individual intent to share knowledge. From a governmental perspective, if a sharing culture is not embedded, then public organisations will be less motivated or inspired to share information and knowledge with each other in order to resolve mutual problems.

7.3.2 Learning Organisation (LO)

The empirical results of this study proved that the factor ‘learning organisation’ was an important determinant for knowledge management. In addition, a significant and direct relationship was found between a learning organisation and the perceived effectiveness of the dependant variable knowledge management. This result stresses the importance of creating a continuously learning environment and culture for improvement and problem solving purposes.

In prior research (over and above that mentioned in Chapter 2), Aggestam (2006) suggested that LO and knowledge management are interdependent. As with the proverbial ‘chicken and egg’, it is difficult to say which one came first, although Aggestam’s findings indicated the strong relationship between the two. Furthermore, Aggestam’s study served as a basis for developing guidelines on how to introduce
knowledge management, and the work required to become a learning organisation. King (2009) affirmed that humankind has been concerned about learning and creating knowledge for centuries, although “it is only in the last 15-20 years or so that a distinct field called ‘knowledge management’ has emerged”. This point has also been highlighted in Chapter 2 of this study, which indicated that knowledge management is relatively new. In essence, King’s study supported Aggestam’s study and this study in confirming that knowledge management and a learning organisation are complementary to each other.

On analysis of the empirical findings of this study, it must be emphasised, the items for a learning organisation combined with other items, like leadership and communities of practice. From these loaded items and findings, the following may be concluded with regards to the learning organisation and knowledge management:

- In both leadership and organisational culture items loaded and questions posed, only 26% and 23% of respondents respectively agreed that leaders and the organisation have knowledge sharing built into their performance work agreements to encourage them to share. It is clear from these responses that leadership has not taken the lead to introduce or inspire a sharing culture, nor to introduce sharing as a key performance indicator. This lack of leadership naturally instils a non-sharing organisation culture (as also confirmed by the respondents).

- Emanating from responses received, it was found that business units and government departments operate in silos. This in turn inhibits a collaborative, sharing culture, both internally and within the government sector.

- Another key issue is that of leaders and organisations not allowing mistakes to occur, as errors are deemed to assist employees to learn and ultimately improve. This question, which is discussed above in respect of CULT1 under organisational culture, is also pertinent to a learning organisation. Quality and continuous improvement are critically important to knowledge management, although it is not the scope of this study. However, in order to improve, the root causes or barriers must be clearly understood so that issues are not
‘swept under the carpet’. A learning environment and culture should be introduced so that employees and managers are not afraid to highlight problems in their span of control. In other words, if a learning culture is not present, then real problems may remain hidden and problems may not be resolved, thus preventing an organisation from continuously improving. The findings in a study by Beeken (2008) highlighted the significance of continuous improvement on knowledge management, which in this study is viewed as equally important when the organisational culture ensures that the organisation is one which wants to learn and ensures that the platform to do this is in place.

In a recent study conducted by Batool and Riaz (2011: 912), it is stated that the learning organisation is a relatively new phenomenon, although these days, “more and more firms wish to shift towards this title”. Their study concluded the following factors that contribute positively in making an organisation a learning organisation, and therefore making LO an important contributor for knowledge management:

- Innovation
- Human resource practices
- Leadership styles
- Team learning

Insufficient research has been conducted into what makes an organisation to be a true learning organisation. Batool and Riaz (2011) confirmed that the most successful firms in today’s world are the ones which followed the concept of ‘learning organisation’.

The researcher disagrees with Batool and Riaz’s view that a learning organisation is relatively new. Instead, the researcher supports the view of Joon (2007) and Aggestam (2006), who suggest that learning and knowledge are ancient concepts, yet over time may have been termed or practised differently. The researcher argues that the problem, as confirmed in this study, is that leaders and companies do not recognise and consider themselves as being a continuously learning organisation.
This may be compared to individuals who think ‘they know it all’ and are not prepared to learn and consider other ideas or alternate points of view.

### 7.3.3 Collaboration

The empirical results proved that collaboration is an important determinant for the effectiveness of knowledge management in government departments in South Africa. The perception of the respondents (76% agreeing) was that a collaborative effort in electronic connectivity would enhance decision making and in general, collaboration amongst government agencies will improve the knowledge effort of government as a whole. Asked slightly differently, 79% of respondents agreed that the sharing of knowledge across departments will assist government in collectively resolving problems. From this, it was deemed positive that government employees acknowledge that by working collaboratively, collective problems may be solved. The key questions that therefore need to be asked are the following:

- Do leaders acknowledge this positive intent by employees and make conditions conducive by driving a knowledge sharing culture?
- Are incentives in place for a sharing culture to evolve?
- Is a conducive learning organisation in place with formal and informal networks in place?

Clearly, from the factors discussed above, insufficient strategies, interventions or communication initiatives are in place in order to ensure and implement a learning, sharing environment. Whilst being an important determinant for knowledge management, the empirical results have shown that no statistically significant relationship exists between collaboration and the perceived effectiveness of knowledge management. However, the literature makes it clear, as first mentioned in a study conducted by Bhandar (2010), that collaborative projects are increasingly common today. These collaborative projects require specialised knowledge of the partners to be integrated - and thereby pose the challenge of inter-organisational knowledge integration. Bhandar highlighted the complexity of collaborative projects and, in his findings, indicated the importance of structures to foster ties
(collaboration) between organisations through projects, regular meetings, social activities and so on. The goals of the project need to be clarified and appropriate mechanisms installed in order to achieve the concerted effort of all organisations towards the common goal. The interdependencies and reliance of organisations amongst one another should be emphasized by identifying those organisations and subject matter experts who will collaborate and assist in resolving the problem. In another study, by Garcia-Perez and Ayres (2009), the findings led to an approach to knowledge transfer involving the collaboration of key stakeholders and experts. The relevance of collaboration to knowledge management is thus seen as a crucial approach in knowledge transfer. Weber (2007:335) also asserted that knowledge management approaches may fail when they do not promote collaboration. Collaboration is an important means for learning and sharing. Therefore, any knowledge management approach that does not promote collaboration is likely to fail.

It is clear from the literature that collaboration is vital for all organisations. However, in this study within the government sector, collaboration was viewed negatively. The negative perceptions of trust and collaboration rejected the hypotheses and were therefore found insignificant. The reason for this, according to the researcher is based on the following fundamental fact – that collaboration and trust are both deemed as interdependent factors. If trust does not exist, then a collaborative sharing culture will definitely be prevented. The researcher is of the view that the private sector thrives and needs to sustain its survival due to the competitive global environment that exists. The government sector however, requires collaboration rather than competition within the government collective. Clearly, this study has suggested that a silo and ‘this is mine’ mentality exists which has resulted in a non-collaborative culture in government. Further discussion on the non-significant factors is discussed below.

7.3.4 Subject Matter Expert (SME)

Most knowledge management literature has failed to sufficiently recognise the aspect of subject matter expert (SME) as a determinant or independent variable influencing knowledge management, although some do mention the topic or refer to ‘knowledge facilitators’, ‘knowledge workers’ and the like. This study has shown that the issue of
subject matter experts is an important determinant for the perceived effectiveness of knowledge management. The term SME was a combination of other variables in this research, as indicated in Chapter 6. Based on the input from respondents on items loading on the SME factor, the following may be elaborated upon:

- Only 26.8% of respondents agreed that their organisations encourage them to work in cross-functional teams with external experts from other government departments.
- From a leadership perspective, only a mere 30% of respondents agree that their management has strategic alliances with other government agencies for knowledge sharing purposes.
- With regards to the retention of highly skilled staff (SMEs), only 30% of respondents believe that their organisations make retention policies a top priority. From a South African perspective and as gathered in informal discussions, especially with White employees, the perception is that the retention of experienced white staff in particular is not a top priority as employment equity (EE) and affirmative action (AA) policies take precedence in instances where senior posts are to be filled, such that numbers (quotas) as per AA and EE legislation are attained by the relevant government departments.
- On the issue of a list of internal SMEs made available (similar to an internal ‘Yellow Pages’ directory) only 35% agreed that such a list exists in their organisation. Thus, the vast majority either disagreed or were not aware that a list of SMEs exists in their organisation.

Although the empirical results have also shown that no statistically significant relationship exists between SME and the perceived effectiveness of knowledge management, the analysis of the responses above suggests and confirms that government departments operate in silos - as is highlighted in the problem statement in Chapter 1. The relevant subject matter experts per department are thus not identified or known. If a list of subject matter experts is not kept in one government agency, it is obvious that another agency will be oblivious as to whom the SMEs of another agency would be. Furthermore, and perhaps uniquely to South Africa, the retention of highly experienced staff appears to be viewed negatively by respondents,
either due to employment equity and affirmative action policies, or perhaps due to management not acknowledging and making use of the tacit knowledge and intellectual capital that currently exists. The non-significance may also be attributed to the fact that the term SME is not widely advocated and hence is not known by many in organisations. In fact, the term SME may be closely associated to a newly emerging term in knowledge management circles: intellectual capital (IC). The concept of intellectual capital is not new, but more authors are acknowledging the importance of the intellectual capital of an organisation, as well as finding means to convert it for the benefit of the organisation as a whole. It is therefore crucial that organisations firstly identify SMEs, whom are the individuals possessing tacit knowledge and with the relevant intellectual capital, before strategizing on how best to use this expertise or tacit knowledge.

Grant (2011) highlighted the management of intellectual capital as one of the major themes associated with knowledge management. Chan and Lee (2011) also focused on the importance of intellectual capital on knowledge management in their study, which proposed that assessment be conducted in a ‘bottom-up’ rather than a ‘top-down’ approach. From a South African perspective, in his study on higher learning, Kok (2007) stated that intellectual capital management forms part of the knowledge management initiatives for higher learning institutions.

Again, while recent literature has highlighted the focus on intellectual capital, this study found SME to be an important determinant, although not significant. As with the determinant collaboration and the next factor of trust, an SME may be seen as equally important only once the organisational culture sets the platform for sharing in the organisation.

7.3.5 Trust

This study has shown that trust, similar to collaboration and subject matter expert (mentioned above) is also an important determinant for the perceived effectiveness of knowledge management. In the reviewed literature, trust was not identified as an independent variable for knowledge management. It was, however, identified as an important factor in enhancing and contributing to a collaborative culture of an
organisation. Paroutis and Al Saleh (2009), for example, investigated the key determinants of knowledge sharing and collaboration using Web 2.0 technologies and explored the reasons for and barriers to active employee participation within a large multinational firm. Their study revealed four key determinants of knowledge sharing using Web 2.0 technologies: history, outcome expectations, perceived organisational or management support and trust.

However, in the public sector, the issue of trust, as briefly discussed in Chapter 2 (more specifically in Section 2.10 within government), has been identified as an important factor for effective knowledge management by both Cloete (2007) and Joon (2007). Both authors focused on the fact that public citizens require more trust, due to the perceived notion of corruption in government as well as the increasing administrative challenges and promises made by governments. Cloete further suggested an electronic standard of knowledge management in order to ensure society’s knowledge-based trust in government. As the citizens are also viewed by the researcher as the employees who work within government, the lack of trust found in social circles will definitely follow into the workplace. As such, negative perceptions of trust may become part of an organisation’s culture. Trust is therefore seen as an important determining factor. However, in this study, the empirical results have also shown that no statistically significant relationship exists between trust and the perceived effectiveness of knowledge management. As with the determinants discussed above, an improved focus on organisational culture may assist in enhancing the issue of trust, thus impacting significantly on knowledge management, particularly in knowledge sharing between so called ‘intelligence’ agencies. The issue of trust as explored during the research process is further highlighted in discussion of the limitations of this study later in this chapter.

On analysis of the responses and the interdependent relationship between the factors trust and collaboration, the following may be deduced on why the factor trust was rejected:

On items measuring the variable trust, 57% of responses disagreed’ by indicating that they (respondents) do NOT voluntarily share information with other government agencies as they do not trust other agencies. In the absence of trust, collaboration
will not exist, due to the negative trust relationships amongst government agencies. This lack of trust was further reiterated on the response which showed that respondents did not trust recipients who receive information. Again, the lack of trust amongst government agencies which leads to the non-collaborative culture is the reason why the factors trust and collaboration were viewed negatively by respondents and as such, was found to be not significant as the negative response rejected the hypotheses which stated that trust has a positive relationship on knowledge management.

As confirmed by Cambell (2009), it is important for organisations to investigate and to enquire what the underlying factors are which inhibit knowledge sharing. Campbell distinctly highlights trust and collaboration as the key social factors which impact on the overall culture. In this study, organisational culture was identified as a major factor which has a positive relationship on knowledge management. Factors such as collaboration and trust in this study were viewed negatively hence the hypothesis was rejected. Even so, it is important to stringently assert that these factors (trust and collaboration) form part of the overall organisational culture as identified by many authors such as Campbell (2009). Thus, they must be the focus of any organisation, although it is suggested that the overall culture be defined such that knowledge is not merely a buzz word but an actionable part of all within the organisation. NB: Issues or factors like collaboration and trust are ‘latent’ factors which are not easily recognised as it resides within people’s minds, feelings, emotions, perceptions and motivational intent.

7.4 MANAGING THE PERCEIVED EFFECTIVENESS OF KNOWLEDGE MANAGEMENT FOR SOUTH AFRICAN GOVERNMENT AGENCIES

Through this research, five primary determinants of perceived effectiveness of knowledge management for South African government agencies were examined. Out of the five determinants, two factors, namely organisational culture and learning organisations, had significant relationships on the dependent variable, knowledge management. The strategic importance of knowledge management to organisations in both the private and public sectors cannot be emphasized enough, as has been documented and confirmed globally. Organisations are ‘living organisms’, bound to
differ in terms of organisational goals, culture and work practices. As proposed in this study, it is imperative for government organisations and their leadership to conduct knowledge audits in order to understand the root causes or barriers towards knowledge sharing. After identifying the relevant obstacles, leaders can focus on appropriate strategies in order to overcome the barriers and ensure that knowledge sharing takes place. Whilst the objective of this study was to look at the state of knowledge management of agencies within government, it was appropriate to first understand the state of knowledge management within the individual agencies selected, for if there is no internal knowledge management strategy in place, then surely one cannot expect the specific agency to share knowledge externally. This research found that some level of knowledge management was in place in some agencies, not necessarily organisation wide but perhaps applied or driven by one division within a relevant agency.

Knowledge management, as stated in Chapter 2, is an extensive discipline, hence the development of an effective knowledge management model should consider all elements of the organisation. Through the literature, it is suggested that knowledge networks be developed, either through people or the proper use of information and communication technologies (ICT) or, ideally, the appropriate use of both people and technology, although in this study, the factors involving people seemed to outweigh the ICT processing theory (briefly discussed in Chapter 3).

Public sector organisations, in contrast to private sector organisations, appear to possess more bureaucratic structures and processes, which normally hinder the effective implementation of any strategy, especially a strategic discipline like knowledge management. As such, the leaders in government are required to play an important role in creating and sustaining the ideal knowledge sharing culture in public organisations.

The research has confirmed that the factors organisational culture and learning organisation have a significant impact on the effectiveness of knowledge management. The literature revealed that there are numerous factors impacting on organisational culture, hence the need to identify what these factors are and their levels of importance, as highlighted above. In this study, latent social factors like
collaboration and trust are factors that need to be looked at, if a positive collaborative and trusting culture is the objective. It must be noted that understanding a culture and identifying the complex knowledge sharing processes is not an easy task. As such, more research needs to be done, especially pertinent to the public sector and in terms of understanding ‘what employees want’? What drives employees to hoard or share knowledge? Furthermore, what knowledge sharing methodology is best suited for the specific public organisations? One thing is certain: a collaborative effort involving all stakeholders is required in order to ensure the effective implementation of knowledge management in the public sector of South Africa.

In support of the critical factors found pertinent in this study, the following model for knowledge management in the public sector is proposed.

**Figure 7.2  Collaborative Knowledge Tree Model for Public Sector Problem Solving**
The model above has at its centre the core knowledge management discipline, with the various branches of government having to collaboratively support and influence the direction of knowledge towards growing and improving on service delivery and ultimate problem solving. The Leadership and Policy making are important in understanding and investigating the ‘factors beneath the surface’ of the tree (organisation), in that they need to look ‘beyond and beneath’ in order to deal with organisational culture and learning issues, as issues of trust and subject matter experts are to be viewed as the roots ‘below the surface’. A relatively young developing country like South Africa is to be viewed as a growing tree in this instance, which requires the caretakers (leaders) to ensure that the ‘seeds and fertiliser’ (organisational culture and learning) are firmly planted in order to continuously grow and provide the fruits of success.

7.5 THE CONTRIBUTIONS OF THIS STUDY

This study has added to the current body of research in the field of knowledge management, by focusing the investigation on government agencies within the public sector in South Africa, in which limited research has thus far been conducted. Furthermore, this research focused on sharing amongst government departments, whilst most previous research has tended to focus on particular single organisations. More specifically, the focus of this research was similar to that required in the United States after the 9/11 terror attacks when government leaders needed to understand the state of knowledge sharing amongst so called ‘intelligence agencies’. In this study, the focus was on government agencies that are considered pertinent in investigating and resolving criminal activities like poaching. The structural equation modeling (SEM) technique was applied in statistically analysing the data gathered in this research from a relatively large sample size.

By identifying enabling factors as per the global literature, a theoretical model was developed and tested, in order to highlight the most significant factors influencing the perceived success of knowledge management. This process has contributed towards understanding the key factors for leaders in the relevant government sector to focus upon in South Africa. These findings may be viewed as a crucial platform for public sector management in planning and ensuring that knowledge management initiatives
are implemented. By installing knowledge sharing in individual government organisations as well as in government collectively, the process of learning can become a continuous journey and a means towards resolving problems.

This study has incorporated another of the main theories in the literature on knowledge management, namely a social (people) theory versus the information and communication technology (ICT) theory. Subject matter experts focus on ‘people’ factors like intellectual capital, and the need to convert tacit knowledge to explicit knowledge, whilst the focus of the ICT processing theory is primarily on the use of technology for knowledge sharing purposes. Of course, in developed countries it might be that the ICT theory is more important due to advanced technologies, and this is a potential subject for further research. Through this study, in a developing country like South Africa, it has emerged that the latent variables primarily associated with ‘people’, such as organisational culture and learning organisation, are more significant than the technology factors. As such, this study has also contributed to the fields of human resources, human resource development, organisational behaviour and general psychology by supporting and confirming the influence of the ‘people’ factor in a knowledge sharing culture.

This research has explored new territory in that, to the best of the researcher’s knowledge, no research had previously been conducted that investigated knowledge sharing by relevant agencies within government in South Africa relevant to problem solving/crime resolution. As such, these findings provide a platform for government agencies in South Africa and other developing nations in the field of knowledge management.

7.6 LIMITATIONS OF THIS STUDY AND RECOMMENDATIONS FOR FUTURE RESEARCH

Through this study, an effort was made to contribute to the current body of knowledge with regards to the public sector, in particular within the field of knowledge management. As is the case with all empirical studies, certain limitations are prevalent and are therefore acknowledged when drawing conclusions in respect of the findings of this study. Although specific findings within the scope of this study
have been concluded, there are always ample areas for future research that may expand the body of knowledge. In lieu of the above statements, the under mentioned limitations as well as recommendations, relevant to future knowledge management research, will be addressed.

In terms of the scope, the selection of specific agencies from the vast pool of government departments was done in order to make the research more manageable but also created a limiting dilemma in that subsequent assumptions must be that findings in one government agency are similar to other government agencies. Furthermore, the use of snowball convenience sampling, according to Zikmund (2003:80), does not always result in representative samples and hence is a further limitation of this study.

During the research initiation process, the researcher experienced an issue of trust, in that there appeared to be a lack of an overwhelming support for the research by managers from other agencies that were engaged. This may have been due to the fact that they perceived the researcher as coming from another agency, entering their ‘territory’ and hence extracting secrets or information of ‘their’ organisation or agency. This silo or ‘stove-piping’ mentality was also criticized by Lahneman (2004) who did a study investigating knowledge sharing amongst the intelligence community in the United States after the infamous 9/11. It was also then made clear by the managers from the relevant government agencies that they neither could nor should ‘force’ participants but merely request teams to participate. Although it is globally accepted that no researcher or research process must force participants, it was clear that managers were not fully supportive of the process possibly due to reasons as highlighted above. As a result and in this study, the vast majority (approximately 80%) of respondents came from one agency, in which the researcher was able to distribute questionnaires internally, rather than depending totally on managers in other government departments to send to colleagues nationally in order to obtain a more even spread of respondents. Again, although perceived to be a limitation, it may be that the cultures in the selected government agencies are similar to others in South Africa. In this regard, it would be recommended that top (executive level) support is obtained for future research endeavours, so that more meaningful participation is assured from all government departments. This is rather contrary to
those supportive of a non-autocratic culture or leadership style, but from this research experience, the culture within government is still assumed to be autocratic in nature.

The research for this study included an in-depth questionnaire comprising of sixty one questions. The data collected depended on the individual responses of participants. Although it is the norm to accept such reports as valid, they cannot always be trusted. It would be impractical to assume in research that respondents’ attitudes and feelings are always truthful or correct without any bias whatsoever. The accuracy of individual reports depends on a number of factors, including an individual’s motivation to participate in the research, as well as the individual’s ability to communicate and articulate his or her views. Furthermore, it is possible that some individuals, especially in autocratic organisations where management are perceived to ‘watch and read everything’, are afraid of what their managers would think about negative comments and are therefore not honest in their responses. In this study, it is possible that, even though there was an electronic link, respondents may have suspected that management would eventually be privy to their responses, particularly those items or questions pertaining to leadership, and as such might not have responded honestly. These possibilities and the reliance on self or individual reports might suggest an element of bias or personal disposition and therefore this is viewed as a limitation.

In future research, it is suggested, questions could be designed to accommodate different employee levels and questionnaires could be distributed individually, again with executive level support, communication and commitment to supporting the truth for ultimate research purposes. The perspectives of individuals in different levels of the public sector organisation are likely to differ, based on their respective positions and involvement in the different departments, although a wider perspective of the organisation as a whole can be based on many different perceptions. This may be why the initial factor of leadership merged with other factors and did not emerge as a single factor. A further recommendation leading from this outcome would be to focus the research on employees only, thus establishing a better understanding of their view of the leadership in terms of support, leadership style and so on.
Another limitation of this study was that it focused only on a selected number of latent variables that influence the perceived effectiveness of knowledge management. Owing to measurement constraints in the statistical technique, and sample size restrictions, all factors could not be considered. In particular, the study could not measure the factor ‘policy and legislation’ (although it was identified in the public sector knowledge management literature), which is said to influence the effectiveness of knowledge management. This could be due to respondents being unsure of the concept (policy), which is fairly new or possibly unknown to employees at lower levels due to policy decisions being made only at a strategic level. However, it is recommended that future studies look at this factor (policy and legislation), as it is seen as a means to steer and drive government plans and strategy. From a South African perspective, the recent debate around the contentious Protection of State Information Bill may be a decisive factor in whether to ‘share or not to share’, a point that highlights the strategic influence of policy and legislation on knowledge sharing. In this instance, the ruling political party (ANC) of South Africa proposes that the bill should take precedent over the Promotion of Access to Information Act, when the two laws are in conflict.

Future research could also include qualitative, in-depth discussions with representatives from relevant government agencies in order to collate field data on how knowledge sharing actually takes place or what the barriers are. These case study investigations could bridge the gap between perception and reality, and might well further support or dispute the factors influencing the perceived effectiveness of knowledge management as identified in this empirical study. More specifically, the factors – trust and collaboration, which were highlighted by Campbell (2009) as key social factors impacting on knowledge sharing needs more research, especially in terms of understanding why the current negative perception exists (as found in this study). The researcher posits that the lack of trust, especially when the scope is within the criminal sector, is likely due to the fact that people’s (government employees) lives may be at stake. The fear of intimidation and sharing of crucial information by one government official is possible where the official investigating a high profile criminal may share or forward information which may get into the ‘wrong hands’ such as being received by another bribed government official who is paid for ‘informing’ the relevant criminals. The perception of bribery and corruption in
government is exposed daily in the national media and as such, possibly creates mistrust and non-collaboration within the government sector. Furthermore, the relevant policy and legislation within relevant agencies may prevent an agency from sharing with others in government. Again, these reasons require further probing through future research.

An alternative comparable study could focus on knowledge management in a private sector organisation. Few, if any, empirical studies in South Africa have been undertaken amongst both private and public sector organisations, whereby the best practices of each organisation (private and public) could be compared and lessons learnt in order to apply principles of knowledge management and knowledge sharing practices through the research itself. The findings in this type of comparative research could prove extremely valuable for any management team.

Regardless of the limitations identified, the results of this study contribute to the current existing theories. Furthermore, external factors and change are constants that impact on the overall culture of any organisation, very much like the ever increasing pace of technology, which also demands change management intervention. These factors necessitate investigation into evolving organisations and make the field of knowledge management a journey of continuous learning.

“It is not the strongest of the species that live on, nor the most intelligent; rather it is those most responsive to change.”
—Charles Darwin

7.7 CONCLUDING REMARKS

This study has succeeded in breaking new ground in the field of knowledge management and its perceived effectiveness in South African government agencies, especially within the security cluster. This area is usually difficult to penetrate due to the silo mentality mentioned earlier in this chapter, and, until now, had not been fully investigated and explored. This study emanates from the ever-increasing challenge of the South African government in improving and meeting the service delivery demands from citizens through collaborative knowledge management efforts. The
lack of co-ordination between the relevant government ministries is widely acknowledged, and was highlighted in a 2012 Municipal Focus publication which includes a report by the Minister of the National Planning Commission of South Africa, Trevor Manuel. According to the article, the Minister stated that, in order to achieve strategic goals, government departments needed to work collaboratively with one another. The lack of co-ordination was also highlighted by Rogers (2007) as mentioned in the problem statement in Chapter 1.

Due to a silo approach adopted by government agencies, problems like poaching are not resolved collectively by government. This problem was witnessed first-hand during this research, as described earlier in this chapter as one of the difficulties experienced during the engagement phase. The lack of internet access in some government agencies further emphasized the shortcomings experienced in government from an information and communication technology perspective. It also seriously challenged the proposal that government departments adopt a net-centric approach, as applied in a developed government agency (such as the United States’ Department of Defence), for knowledge sharing purposes.

Organisations pursuing knowledge management in general, and knowledge sharing in particular, have traditionally focused on the information technology infrastructure (Davenport, Delong and Beers, 1998). While information technology is important to the overall knowledge management endeavour, a lack of attention to cultural factors has proven to be the roadblock to any sustainable success. This researcher has witnessed several deployments of information management and team collaboration solutions that have failed to meet their objective of facilitating consistent information and knowledge exchange. Whilst there may be many factors contributing to these deployment failures (for example, insufficient training, application champions, communication or support), the organisation in question neglected to take into account the social and motivational drivers behind why an employee would share what they know regardless of what tool was available. As such, the imperative importance of organisational cultural factors could not have been more strongly emphasized.
The findings also support the view that, in order to improve the co-ordination and collective efforts of government departments, a sharing and learning culture needs to be in place, before attention is turned to ensuring that appropriate ICT and knowledge sharing practices are in place. There is however clearly positive intent, as the majority of respondents agreed that the collaborative efforts of agencies would benefit government collectively. As important as it is, then, for the vast majority to express intent to collaborate, it is equally important for leaders to ensure that organisational cultural barriers for sharing are identified and removed, so that the appropriate platform is set from which the employees can operate.

This study noted that a common theme emerged from the literature of organisations moving from competition towards collaboration. If this collaborative mind-set is installed through the employees and the management collective, it creates an extremely strong possibility that government agencies may learn to share knowledge with each other. This could, in turn, begin a trend in which developing countries work together and mutually assist one another, sharing knowledge and expertise for the betterment of all mankind. Furthermore, it is clear from the literature and this study that interdependencies among the independent variables highlight their nature as critical success factors. In other words, determinants like trust, collaboration, subject matter experts and learning all depend on culture and vice versa, in that a sharing culture depends on factors like trust too. From a knowledge management practitioner’s perspective, the model presented in this study is a reference that may be used in a change management plan for the adoption and dissemination of knowledge management practices in the government agencies of South Africa and other related professional services organisations.

This study has furthermore affirmed that the question being posed by private organisations, and possibly still to be asked by the public sector, is: should organisations be investing more in people or in technology? Further research may look at amounts spent by government organisations on technology vs. people (learning, rewarding, incentivising etcetera). More importantly, greater strides should be taken by human resources practitioners and by leaders in general in investigating what employees want. Most mechanical and industrial engineers, for example, will assert that it is the people on the ground, in most instances, who know the answers
to problems, and that it is merely a matter of asking the right questions to the right people (subject matter experts). This, in turn, requires deeper research into the organisational culture and questions such as ‘why’ people share, and what the barriers and enablers are to effective sharing.

This study thus attempts to challenge public sector leaders to consider the findings emanating from this study and to focus on the two main independent variables – organisational culture and learning organisation – found to be most significant in the successful implementation of knowledge management in the public sector. As stated in Section 7.6, Campbell (2009) points out the social factors like trust and collaboration as part of the overall organisational culture. Thus, by focusing on an organisational culture, the inhibiting factors such as trust and collaboration will improve. Similarly, by acknowledging an organisation as a learning organisation, subject matter experts are more likely to be recognised, empowered and used in order to share their knowledge with employees and thus the overall organisation. The point being driven by the researcher is although social factors like collaboration and trust were found not significant, they are nevertheless important as they form part of the overall culture, which is found to be significant in this study. The factors like collaboration and trust, as mentioned in Section 7.6 were perceived as negative in this study due to the lack of trust emanating from the research responses. Contrary to the question posed by Wilson (2002), knowledge management is not a fad but a discipline that is continuously being embraced by visionary leaders who anticipate the strategic benefits of its utilisation.
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Cambridge, USA.


Dear Respondent

RESEARCH PROJECT: INVESTIGATING KNOWLEDGE SHARING BETWEEN GOVERNMENT DEPARTMENTS IN SOUTH AFRICA

This study is currently researching the knowledge management discipline, by seeking to investigate knowledge sharing processes, in order to establish an effective knowledge sharing model for government agencies in South Africa. The purpose of this research is to establish enabling factors that influence the knowledge sharing process within relevant government organisations in South Africa, thus ensuring proposed strategies and approaches that will assist government organisations to ensure effective knowledge sharing between government organisations. As such, this study will approach knowledge sharing within and across government organisations.

To obtain meaningful results, your co-operation is of particular importance. Completing the questionnaire should not take more than fifteen minutes of your time. Please note that no attempt is made to identify you. Your anonymity is assured and all responses will be treated in the strictest confidence. The anonymity of your relevant organisation shall also be treated in strictest confidence, i.e. although one is requested to indicate the name of the department, the findings will not name but use pseudonyms when naming your department, thus assuring strictest confidentiality.

In a time when the need for collaboration towards problem solving is in great demand, your input and valuable contribution will appreciatively assist towards understanding the current state of knowledge management within the public sector and within a developing country such as South Africa.
Kindly click on the link sent on this e-mail communiqué in order to begin. We would be grateful if you would make sure that this questionnaire is completed at your earliest convenience, but not later than 20 May 2012.

To ensure full accuracy of the survey results we would like you to answer the questionnaire carefully and to please complete all questions.

Thanking you for your willingness to contribute to the success of this important research project.

Yours faithfully

Avain Mannie: Researcher (avain.mannie@gmail.com)
Appendix B Online Survey

This appendix indicates screen shots from the online survey designed for the purpose of this research. The online survey was hosted on the Nelson Mandela Metro University web portal (My World@NMMU) with the respective link directing respondents straight to the biographical details of the on-line survey:

http://www.nmmu.ac.za/websurvey/q.asp?sid=441&k=miwbyclkvf
Section 2 of the survey:

Section 3:
Section 4:

Section 5: