KNOWLEDGE-MANAGEMENT IN THE PUBLIC SECTOR:

ITS ROLE IN FACILITATING THE DELIVERY OF HEALTH INFRASTRUCTURE

A thesis submitted in partial fulfilment of the requirements for the Master's degree in Information Management in the Department of Information Systems in the Faculty of Economic and Management Sciences of the University of the Western Cape

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KEYWORDS

Knowledge-management, public sector, knowledge-based economy, knowledge assets, knowledge-worker, project-knowledge management, public works, health infrastructure, enablers, processes.

ABSTRACT

Knowledge is recognised as a crucial resource in the knowledge-based economy; and it is believed to drive sustainable success in organizations. Knowledge management (KM) helps organizations identify, create, organize, distribute and transfer vital knowledge among employees within and across organizations. The underlying premise is that good KM leads to efficiency and effectiveness, which in turn, influences the total performance in an organization. Therefore, this study investigates the role of KM practices as they relate to projects in a South African government organisation. The problem was dwelt with by establishing research questions and objectives.

In order to answer the research questions, a literature search was conducted in the area of KM to establish the KM enablers, barriers, and processes known to facilitate or hinder successful KM in organizations. This led to the identification of five enablers, including organizational culture, structure, technology, strategy and leadership, as well as the resources believed to be fundamental in the success of KM practices. Barriers to KM were identified as individual, organizational and technological. The study established four KM processes: acquisition, conversion, application and protection that were found to concur with good KM practices. A conceptual model was developed around these areas. The model assisted in developing qualitative and quantitative questions. In order to investigate the proposed research questions, the study identified a single directorate within the department of public works that is directly involved with the delivery of health infrastructure.

The methodology used, which was mainly qualitative research, was conducted by using multiple-data evidences, namely: semi-structured interviews, document review; these were sourced from primary and secondary sources, as well as similar organizational best practices in KM. A total of nine interviews were conducted with individuals in managerial positions. A total of 7 of the 30 e-mailed questionnaires were completed and the data were used to supplement the qualitative data. This study used the Content-Analysis Technique approach to analyse the text data obtained from the interviews.

It was established that successful KM implementation requires the promotion of an enabling environment. The results from the findings revealed that organizational culture, structure, leadership and strategy, ICT, as well as KM resources form, a foundation for the KM environment. KM processes, such as knowledge-retention, creation, capture, transfer and

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sharing, were found to be fundamental for KM practices to occur. Barriers to effective KM occurred largely due to the lack of awareness and time. To capitalize on knowledge, an organization must be prepared to balance its KM enablers and processes. The existing challenges impeding KM success should be identified and dealt with, in order to realize the KM benefits. The study, therefore, proposes a KM conceptual model to be integrated with the decision-making framework, as an implementation strategy for KM in the public sector. This would ensure an embedded knowledge-intensive environment in the Department, and hence the improvement of infrastructural delivery.

This study is limited, since only a single case was used, which plainly suggests that there is a possibility that the results cannot be generalized beyond the researched organisation – without conducting any further study.

It is recommended that for future research, this study be replicated through several other directorates, or even departments at various government levels (e.g. national, provincial). Also, quantitative analysis, together with qualitative analysis, should be used to create a triangulation between the two approaches.

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DECLARATION

Hereby I, Lydiah Wanjiru Kimani, declare that "*Knowledge-management in the public sector: Its role in facilitating the delivery of health infrastructure*" is my own original work and that all sources have been accurately reported and acknowledged, and that this document has not previously in its entirety, or in part, been submitted at any university, in order to obtain an academic qualification.

Signed: …… Date: ……

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Abbreviations and Acronyms

CoP	Communities of Practice
CPSI:	Centre for Public-Service Innovation
CSFs:	Critical Success Factors
DoH:	Department of Health
DPSA:	Department of Public Service Administration
DPW:	Department of Public Works
IC:	Intellectual Capital
ID:	Infrastructural Delivery
KM:	Knowledge Management
MoH:	Ministry of Health
OECD:	Organisation for Economic Co-operation and Development
PDTPW:	Provincial Department of Transport and Public Works
PG:	Provincial Government
PPP:	Public-Public Partnership
SAITOC	South African Government Information Technology Officers Council
SAPG:	South African Provincial Government
WHD:	Works Health Directorate

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DEFINITION OF TERMS

Term	Description
Implementing Agent	The Department of public works that is given a mandate by the government to provide infrastructural services to selected government and public organizations.
Client/User	Client or User department refers to provincial government department that makes use of immovable property of the South African Provincial Government (SAPG) (Government gazette, 2007). The DOH outsources infrastructural services to the DPW, and is charged with the provision of infrastructural plans and budget to the DPW in the delivery process.
Public-Public Partnership	A public-public partnership is a contract between two or more public sector entities for different transactions to warrant integrated service delivery (PWC, 2004).
Service Provider	A service provider is a constructor, professional, or consultant providing required services to the DPW or Client Department (DOH) (PWC, 2004).
Batho Pele	It is a Sesotho adage meaning 'People First'
Critical Success Factors (CSFs)	Defined as "*areas in which results, if they are satisfactory, would ensure successful competitive performance for the organization*" (Rockart, 1979:1).
Infrastructure	The word infrastructure from the Oxford dictionary means "the basic facilities that a country needs to function efficiently, for example, roads, sewers, electrical services."
Infrastructure delivery (ID)	In this study, ID refers to the activities undertaken by the agent department in collaboration with the client department to manage, develop, procure, construct and maintain hospital infrastructure, as stipulated by the SAPG strategic accommodation and infrastructure plan (Strategic plan, 2005/2006).
Project management	PMI (2004), defines project management as "*the application of knowledge, skills, tools and techniques to project activities to meet project requirements.*"

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Project	A project is defined as a complicated, unique, once-off endeavour that is restricted by time, resources, in collaboration with a performance requirement planned to provide customer satisfaction through product or services provision (Gray & Larson, 2006).

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CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter provides an overall introduction to the study. The first part of the background discusses the significance of knowledge, along with the features of a knowledge-based economy. This is followed by the definitions of the two primary concepts, that is, knowledge-management (KM) and project-knowledge-management (PKM) that are considered key for this study. The problem to be addressed is set out, together with the research objectives and questions presented. The next section lays out the research methodology and the study limitations. The chapter concludes with an overall outline of the content layout of each chapter and a summary.

The purpose of this study was to investigate the role of knowledge-management (KM) practices in a public sector organization in South Africa. The study was centred on the Work Health Directorate (WHD), which is an implementing agent housed in the Department of Public Works (DPW) in the Provincial Government of the Western Cape (PGWC). The general underlying premise was that good KM practices leads to efficiency and effectiveness, and hence the improvement of organizational performance. The exploratory study examined the KM practices in WHD through interviews of mid-level and senior government managers. The aim was to investigate how knowledge is being managed in WHD, and the role played by KM principles and practices. The main question of this study is to identify the challenges and ways to manage existing knowledge, in the project environment, more effectively.

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The question is answered by exploring the presence of KM "enablers", barriers, processes and potential benefits.

1.2 Background of the research

Legend has it that General George Patton once said, *"I don't know what this logistic stuff is all about, but I sure as hell want some!"* This is true of knowledge-management – everybody wishes to have some. Economic sectors believe that KM should occupy a central place if organizations seek to succeed in the knowledge-based economy, or in the so-called "knowledge age" (Drucker, 1993). Knowledge is considered one of the most important drivers of this economy; and it is likely to continue being so in the years to come. In the industrial economy, organizations relied on land, labour and capital as the primary resources

(Hoffman *et al*., 2005). The focus has shifted; in the knowledge-based economy, organizations depend on the efficient mechanisms of creating, sharing, and the application of information and knowledge to advance social and commercial ends (OECD, 1996). A country's economic wealth can be derived from the generation, utilization and sharing of knowledge (Roberts, 2009). This is because knowledge and information display very different characteristics from the goods and services of the industrial economy.

1.2.1 Knowledge-based economy

The key features of the knowledge-based economy are knowledge-intensive organisations, technology innovations (Du Plessis, 2007), information and communication technology (ICT), globalization, knowledge assets, knowledge workers (Roberts & Armitage, 2008), among others. Some of these features, which are important for this study, are discussed below in more detail.

Knowledge-intensive organizations

Knowledge-intensive organisations are ones that consider knowledge as the single most important resource that provides sustainable competitive advantage (Roberts, 1998). Most public sector organizations are knowledge-intensive; and therefore, the absence of suitable knowledge-management practices might result in increased costs caused by the loss of institutional memory, knowledge gaps and poor decisions. Therefore, the nature of knowledge-intensive organizations is determined by massive investments in innovations, as well as the intensive utilization of acquired technology and highly-skilled employees (Godin, 2006). Such organisations place the emphasis on knowledge, knowledge-management, and ultimately, the maintenance and improvement of their knowledge assets[1].

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These priorities are challenging for those organisations in transition from the industrial economy to the knowledge-based economy, because they are still adjusting to technological demands and the innovations associated with the knowledge-economic era.

Technology innovation

Innovation can be described as the introduction of a new combination of the necessary factors of production into the production system, such as technical, physical, and knowledge-based

1 Defined to as resource, intangible assets or intellectual capital (Bontis, 1998; Nonaka *et al.*, 2000; Sveiby, 2001; Marr *et al.*, 2004; Moustaghfir, 2008; Kong & Prior, 2008)

activities (Du Plessis, 2007). With regard to the ICT component, this is seen as a driver of innovations and competitive efficiencies associated with the knowledge-based economy (Chong, 2006). As an umbrella term, ICT consists of several communication devices or applications, such as computer and network hardware and software, mobile phones, radio, satellite among others. ICT, such as mobile telephones, international telephone networks, personal computers and the Internet, globally improve access to and the exchange of information and knowledge (Roberts, 2009).

In particular, the widespread application of ICT contributes immensely to the increased rate of new knowledge production, along with the rate of technological change in the knowledge-based economy (Castells, 1996). ICT has also improved the ability to rapidly codify knowledge (Roberts, 2009). ICT networks, like the Internet, provide high-level connectivity – thereby, allowing for the gathering and dissemination of codified knowledge. In addition, the Internet is a "*storehouse of knowledge*" – offering access to a massive quantity of information. Private computer networks, specifically intranets, allow the exchange of important information in an organization and collaboration among employees located in different geographical areas (Feng & Xiao, 2009).

Accordingly, it may be concluded that the Internet is a major facilitator of knowledge collaboration, interactions, flows and developments in the knowledge-based economy.

The Internet also offers a variety of helpful tools for communication, of which among the most widely used are the World Wide Web and electronic mail (Salman, 2010). The web, recognized as one of the rapid and most important means of transmitting information, has been an influential mechanism in managing knowledge progress in the knowledge-based economy (Chong, 2006). Today, public organizations, academics, researchers, business people around the world are able to access educational resources, like journals and databases on diverse aspects of knowledge.

Additionally, the use of electronic mail plays an important role in enabling organizations of all sizes to radically improve their interaction with customers and other businesses (Feng & Xiao, 2009). Overall, progress in information and communications technology has enabled inexpensive and fast global (hence, the globalisation phenomenon[2]) transfer of information and access to knowledge in the new economy (Feng & Xiao, 2009). In addition, ICT has

greatly influenced globalization, fostering intensive competition between various organisations.

Knowledge assets

Another key feature of a knowledge economy involves a greater reliance on knowledge assets' capabilities, rather than on physical inputs or natural resources (Powell & Snellman, 2004). Nonaka *et al*. (2000) describe assets as the specific resources of an organization that are crucial in generating values for the organization. Hence, knowledge assets are defined as resources, intangible assets or intellectual capital (Bontis, 1998; Nonaka *et al*., 2000; Sveiby, 2001; Marr *et al*., 2004; Moustaghfir, 2008; Kong & Prior, 2008).

The term resource in the strategic management literature is used to collectively define all the organization's assets, knowledge, capabilities, organizational processes, information and others (Moustaghfir, 2008). A resource therefore refers to an asset or input to the production process, encompassing both tangible and intangible assets that are owned and controlled either permanently or temporarily by an organization (Helfat & Peteraf, 2003).

Presenting a different view is Fahey and Prusak (1998), who describes organization's resources as comprising three separate sub-groups, namely: tangible assets, intangible assets, and capabilities. Examples of resources include company employees' skills, capital equipment, patent names, brand names, and finance, among others. Knowledge assets include the intangible aspect of organisations resources that are mainly represented by knowledge that supports capabilities, activities and products (Moustaghfir, 2008).

Marr *et al*., (2004), on the other hand, propose two classifications that indicate two main streams: knowledge as an epistemological asset, and as an organisational asset. The epistemological approach construes knowledge as an object that differs from information and its effect on KM (Marr *et al*., 2004). Davenport and Prusak (1998) suggested that knowledge may be considered as information when it includes practical interpretation processes. The main focus is on the various characteristics of knowledge; these are intended to present managers with significant guidelines for KM implementation processes (Spender, 1996; Marr *et al*., 2004).

This approach identifies two types of knowledge: tacit and explicit knowledge; and it presents the distinction between them (Nonaka, 1991; Nonaka & Takeuchi, 1995; Prusak, 1997).

The organizational asset approach, on the other hand, perceives knowledge as the most important component of organizational performance (Teece, 2000; Stewart, 1997). Knowledge assets, in terms of this approach, are collectively referred to as intangible assets or intellectual capital (IC). This includes three interrelated elements classified as human capital, structural capital and relational capital (Bontis, 1998; Civi, 2000; Sveiby, 2001; Marr *et al*., 2004; Kong & Prior, 2008). This section is discussed in detail in section 2.6 under Intellectual capital models. Achieving a competitive advantage in today's economy is said to depend on the way organisations manage their knowledge assets and apply KM processes to create value to attain improved performance (Wiig, 1997; Teece, 1998).

Managing knowledge assets also facilitates an organization's growth and development of suitable organizational competencies (Teece, 1998). Similarly, Renzel (2008) and Ribeiro (2009) maintain that knowledge remains an organization's most valuable asset, since it represents best practices, routines, lessons learned, problem-solving techniques and innovative procedures, which are normally hard to duplicate. Consequently, it is important for organizations to effectively manage their knowledge assets if they are to survive in the global competitive knowledge-based economy (Drucker, 1998).

The knowledge worker

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There is a general agreement that it is the individual who holds the knowledge and exercises that knowledge within the corporate environment. The term 'knowledge-worker', first coined by Peter Drucker in 1974, describes these individuals as workers who carry knowledge as a powerful resource owned by them instead of the organization. Formally defined, knowledge-workers refer to those key employees who create intangible value-adding assets, and who often transfer these intangible assets, that is knowledge-work across borders (Harrigan & Dalmia, 1991). Knowledge-workers are people who engage in the processing of information, are capable of thinking, and applying ideas, as well as making decisions.

Such workers are sometimes identified by their professions, such as accountants, engineers, attorneys, scientists, professors, journalists, executives, and others, who make use of information and knowledge (Roberts, 2009). Knowledge-workers are considered to be an essential resource that is important for nations and organizations to realize global competitiveness. It is the globalization of work, along with technological advancement, that has transformed the workforce in the knowledge-based economy – giving rise to the term 'knowledge-worker' (Drucker, 1998).

The characteristics of labour have changed in the knowledge-based economy. In the industrial economy, value was formed largely by applying physical power, whereas in the knowledge-based economy value is created by means of brain power, using the accumulated knowledge, skills, expertise and experience of the knowledge-worker (Drucker, 1998). Because knowledge-workers effectively own the primary means of production mostly considered as knowledge, the traditional relationship between workers and the organisation has been changed significantly (Drucker, 1992). The result is a rising demand for highly educated knowledge-workers in the new economy.

In the industrial economy, for example, the enabling of routine daily activities was more labour-intensive, requiring professionals, such as accountants, to manually capture all aspects of accounting information on paper. On the contrary, in the knowledge-based economy, the emergence of ICT has made it possible for organizations to automate most of their routine activities. It is important to note that ICT investments are complementary with the investment in workers and their skills (Soete, 1997).

The increasingly sought-out skills from workers in the new economy are the ones that are complementary with ICT – and not those that are substitutes. Such skills include the workers' ability to use ICT to codify and transfer knowledge, in addition to those unique human skills that involve intangible and inter-personal management, as well as communication skills (Houghton & Sheehan, 2000).

In the knowledge-based economy, organizations view their employees in a different light than in the industrial economy (Smedlund, 2008). Previously, companies were ownership-based, which means that they owned all their resources, including the competencies and skills of their personnel. Employees who perform manual work do not own the physical production material, processes, procedures and capital. Even though they may have a lot of valuable experience, this is valuable only at the place where they work; and again, it is not portable (Drucker, 1999).

The situation has drastically changed, given that it has now become more difficult for organizations to own the tacit knowledge of their employees. Knowledge-workers, therefore, own their tacit knowledge themselves (competencies and acquired experience); and they are highly mobile (Lenzi, 2010). For example, the tacit knowledge possessed by the employees resides in their heads, meaning that it cannot be constrained to filing cabinets, or in databases

for the sole ownership of an organization. With the ICT revolution, knowledge-workers are able to transfer their experience and expertise across borders, thereby giving rise to organizations' increased reliance on highly skilled workers (Serrat, 2009).

For example, a new trend has emerged where corporate organizations are increasingly outsourcing knowledge-work, as a means to cut labour costs. Thus, whilst knowledge (including tacit knowledge) is considered an important resource in the knowledge-based economy, the flexible nature of tacit knowledge has made the increasingly mobile knowledge-workers even more critical, which makes the management of knowledge assets, even more important to the new economic system (Teece, 2000).

The stable management of all knowledge assets, and ultimately, of relations with knowledge-workers, becomes even more important for the public sector, given their responsibility to provide basic national goods and services (Cong *et al*., 2007).

However, success in managing this vital resource of knowledge assets (including knowledge-workers) seems illusive for economic sectors. In the public sector in particular, which depends heavily on information and knowledge to deliver services to the citizens, progress in this process remains unclear in South Africa (Samasuwo, 2009). This may be partly attributed to the lack of any clear understanding of the KM concept. This point is alluded to (in detail) in the KM sections that follow.

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1.2.2 Knowledge-Management (KM)

KM is not an entirely new concept. It was first introduced by Karl Wiig in 1986 in a keynote address during a European conference on management. The concept is defined in different ways by authors across different disciplines, with definitions showing the variations in scope and content (Wiig 1994; 1997; Monavvarian & Kasaei, 2007). Practically every paper written on the subject includes a revised definition. One of the difficulties in defining KM can be attributed to a failure to recognize knowledge itself (McAdam & McCreedy, 1999). Also, different authors have presented a broad range of interests, views and issues on KM (Audrey *et al*., 2001). Therefore, some researchers and practitioners define KM as a discipline, albeit, a multidisciplinary field (Jasimuddin, 2006). Others define KM as a strategic approach (Sveiby, 1997; Malhotra, 1998), whilst yet others view it as an object (Quintas *et al*., 1997; Alavi & Leidner, 2001; Chong, 2006; Seba & Rowley, 2010). There is also a perspective that

presents KM as a process, whereby various steps are applied in the process of managing knowledge (Lettieri *et al*., 2004; Chong, 2007; Fong & Choi, 2009).

All these definitions are discussed in further detail in Chapter 2.

The working definition for KM in this study follows that of Mosoti and Masheka (2010). They expressed KM as a set of activities that an organization applies to create, store, use and share knowledge – for the purpose of improving organizational performance. This is because KM is more than merely implementing a system to manage information; it includes managing employees' skills and experience. These skills are generally referred to as knowledge assets. They are useful for the sole purpose of improving the returns for an organization. The effective management of knowledge is considered significant to the success of organizations (Davenport *et al*., 1998; Davenport & Prusak, 1998; OECD, 2001; Robertson, 2008; Kim & Lee, 2010).

Managing knowledge is what government organizations do when performing the core tasks for which they are responsible. Thus, KM practices become inseparable from processes, such as strategy, planning, consultation and implementation (Riege & Lindsay, 2006). However, evidence from KM research and publications suggests that public sector is not keeping pace with these practices when compared with the private sector (OECD, 2003).

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Even though KM is said to have potential in delivering value – especially in the area of service delivery, many government departments are lagging behind in its implementation. As for the departments reported to have introduced or implemented KM practices, any clear and visible signs of progress are lacking; and furthermore, KM benefits are not plainly revealed. Successful KM implementation requires public-sector readiness to fully promote and regulate the knowledge-based economy, so as gain the benefits that come from managing knowledge assets. In particular, the public sector should be in a position to manage its activities in a competitive way – such as creating new ideas, improving the capacities of the employees in government departments.

That readiness, with the advent of the knowledge-based economy includes, among other things, the demand for services that are integrated, timely and customized. This has put a responsibility on public organizations to pursue new managerial paradigms (Lettieri *et al.*, 2004). Improved service delivery and overall performance in the public sector in today's knowledge-based economy requires efficient management of the existing knowledge assets.

1.2.3 Project-knowledge-management in the context of this study

A project is a complex, unique, once-off endeavour that is restricted by time, as well as the resources, together with the performance-requirement planned to provide customer satisfaction through the provision of products or services (Gray & Larson, 2006). It combines a number of temporary activities carried out by an organization on demand (Lierni & Ribie`re, 2008). The process of applying knowledge, skills, tools and techniques to project performance, in order to accomplish project requirements, is referred to as project management (PMI, 2004). This project work is managed by project team; and it entails a number of activities. Thus, project-knowledge-management (PKM) refers to the managing of knowledge in project environments, thus linking the principles of KM and PM.

Such PKM involves the management of three kinds of knowledge asset. These include: knowledge within the projects; knowledge between different projects; and knowledge of projects (Hanisch *et al*., 2009).

When managing project-knowledge, five basic process groups are recognized; and these are considered applicable to any type of project (PMI, 2004). These processes include: (i) Initiating; (ii) Planning; (iii) Executing; (iv) Controlling; and (v) Closing. The closing phase provides a link between knowledge-management and project-management. It is during the closing phase – when the project completion is formalized and evaluated – that the compiling of lessons learned occurs (PMI, 2004). The closing process is important for this study, where the collection of lessons learned is aimed at assembling the insights and experiences achieved during a project.

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An important aspect of project closure is to capture the experiences, and help organisations to develop knowledge, and thereby to make the facilitation of projects easier. The collecting of the lessons learned is beneficial to an organization, as this increases the knowledge base; and any new knowledge could also be applied in future projects.

The WHD is involved with different types of projects of all sizes, and with others of highly strategic importance. In this regard, project-management plays an important role in the delivery of the health infrastructure because the nature of the work outsourced by the WHD is project-based (Public Works, 1997). The WHD manages knowledge about projects, which essentially represent an overview of the projects being carried out, or for past projects. The

types of knowledge managed comprise: skill profiles, processes, project-management, and best-practice methodologies, among others.

Project closure makes an important contribution to KM, since it mitigates the risk of not transferring knowledge to the organisational memory. The use of predefined knowledge domains supports the structure, and the systemisation in the production of the documents, as well as in the compilation and dissemination of useful knowledge. Project work involves the awarding of tenders to various construction companies and expert consultants for the building of hospital facilities, such as ambulance and community centres, which are custom-built, according to unique specifications.

The WHD is a knowledge-intensive division in possession of knowledge assets that if well-managed can contribute immensely to the efficient delivery of the health infrastructure. These knowledge assets can be broadly categorized as tacit and explicit knowledge. A structured way of managing knowledge is lacking; and consequently, the WHD is faced with challenges relating to the delivery of any new infrastructure, along with the upgrading and maintenance of the existing hospital infrastructure (Van Wyk, 2007).

The WHD contracts the building work to a diversity of constructors and specialists, who follow specific regulated deadlines; and once the project is completed they move on. The tacit knowledge held by these people is important, and needs to be preserved for future improvement purposes. The KM initiative is important for the transfer of tacit knowledge and lessons learned (Teerajetgul & Chareonngam, 2008). With the efficient management of such knowledge, it is possible to enhance quality, as well as customer satisfaction, and expedite delivery times (Lierni & Ribie`re, 2008). A planned effort is, therefore, necessary to enable individuals to consciously share the lessons learned from a project, before they move to the next one (Ajmal *et al*., 2010).

In addition, a proper mechanism for documenting the lessons learnt from various projects is needed to make it possible to assemble and distribute valuable knowledge to other projects.

In addition to managing project-knowledge, an increasing awareness that the public sector is also in the knowledge business has been demonstrated. Government organizations are embracing KM, having realized that they too are faced with competition in terms of funding and the provision of alternative services (Al-Hawamdeh, 2002). Not surprisingly, public sector management has become increasingly results-oriented and customer-focused. Service

delivery has become customer-centric; and governments are now recognizing the significance of KM in making policies and delivering services (Public Works, 2007). The growing demand for better products means that quality services in real time are becoming a pressing issue too. Government departments, therefore, are expected to timeously and constantly provide improved service delivery to the public, in order to ensure client satisfaction. KM can provide a solution to improve such operations and to enhance customer service.

Therefore, this study seeks to explore the role of KM practices and competencies in achieving superior performance in the health infrastructure delivery in the department of public works. The case study is based on WHD, which is that part of government organization charged with providing infrastructural services to the Department of Health (DoH).

1.3 Problem Statement

It is evident that KM is not new in the South African public sector. Government organisations, like the DPW, have been introduced to the practices; but it is unclear how the existing knowledge is handled to ensure improved effectiveness in the delivery of health infrastructure, a core concern echoed by the DoH (Public Works, 2007). The nature of knowledge assets in the WHD is varied; it encompasses a wide range of stakeholders, such as contractors, projects teams, consultants and government employees. However, it is not clear how knowledge generated in the project-delivery process and the actual knowledge sector are preserved, used or shared.

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Given that knowledge has been recognised as an important asset, it is important to seek ways of managing to satisfy such requirements as improved organizational effectiveness, and to meet clients' satisfaction.

From the above presented discussion, it is clear that the main concern lies in effectively managing the existing knowledge assets (explicit and tacit) by:

- Firstly, tapping the tacit knowledge held by the public workforce and construction professionals (sector-tacit knowledge), lessons learned from projects; and
- Secondly, to integrate small quantities of explicit knowledge held within various disparate systems in the filing cabinets, how to standardize such knowledge, and how to make it usable and accessible to the relevant stakeholders.

These problems create difficulties in adopting a single efficient approach to managing information and knowledge between the directorate and other parties involved, such as the contractors in the Department of Health (DoH). As stated by Teece (2000), knowledge that is trapped in the minds of the main employees, inside the file drawers and databases, can provide little or no value – unless it is distributed to the right people at the right time.

These factors have led to the identification of KM as one of the key strategic levers; and there is a need for the directorate to develop sound KM frameworks to guide their knowledge generation, processing and management activities. Evidently, KM is an important aspect of change management.

According to the above background, the research problem in this study was identified as: The knowledge obtained at various DPW projects is not managed properly – causing inefficiencies in the delivery of the health infrastructure. The above-mentioned problems were addressed through the aims and objectives given below.

1.4 Research Objectives

The primary objective of this study was to identify the essential KM factors, and to understand their influence in the effective management of knowledge in WHD operations, and also to examine ways to manage project-knowledge more effectively. In the process of realising the primary objective, several secondary objectives were also identified. Thus, this research sought to address the following additional objectives:

- Determine the factors that influence the poor management of knowledge in the WHD health-infrastructural projects;
- Establish if there exists a KM policy or strategy supporting KM practices in the WHD.
- Identify the factors that would motivate the adoption of knowledge-management in the WHD;
- Establish the enablers and barriers that influence the effective implementation of KM.
- Explore the KM processes essential for transforming knowledge into a valuable organizational asset.
- Identify tools/techniques that can be utilized for knowledge acquisition, conversion, application and protection in the directorate.

- Investigate the potential benefits of implementing knowledge-management practices in the WHD.
- Recommend KM strategies for improving hospital-infrastructural delivery, based on the findings of the study.

1.5 Research questions

In accordance with the identified research problem and the defined objectives, the main research question can be defined as:

What are the factors that influence the poor management of knowledge in the WHD health infrastructural service, and what is the way to manage the project knowledge more effectively?

In order to build up a practical KM framework for application in the directorate, a number of interrelated research questions need to be addressed. The research seeks to achieve these objectives by answering the two main subsequent questions:

- What are the factors that influence the poor management of knowledge in WHD health infrastructural projects?
- What factors would motivate the adoption of knowledge-management in the WHD?
- What are the enablers and barriers that influence effective knowledge-management practices?
- What KM processes are considered essential in transforming knowledge into a valuable organizational asset?
- How can knowledge be acquired, converted, applied and protected within the directorate?
- What are the potential benefits of adopting knowledge-based strategies in the department?

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1.6 Methodology

In order to investigate the proposed research questions, the study identified a single directorate within the department of public works that is directly involved in the delivery of the health infrastructure. This specific directorate was chosen because the researcher believed it would offer a good learning experience. Other reasons for the choice were that it was convenient and accessible (Stake, 2000).

The case was examined qualitatively, using a Case-Study methodology, by recording and analysing the perception and experiences of project-related KM in the studied organization. The Case-Study methodology was selected, since it is perceived to support both quantitative and qualitative approaches – thereby, enabling the researcher to go beyond quantitative statistical results to seek an in-depth meaning associated with the actions and knowledge of the participants (Kyburz-Graber, 2004).

According to Yin (2009), a case-study design is applied to examine in-depth individuals, groups, organizations and other social units within a specific context. Frequently, a case-study design is employed when the boundaries between the unit of analysis and the social setting are not clearly defined. Klein and Myers (1999) argued that the interpretive case-study method can be used to access and understand the research situations through the meanings that people assign to them.

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The data were collected from secondary and primary sources, using multiple-data evidences, namely: a literature review, semi-structured interviews and documentary analysis. The case-study design included the administration of online questionnaires and semi-structured interviews to selected staff members in the department. The response rate from the questionnaire was poor, thus making the research data predominantly qualitative. Given the prevailing situation as regards the data, the researcher used the content method to analyse the data by pattern-matching, theme-building and categorization.

1.7 Contribution of this study

This study's findings add to the extant KM research – beneficial to both the public sector and academic communities. In addition, this study contributes to both academic researchers and public-sector organizations in three ways. ***Firstly***, it leads to a better understanding regarding the current status of KM's implementation and readiness to allow and implement KM

practices. ***Secondly***, it explains the drivers, enablers and processes associated with KM practices in South African government organisations. ***Finally***, some of the potential benefits derived from successful KM initiatives have been highlighted.

1.8 Limitations

The research focus of this study was mainly on the significant role played by KM in the overall improvement of the Departmental performance in health infrastructural delivery. The findings from the research, therefore, are directly applicable only to the DPW. The single case that was used suggests that there is a possibility that the results might not be generalizable beyond the researched organisation – without conducting any further study.

The DPW is a large organization with different divisions, each catering for specific infrastructural delivery. In accordance with the study's scope, the case study in this research did not explore the entire DPW – for scalable reasons. The focus of the study was the building division, and works, such as the health directorate responsible for health-facility building. However, it is important to state that the building division is a core section at the DPW, where significant knowledge is at risk of being lost.

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1.9 Thesis outline

The research is subdivided into six chapters. An outline of every chapter is provided below; and this is intended to give the reader a guideline on the structure and content of each chapter.

Chapter 1 introduces the study, and gives a brief background to the project. Other aspects discussed are: the problem statement, the objectives and the significance of the study under investigation. The chapter further clarifies the research methodology, including the scope and limitations of the study.

In **Chapter 2**, the main focus is on introducing the reader to the nature of knowledge-management in the public sector. A detailed account of the area under study is given and the challenges encountered during the delivery of infrastructural services. The concepts of knowledge, KM and KM models are also addressed here.

Chapter 3 presents a conceptual model of selected KM enablers, namely: culture, structure, strategy and leadership, resources and ICT. The factors that hinder KM practices, as well as

KM processes are discussed. It further presents the proposed components for knowledge-management in the project-environment.

Chapter 4 focuses on research design and methodology, providing motivation for the selection chosen and used in the case study of WHD within the DPW. It also discusses the data-collection methods and analyses.

Chapter 5: Here, the study findings from both qualitative and quantitative methods are interpreted and discussed.

Chapter 6 presents the conclusions drawn from the analyses; and some recommendations are given.

1.10 Summary

This chapter has presented a general direction for the entire research plan. It has also provided the context within which the study was determined. It presented a description of the research problem, and the research objectives, as well as research questions. A summary of the research design and methods has been put forward, in addition to the danger of bias and ways to avoid it. Definitions of the terms addressed in the study, limitations and scope are set out; and the final part of the chapter provides an insight into the other chapters that constitute the thesis.

The next chapter presents the challenges faced by the area under investigation, and the factors that enable or constrain the adoption of KM practices in the public sector.

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CHAPTER 2: THE ROLE OF KNOWLEDGE-MANAGEMENT IN THE PUBLIC SECTOR

2.1 Introduction

The previous chapter presented the purpose of this study. This chapter discusses the literature on public sector KM, the drivers, the objectives and the role. It further discusses the current status of KM in South Africa, as well as the background of the research context, along with the existing challenges encountered in the course of service delivery. This is followed by a discussion of the key components of knowledge, their characteristics and the definition of knowledge-management from varied sources. The subsequent section examines project-knowledge-management objectives – the roles, practices and benefits delivered in the public sector.

The section is built on the input resulting from the published literature and the reviews in public-sector knowledge-management.

2.2 Public-sector knowledge-management

The public sector comprises organizations that deliver the goods and services of the government at a local or national level (Fryer *et al.*, 2007). It deals with numerous stakeholders that cover the citizens, local government, lobbyists, private companies, and the unions, among others. The responsibilities shouldered by the sector are more demanding and quite complicated to manage effortlessly. In this regard, the government – classified as a public body – has specific functions it must fulfil towards its citizens.

A report presented by the United Nations, Economic and Social Council, (2004) shows that government consumes approximately 20 to 50 per cent of the gross national product. Consequently, its actions and behaviour have a deeper impact on the way in which people live and work. Unsurprisingly, the government has been identified as big consumer and producer of knowledge at the same time (United Nations Economic and Social Council, 2004).

Most occurrences of knowledge-management applications – particularly those found in the literature – are embraced by the private sector organizations that exploit knowledge-management practices as a means of achieving improved operations, a competitive edge and overall maximum profits. KM in the public sector setting is less common and its

investigation is usually overlooked, bearing in mind that governments too are faced with challenges and opportunities related to the knowledge economy (Cong *et al.*, 2007).

2.2.1 KM motivating factors in the public sector

In the public sector, the management is of increasing importance for governments in dealing with the challenges created by the knowledge economy. A number of public organizations have adopted the KM approach, basically not driven by the bottom-line considerations (such as maximizing profit) similar to those found in the private sector (Koenig & Srikantaiah, 2004). Rather it is motivated by the need to address factors contributing to:

- The loss of expertise – in order to minimize the costs associated with the acquisition of new knowledge;
- Improving the decision-making within public services;
- Assisting the public in taking part effectively in decision-making;
- Building a competitive community with intellectual capital capabilities; and
- Building up a KM work force (Wiig, 2002:224).

In addition, the focus in the public sector is to protect and improve service delivery to its citizens (Cong & Pandya, 2003). Even if there are differences between the public and the private sector in terms of their objectives, public organizations at all levels, as in business organizations, are finding it essential to overhaul their internal organization, and to search for sources of tacit or explicit knowledge that reside internally and externally of these organizations (Economic & Social Council, 2004).

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KM has become particularly significant in the public sector – given that employees have been identified as the vital knowledge depository (McAdam & Reid, 2000). Some authors believe that KM has the potential to significantly influence and develop the public-sector renewal processes (McAdam & Reid, 2001; Edge, 2005; Monavvarian & Kasaei, 2007). KM can be used further to improve communication within the top management, to instil a culture of sharing, to promote and implement a performance-based reward system for the employees, thereby enhancing overall organizational performance (Monavvarian & Kasaei, 2007).

KM objectives in the public sector

Cong and Pandya (2003: 29) argue that government needs KM for four reasons. Firstly, in the knowledge economy, governments are increasingly facing competition over service delivery

and policy-making: both nationally and internationally from foreign organisations delivering the same services. Secondly, customers demand and receive more customization from knowledge-oriented organizations; so they expect similar benefits from the public service. Thirdly, the retirement of civil servants, and the mobility of knowledge workers across government departments, create new challenges for the retention of knowledge and preservation of institutional memory, and hence the need for the training of new staff. Finally, jobs today depend more on employees' knowledge than on manual skills.

Riege and Lindsay (2006: 25) elaborate on the objectives for KM initiatives in the public sector, as identified by Wiig (2002). They see KM as a means to:

- Maximize efficiencies across all public services by connecting silos of information across different levels of government and across borders, thereby developing new or consolidated systems to improve overall performance and capitalize on a broader, more integrated and more easily accessible knowledge base;

- Improve the accountability and lessening risks by making informed decisions and resolving issues faster, supported by access to integrated, transparent information across all organizational boundaries;

- Deliver better and more cost-effective services by enhancing partnership with – and responsiveness to – the public;

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In their study of the status of KM in the public sector in Nirmala and Shrestha (2004) maintain that the ultimate objective of KM in the public sector is to maximize productivity and to enhance public service delivery. They believe that KM at government level aims to improve the internal processes and to formulate sound policies and procedures for efficient public service delivery and increased productivity.

All these objectives highlight the importance of KM in the public sector. Its goal is to break the barriers that hinder the flow and sharing of knowledge in the public sector. Through KM practices, the possibility of the duplication of efforts between departments and divisions can be minimized. KM improves decision-making in the public sector, as it enables the right knowledge to be received by the right person at the right time, so that s/he makes the right decisions. Nirmala and Shrestha (2004) believe that, for these objectives to be attainable there have to be strong systems and mechanisms to share knowledge, to provide access to

knowledge and expertise, and to retain knowledge in-house. Increased transparency of public service activities can result in building more trust in government among citizens.

Knowledge-management in government organizations

The current literature offers compelling reasons for adopting KM in government organizations. Firstly, government organizations are faced with competition in terms of funding, policy-making and the provision of alternative services (Al-Hawamdeh, 2002; Gottschalk, 2006; Cong *et al*., 2007). To achieve this, government agencies require resources and capabilities (Al-Hawamdeh, 2002). This includes the skills the government organizations employ, and the organisational capabilities built up over time.

Secondly, public sector management has become increasingly results-oriented and customer-focused (Public Works, 2007). The growing demand for better products, and for quality services in the public sector in real time is becoming a pressing issue too (Gottschalk, 2006). Government departments, therefore, are expected to timeously and continuously provide improved service delivery to the public to create client satisfaction. KM can provide a solution to improve operations and to enhance customer service (Cong *et al*., 2007).

The role of KM in the public sector

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The first role of KM relates to the management of explicit knowledge. Although there has been a considerable movement in this direction, KM has not been adopted as broadly in the public sector, as it has in the private sector. Yet both the private and public sectors are facing many of the same pressures from the explosion of information flowing from their digital systems, contributing to excessive attrition and retirements (Koenig & Srikantaiah, 2004). As many government departments are dealing with excessive information stored in disparate databases, it is imperative to consider ways of managing this information and establishing structures to make it accessible to the stakeholders.

Apart from these issues, the role of KM should be clearly defined and given the outmost importance, in order to avoid misconceptions.

Similar to explicit knowledge, tacit knowledge too can be managed to improve organizational performance and to achieve the organizations goals. To many organizations, tacit knowledge seems elusive and more difficult to manage (Pathirage *et al.*, 2007). Another important role of KM management in the public sector is to enable the sharing and codification of tacit

knowledge. Tacit knowledge is articulated in human actions in terms of opinions, commitments, motivation, attitudes and others (Nonaka & Takeuchi, 1995). It is shared through social interactions among individuals within the organization; while information technology and other enabling tools and devices support and maintain human communication and interaction (Pathirage *et al.*, 2007).

The third major role played by knowledge-management in public sector organizations is to facilitate collaboration. The process involves structuring knowledge-sharing communities of employees and stakeholders inside and across organizational borders, capable of working together to attain a shared business objective, and to benefit the relevant community members. Internal and external collaboration within an organization is important for the transfer of tacit knowledge and for building collective know-how (Du Plessis, 2007).

KM can promote collaboration by providing technological platforms and tools that allow for the sharing of knowledge within formal communities, such as online discussion forums. It also supports non-technical platforms for collaboration, such as competency groups (Du Plessis, 2007).

KM further establishes organized procedures to support knowledge flow: both horizontally and vertically within departments and among colleagues (Riege & Lindsay, 2006). It reaches organization externally to help knowledge flow to and from other organizations, clients and the community (Civi, 2000). The access to organizational knowledge helps people to understand the environment, and in turn, to give it meaning. In addition, they can find new and better ways to perform, to be able to work together, to break down barriers, to share their vision, to fill gaps of knowledge, to increase productivity, to satisfy customers, and ultimately, to compete (Riege & Lindsay, 2006).

In order for the government departments to achieve their organizational goals, among them being improved service and infrastructure delivery to the society and clients' departments, it is important to consciously and explicitly manage knowledge. Particularly, the processes associated with the creation, sharing and use of knowledge. Managing knowledge goes beyond information management; it also takes into account the human and social factors (Mason & Pauleen, 2003).

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2.2.2 KM current status

Managing knowledge is not straightforward; and many organizations in the public sector are reported to be grappling with its implementation (Yao *et al*., 2007). KM practices are in progress, and best practices are still emerging; and therefore it is not easy to find a guide defining success (Skyrme, 2002). A typical progression of KM in an organization goes through a number of stages to get to the maturity level, namely: ad-hoc, formal, expanding, cohesive, integrated and embedded KM (Hansen *et al*., 1999; Davenport & Völpel, 2001; Skyrme, 2002):

- Ad-hoc means that KM is informally practised to a certain degree in some parts of the organization.
- The formal stage refers to the level at which KM is acknowledged as a formal project.
- The expanding level involves the increased use of KM practices across various areas of the organization.
- During the cohesive stage, there exists a degree of organization of KM activity – meaning that knowledge can be shared across departmental boundaries more easily.
- The integrated stage involves building common structures, such as a corporate portal to allow employees access to necessary organizational knowledge.
- In the embedded stage, KM is accepted as part-and-parcel of the daily tasks; and it becomes integrated easily into the background.

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Based on the existing amount of research dedicated to KM, however, one could argue that KM has certainly gone beyond the fad stage of uncertainty and resistance, as was once suggested by Holtham (1997), to a level of acknowledgement and acceptance as a primary resource, upon which knowledge-dependent operations should be based (Girard, 2004). Therefore, if properly supported, KM can enhance the performance of organisations and the workforce alike. On this point, both public and private organizations have come to the realization that managing knowledge is no longer an option, as it was before, but rather a necessity for their sustainable existence (Davenport & Prusak, 1998).

To this effect, the private sector has been making strides in adopting new management approaches and techniques (Cong & Pandya, 2003). Management concepts, such as enterprise-resource planning (ERP), total quality management (TQM) and business-process re-engineering (BPR), among others, are some of these new approaches (McAdam & Reid, 2000). KM is no exception – in that it has followed similar developmental trends in the private sector.

Some international organisations, including large organisations and Multinational Corporations (MNCs), such as Buckman Labs, Dow Chemicals, Ernst and Young, Hewlett Packard, Monsanto, and Xerox, have adopted KM practices to enable knowledge-sharing (Reige, 2005). At Buckman Labs for instance, every employee has access to the knowledge base of the company (Buckman, 1998).

Multinational public organizations, such as the United Nations (UN), the United Nations Development Programme (UNDP), and the World Bank among others, have exhibited a common similarity of implementing KM in stages – instead of employing a holistic approach (Ringer-Bickelmaier & Ringel, 2010). A similar trend has also been noted among government institutions in developed countries. Government agencies, like the Department of Labour (DOL) and the Department of the Navy (DON) in the United States of America, for example, provide a few success cases in KM implementation.

Particularly in 2002, the DON was recognized as one of North America's leading knowledge enterprises, the only public organization to receive this kind of recognition (Koeing & Srikantaiah, 2004).

Generally, most of these organisations have moved from the information-management phase to information and knowledge sharing, as well as culture-management, supported by information-management systems and human-resource policies (Koeing & Srikantaiah, 2004). Whilst the informal KM practices can be traced in the public sector, a lack of conscious effort is regrettable, given the ever-increasing significance of knowledge-management in the public sector.

2.2.3 The South African public sector

KM practices across private and public sectors have progressed; and a notable presence is slowly being established by the KM community in both sectors; and public organizations are

slowly peaking up. Similar to elsewhere in the world, the most obvious impact of KM is shown in the South African private sector. The status of KM implementation in South Africa reveals a significant progress of knowledge-sharing past the organisational boundaries in large organisations (Kruger & John, 2010). Some organizations recognize the importance of KM to the extent of formulating KM strategies (Kruger & John, 2010). Among these organisations, the building and service industries are reported to exhibit higher levels of KM implementation, whilst government organizations are rated as the lowest. Clearly, KM in South Africa is well recognised for its contribution to service and product improvement in the private sector; but it regrettably lags behind in the public sector, which needs it most.

An example of a private organization that has achieved considerable benefits through KM is Unilever; one of the largest consumer goods companies. It acknowledges knowledge as an important resource that can assist in achieving and maintaining a competitive advantage. The organisation has invested in various KM initiatives, such as knowledge workshops, training programmes, and the utilization of best practices (Pos *et al.*, 2009). Based on these initiatives, the company has managed to maintain market leadership in a number of brands, such as Lipton, Knorr, Dove and Omo – not only in South Africa, but internationally as well.

In the South African public sector, KM is gradually gaining recognition since its implementation in 2003 (DPSA, 2004). The Department of Public Service and Administration (DPSA) spearheads most of the KM implementation in South Africa's public service; and using its Centre for Public Service Innovation (CPSI), it supports government departments in developing a platform for knowledge-sharing and dissemination across the public sector. It is, therefore, apparent that KM has received attention in South Africa in both private and public sectors; but the public sector is faced with many challenges, and is not performing as well as its counterpart.

Clearly, the private sector differs from the public sector, in that it is more focused on creating competitive advantage and maximising profits for the shareholders (Chong, 2006). In stark contrast, government is not concerned with any competitors, making profit or ensuring high returns for investors. Rather, its focus is on the delivery of essential goods and services to the citizens, as well as ensuring effective administration (Fryer *et al.*, 2007).

It is clear that the required knowledge already exists in the South Africa public sector; it is at the centre of all government operations, and it underpins what government does in striving to

meet its mandate. For the public service, in particular, the need to be more innovative in policy and decision-making and service delivery, the existing knowledge needs to be preserved and better utilized, in order to get good results. The real problem lies with the failure to document and co-ordinate it appropriately; thus, it remains inaccessible for sharing – thereby, leading to the expensive duplication of efforts (Cong *et al.*, 2007). Furthermore, the public sector deals with numerous stakeholders, including the citizens, local government, clients, private companies, and unions, among others.

Consequently, the responsibilities shouldered by the public sector are considerably greater than those of the private sector; and they are too complicated to manage effortlessly (Sinclair, 2008).

2.2.4 The importance of knowledge-management for the Works Health Directorate

Every government, whether at national, provincial or local level, needs infrastructure to support and sustain all public activities, as well as their strategies and operations across the sector (Fryer *et al*., 2007). In South Africa, infrastructural development is one of the primary cornerstones for economic growth. This is reflected by the funding support provided by the National Government, with the significance attached to ensuring continuous improvement of service delivery (KDPW, 2006). The DPW is among the six branches housed in the Provincial government Department of Transport and Public Works (PDTPW).

Others include finance management, corporate affairs, roads infrastructure and traffic management, public transport and community-based programmes. Every branch follows established job objectives, in order to satisfy a diversity of customer's needs and demands. The department's core business is to offer procurement; to design and construct services; to provide the design for hospital buildings, ambulance and community centres; to manage and undertake construction and maintenance; to allocate consultants and professional experts (Public Works, 2004).

Public works can be further sub-divided into three directorates: Works health, Works general and Works education. The DPW has been given a mandate by the government to administer the process of infrastructural implementation to the Department of Health (DoH), by providing technical, professional and other services through one of its directorates (WHD).

Works directorate renders professional and technical services on building designs, maintenance and other related infrastructural services to the DoH in a Provincial Government (PG). In the past, the Department of Public Works (DPW) acted as the fundamental agency for the procurement of capital works all over South Africa. This role was altered in the 1990s, following the government action to improve client departments' accountability (Public Works, 2004). As a result, the DPW in collaboration with the Department of Health (DOH), has developed new directions of focus to create more value for their stakeholders.

This relationship is illustrated in Figure 2-1 below:

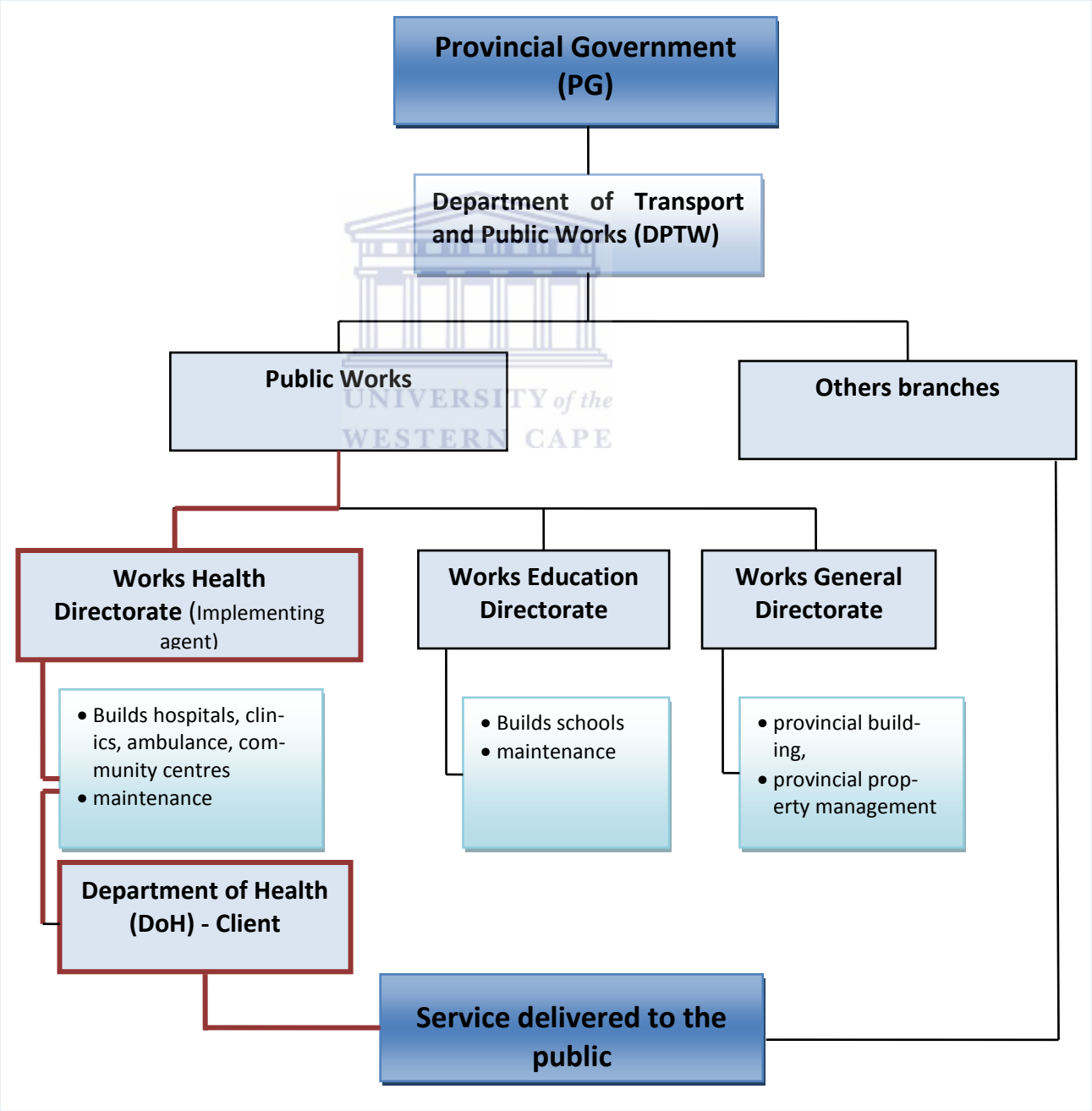

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Figure 2-1: DPW and DoH Framework

The WHD undertakes many projects in relation to maintenance and the construction of new buildings to meet the ever-growing demand for health-infrastructural delivery in the PGWC. These projects differ in types and sizes; and some of them require highly specialized skills to deliver the planned end-products. This research centres on the WHD team of the building division that provides health-infrastructural services. The team encompasses mechanical, electric, structural and civil engineers, architects, quantity surveyors, IT managers, clerks of work and administrative staff.

Most of the work managed by the directorate is project-based, which produces different kinds of knowledge. In an era where knowledge and information are considered essential, strategic tools for enhancing performance, the emphasis on the conscious management of these different kinds of knowledge is necessary, in order to facilitate achievement of the KM.

2.2.5 The need for KM in the directorate

The health-infrastructural delivery process involves a host of related activities, such as research, tendering, procurement, project-management, and also collaboration between wide ranges of stakeholders whose contribution towards the betterment of the entire operation is essential. In response to these challenges, it has become imperative that the DPW should reconsider its position in the knowledge-based economy.

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The following challenges from the preliminary study include, among others, the nature of the project, communication flow, staff turnover, institutional knowledge, scarce skills and comprehensive ICT.

Nature of projects

Some challenges encountered in managing project knowledge are caused by the integral project characteristics (Schindle & Eppler, 2003). The projects are mainly unique, short-term and temporary undertakings. The workforce changes soon after the completion of the project and the knowledge generated in the project may get lost. The participants are forced to adapt quickly to the new conditions and the content of the work. The knowledge-management processes take over routine tasks to allow for knowledge-integration (Grant 1996). These processes support the transformation of temporary knowledge into permanent knowledge by turning tacit knowledge into codified knowledge (Lindner & Wald, 2011).

The temporality and the uniqueness of the characteristics preclude organizational learning (Hanisch *et al*., 2009).

Most of the knowledge asset in the directorate is derived from varied projects. Lessons learned is one important type of knowledge generated from these projects. However, lessons learnt in various projects lack any proper mechanism for documentation and organization; thus leaving it buried in details. This makes it difficult to assemble and distribute valuable knowledge to other projects. Also, the department contracts the work to a diversity of constructors and specialists, who follow specific regulated deadlines; and once the project is completed, they move on. The tacit knowledge held by these people is important; and it needs to be preserved for future improvement purposes.

The KM initiative is important for the transfer of tacit knowledge and the lessons learned (Teerajetgul & Chareonngam, 2008). With the efficient management of such knowledge, it is possible to reduce the project time, to enhance the quality, as well as customer satisfaction, and to expedite delivery times (Lierni & Ribie`re, 2008). A planned effort is, therefore, necessary to enable individuals to consciously share the lessons learned from a project before they move on to the next one (Ajmal *et al*., 2010).

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Communication flow

The DPW collaborates with different groups during the process of health-infrastructural delivery to the client (the DoH). The fragmentation of the groups impedes any efficient communication among the parties involved. The DoH is expected to provide infrastructure plans to the DPW in time to provide allowance for proper planning and delivery. In some cases, the client provides ad hoc projects intended for immediate implementation. The DPW has not done a good job of documenting the processes and capturing the knowledge. Because of the dynamic nature of the client department, the need for KM to improve the existing processes to assist in the management and improve communication between stakeholders is inevitable. Collaboration is an aspect of KM that is important in improving supportive and reflective communication (Lee & Choi, 2003).

Loss of project and institutional knowledge

KM is crucial to the department, partly due to the prospective loss of employees resulting from an ageing workforce. Similarly, high staff turnover in areas such as engineering

professionals and administrative workers in the provincial department stand in the way of the hospital-delivery process (Public Works, 2007). Since staff in the public sector are recognized as important in storing knowledge (McAdam & Reid, 2001), the biggest challenge facing the directorate is to retain the knowledge and expertise of the knowledge worker within the organization. Often, employees gain a wealth of knowledge, while working in a certain position. Once an employee retires, is transferred or leaves an organization, the accumulated knowledge also leaves – unless proper measures are taken to retain it within the organization. In addition, inadequate training, and employees duplicating work by reinventing the wheel further interferes with and hinders the success of knowledge-development and its retention.

Information and knowledge overload

The activities of public organizations are more knowledge intensive. When carrying out these tasks, knowledge is deemed a vital resource important in each of the steps employed to execute the activities of business of government (McAdam & Reid, 2001). Nearly all of the end-products of the governmental activities are delivered as information and knowledge. These activities generate massive amounts of data and information that are directly transmitted to the citizens, the business environment, and the entire society. The hospital-infrastructural delivery process between the agent and client departments is regulated by various policies, rules and guidelines that generate massive volumes of explicit knowledge.

Additional explicit knowledge is created through research and policy-making. KM is significant in addressing the issue of explicit knowledge (Du Plessis, 2007).

Skills shortage

Hospital-infrastructural delivery is dependent, to a larger extent, on employees' skills. The important basic skills are mainly professional and technical (CIBD, 2007). Similar to the challenges experienced in the public sector, the WHD has specific challenges that drive the need for KM initiative. Firstly, the scarcity of expert skills is one of the major problems currently experienced in the entire construction industry (CIBD, 2007). The scarcity of skills in the built environment continues to impede the DPW's attempts to supply the best possible service to the clients (Public Works, 2007). This shortage places pressure on a small number of employees, leaving them with no time for informed interaction with their colleagues.

Secondly, there is a need to tap knowledge from the experts and professionals to ease the problem of skills scarcity within the department undertaking health-infrastructural delivery. A report presented in the Sunday Times on 22nd February 2009 states that South Africa is among the biggest losers in the global race for skills, which highlights the necessity for organizations to retain the skills of their staff. This should be done by investing in staff skills, along with ensuring that personal development training programmes bring about staff retention, which is important – especially in the war for talent (Jackson, 2009:11).

Managing the flow of this expert knowledge is one issue on which the agency needs to focus, especially when creating a knowledge base. If implemented, KM could provide a continuous organized way to capture the accumulated individuals' expertise before a particular project is completed, and for the Department's use in times of shortages. A knowledge base could also assist in the documentation and distribution of best practices.

Subsequently, the WHD is concerned about keeping the staff updated as regard the latest developments in terms of improved hospital design that provide appropriate settings for promoting patients' recovery and healing (Gesler *et al*., 2004). However, the existing information and knowledge regarding hospital design is old; and it is housed in separate documents that in some instances are inaccessible to the relevant people.

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Additionally, hospitals are considered as contested spaces that involve diverse stakeholders trying to find a way to communicate their ideas on good hospital design (Gesler *et al*., 2004).

Advances in the use of information and communication technology (ICT)

New technologies have contributed to the accumulation of vast amounts of information – often housed in disparate files and databases that are not easily available for decision-making (Koenig & Srinkantaiah, 2004). Some technologies, namely: the Internet, the intranet and the World Wide Web supply workers with massive quantities of information (Dave & Koskela, 2009). The ability to utilize this information is largely restricted by a lack of understanding regarding the context and purpose, or the value, of the information. The storage of important explicit knowledge in many locations impedes the accessibility and efficient decision-making. ICT can assist in the formal integration of explicit knowledge by simplifying the process of coding, communicating, assimilating, storing, and retrieving such knowledge (Dave & Koskela, 2009). However, ICT is often not adequate as a knowledge-management system, since people, not technology, are critical to the flow of tacit knowledge – through mentoring,

training, and other similar processes (Nissen, 2006; Polanyi, 1967). For this reason, it is crucial for organizations to consider the use of social processes that are primarily informal, and others that are more formal, to facilitate the transfer of knowledge. This could include on-the-job training, meetings, transfer of personnel, and personal discussions, as well as consultations to exchange knowledge (Syed-Ikhsan & Rowland, 2004a).

In the public sector, organizations are slow in dealing with the human aspect of KM practices.

2.2.6 South African government initiatives

South Africa has been making strides to improve service delivery by initiating programmes in the public sector. Since 1994, when South Africa became a democratic country, the public sector has undergone numerous changes in its service-delivery efforts. The sector has sought different initiatives to improve the service-delivery processes amidst expensive developmental challenges (Russel & Bvuma, 2001; Pillay, 2004; PMG, 2007). This need for constant improvement in the public service has resulted in the government adopting three initiatives. These are: the Batho Pele principles, Public-Private Partnerships (PPP), and Alternative Service Delivery (ASD).

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The Batho Pele Principles

The *Batho Pele* Principles were introduced in 1997 by the Department of Public Service and Administration (DPSA). These principles are included in 'The White Paper on Transforming the Public Service'. Batho Pele means 'people first'; and the white Paper encompasses eight guiding principles provided to the public servants regarding the rights of those whom they serve. These eight principles are: consultation, service standards, access, courtesy, information, openness and transparency, redress as well, as value for money (NPI: 2004:28). Their main purpose is to get public servants to be more service-oriented, to provide maximum excellence in service delivery, and to commit to constant improvement in service delivery.

The *Batho Pele* White Paper puts more emphasis on serving the public interest, that is, the citizens. It further specifies that citizens have the right to expect a high standard of service delivery, and that their right of access to information should be respected. The principles are widely adopted in government organizations; but the government is faced with difficulties in transforming traditional bureaucracy that is clouding the knowledge-sharing process (Chiem, 2001; Seba & Rowley, 2010).

Public-Private Partnerships

The public sector has experienced more participation of the private sector in the delivery of infrastructural services. This trend is driven and underpinned by the necessity to become more efficient with regard to cost and service delivery. The Public-Private Partnerships' (PPP) initiative was implemented in 2000, and put into operation through the National Treasury Department (Russell & Bvuma, 2001). The PPPs are based on stipulated guidelines aimed at providing departments and provinces with an organized approach to the issues; and they emphasize more on value for money, affordability, transparency and a structured project management-implementation framework (Department of Finance, 2000).

However, the move towards reforming bureaucratic structures through promoting Batho Pele principles that focus more on customer-service behaviour and the Treasury's advocacy of public-private partnerships does not seem to be providing the required solution. Indeed, further measures like alternative service delivery are essential to cover all the spheres of infrastructure and service delivery if improved performance is to be realized.

Alternative Service Delivery

The Alternative-Service Delivery (ASD) initiative that followed later allowed for the selection of varied techniques or approaches in facilitating service delivery. Alternative-service delivery involves different strategies intended to make available innovative delivery solutions to customers (Russell & Bvuma, 2001). These strategies promote the identification, development and adoption by public departments and agencies of methods of delivering public services other than those delivered by the traditional, hierarchical bureaucracy. This initiative enables management to select a more suitable option from a wide range of techniques or approaches designed to bring service-delivery changes ((Russell & Bvuma, 2001).

The three initiatives are extremely useful, as they form the basis of a calculated change-reform process in the service and infrastructural delivery. Additional legislation is the Constitution Act 108 of 1996, which lays the emphasis on the significance of service delivery in South Africa (Republic of South Africa, 1996). These initiatives were established in an effort to transform and improve public service and infrastructural delivery within departments, and the DPW is not an exception. The government has shifted to an alternative approach in managing knowledge assets.

2.3 Defining Knowledge

Like KM (discussed in Chapter 1), the term knowledge lacks a single commonly accepted definition. A variety of definitions ranging from practical, conceptual to philosophical viewpoints, and others, from wide to narrow definitions exist (Pathirage *et al*., 2007). Given the many definitions, it is almost impossible to find a particular one that entirely presents the real meaning in a given setting. Spiegler (2000:2) describes knowledge as "…*that slippery and fragile thing or process we have a hard time defining. It has the curious characteristic of changing into something else when we talk about it*".

From the Oxford dictionary, knowledge is defined as *facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject.*

Knowledge is considered to be a true and justified individual belief that enhances a person's ability to act (Nonaka & Takeuchi, 1995). It can also include both the beliefs of groups or persons, and it is closely related to performance (Van Krough *et al*., 2000: 27), such as increasing a person's ability to perform effectively (Alavi & Leidner, 2001). In an organization, knowledge comprises the collection of know-how, experience and information used by individuals and workgroups in performing their tasks (Vasconcelos, 2005). Davenport and Prusak (1998: 5) define knowledge as;

> "*…a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information."*

Referring to the above, and to other attempts to define knowledge, there is no single view or definition of knowledge, which adequately explains the difficulties experienced by KM scholars and practitioners in developing a uniform approach. Knowledge entails what people know; and it does not exist without somebody knowing it. Drawing from the definitions discussed thus far, it is clear that knowledge exceeds justified true belief. It does exist outside a person's head in the form of organizational processes, services, products, facilities and systems (Davenport & Prusak, 1998).

These types of knowledge still require human interaction to create any value from them.

The definition given by Davenport and Prusak (1998) essentially covers the significant elements of knowledge, which consist of the context, relationships, new knowledge and organizational aspects. Examined closely, it also touches on tacit and explicit knowledge by

simply providing an indication of the distinction between the two forms of knowledge; that is, knowledge residing in people's heads and codified knowledge that is stored within organizational structures. The definition provides a clear picture of knowledge being more than information.

To recognize KM, one must first have a clear picture of the true essence of knowledge. Therefore, the working definition of knowledge for this study is adopted from Davenport and Prusak (1998: 5). This is because effective KM requires an understanding of what constitutes 'knowledge', since how it is managed will depend on how it is viewed (Scarbrough *et al.*, 1999). Given the different views presented on knowledge, it is imperative to examine these approaches in the following section(s).

The different approaches (taxonomy) to knowledge

There is a variety of perspectives on knowledge that emphasise the lack of consensus in its definition. The different perspectives deemed relevant for this study are: data, information, knowledge continuum; individual and organizational perspectives. For all the mentioned views, each view proposes a different view to knowledge, a different approach for managing knowledge, and a different implication of KM.

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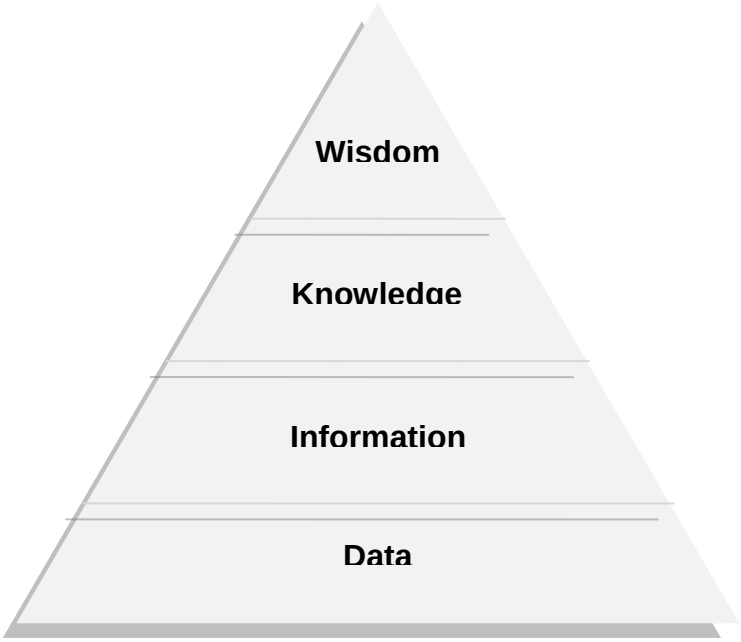
2.3.1 The data, information and knowledge view

By scanning an array of literature sources, this study identified various attempts by different authors to explain knowledge by contrasting it with concepts, such as data and information. Some author's attempts go no further than merely describing knowledge data or information. This interchangeable use may be misleading, especially to organizations intending to make sense of KM. The researcher asserts that the apparent failure to draw clear distinctions between knowledge and information has a major impact on the chance of KM to advance as a discipline. Unless this is done, knowledge-management will forever be confused with information management.

As such, it is imperative to clearly distinguish the difference and the relationship that exists between these terms – together with the roles they play in the organization, in order to understand the depth of knowledge.



Source: (Adapted from Cong & Padya, 2003)

Figure 2-2: Knowledge hierarchy

In the information systems literature, various academics and KM authorities make a distinction between the three related, yet discrete, terms: data, information and knowledge (Davenport & Prusak, 1998; Alavi & Leidner, 2001; Cong & Padya, 2003; Girard, 2004). Their interpretation is hierarchical in nature, with data forming the basis upon which information builds to a pinnacle of knowledge. This relationship assumes a hierarchical structure, as shown in **Figure 2.2**.

In some instances, authors group together the three terms into one single term: that is, knowledge. The unfortunate outcome of this kind of grouping the terms leads to the fallacy that data-processing, information-management and knowledge-management all mean the same thing (Girard, 2004). In other instances, the pyramid is extended to include wisdom (Cong & Padya, 2003).

Data appears in the first phase of the knowledge hierarchy. Data in its correct use means raw facts, concepts, or instructions that can be communicated, interpreted, or processed by humans or automatic means (Bhatt, 2001). Data consist of separate unorganized facts, such as numbers, letters, symbols, audio-visual images, and others. In organisations, data merely exist without considerable value for managerial decision-making; however, they are still

needed for any organization. They are used for the purpose of generating information within organizations (Amidon, 1997).

Information is exhibited in the second phase of the knowledge hierarchy. Information comprises a part of data. It consists of data that have been assigned some meaning, whenever the individual uses the data for an intended purpose (Bhatt, 2001). Drucker (1998:5) defines information as "*data endowed with relevance and purpose*". It is often suggested that information constitutes a part of knowledge, but not the entire component (Al-Athari & Zairi, 2001). Information comes in the form of published documents or recorded reports stored in computer databases. In addition, it is comparatively easy to organize, share and apply information to problems; making it easier and quicker to transfer from one place to another. Information alone does not create much potential for strategic action. Therefore, more value is likely to be derived when it is combined with human interpretation, is found in individual contexts, and exists as experiences expected to inform individuals and drive organizational success. Knowledge is significant in value delivery.

Presented in the third phase of the hierarchy, there is the knowledge which has been given close attention in both research and practice. Knowledge is information, which has been used and becomes a part of an individual's experience base and behavioural patterns (Davenport *et al.*, 1998; Davenport & Prusak, 2000; Awazu, 2004). In an organization, knowledge is seen as the understanding people possess regarding the customers, the products, processes, mistakes and successes (Grayson & O'Dell, 1998). This knowledge may reside in databases or through the sharing of experiences and best practices, or through other sources both internal and external to the organization.

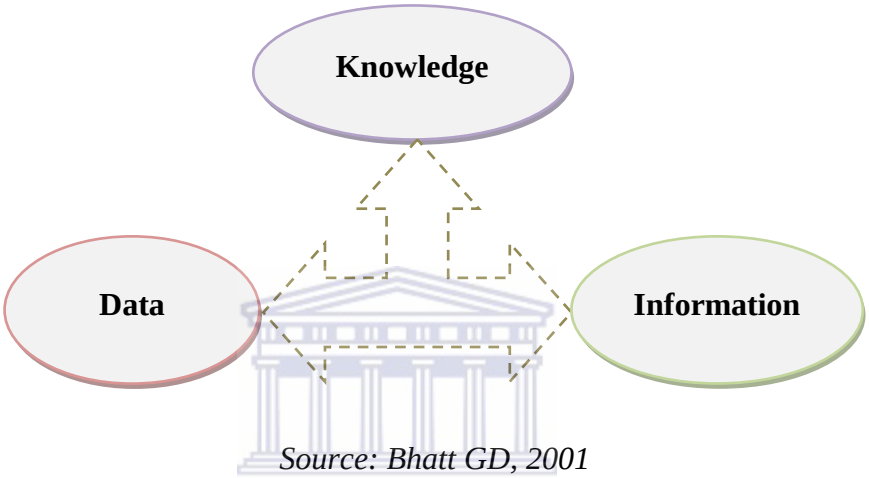
Knowledge is about people, it comes from people and their experiences, and it is through their experiences that knowledge can be built on. Knowledge has more value than data and information, since it is closely connected to the, action and gives meaning and insight.

The hierarchy of Cong and Pandya (2003) concludes with the level of wisdom. This level assumes the highest level of understanding … Organizational knowledge accumulates over time, and enables firms to attain deeper levels of understanding and perception that lead to business astuteness and acumen, all of which are characteristics of wisdom. Wisdom is acquired as organizations gain new knowledge through the transformation of collective experiences and expertise.

Davenport and Prusak (1998) argued that organizational achievement and failure can often rely on understanding which of them is required, recognizing the one in possession, in addition to understanding what can be done with each of them (Davenport & Prusak, 1998).

2.3.2 The recursive relations between data information and knowledge

Bhatt (2001), on the other hand, argues that the relationship between data, information, and knowledge is 'recursive', as shown in **Figure 2-3.** This disagrees with the notion that knowledge is a higher-order form of information.



Source: Bhatt GD, 2001

Figure 2-3: The recursive relations between data information and knowledge

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The difference is based on the level of organisation and interpretation to which each of them is subjected. Value is added to data, turning these facts into information. Information becomes knowledge when it is processed in the mind of an individual. This knowledge then moves down the value chain and becomes information. The data, information and knowledge view provide a way of understanding different concepts by presenting the hierarchical relation between data, information and knowledge with each varying in context, usefulness and interpretability. Two significant implications can be drawn from this view.

The nature of knowledge

Knowledge is different from other traditional assets, such as land, capital and labour found in most organizations (Drucker, 1998; Smedlund, 2008). Knowledge is constructed from data that are initially processed into information (Pathirage *et al.*, 2007). From an intangible asset aspect, knowledge is essentially different from data and information, as indicated in the discussions of various characteristics that will follow.

Knowledge has an element of subjectivity to it (Jùrgen *et al.*, 2003). A piece of knowledge can mean different things to different people – especially, to managers involved in decision-making. Different understandings might lead to different perceptions and interpretations, which in return can lead to mistakes, confusion and ultimate failure (Jùrgen *et al.*, 2003). Knowledge can be transferred and applied to diverse contexts, consequently bringing value to individuals and organisations (Lin, 2007).

It is not easy to obtain knowledge. A part of organizational knowledge is sometimes buried deep in people's minds (McAdam *et al.*, 2007). The other part might be lying undisturbed, hidden in libraries, organizational databases or repositories, filing cabinets and others (Riege & Lindsay, 2006). Extracting knowledge from the individuals possessing it remains the biggest management challenge in organizations (Pathirage *et al.*, 2007). Organizations benefit from understanding the existing types of knowledge, and also knowing where they reside.

Knowledge often increases in value, unlike other traditional assets like land, labour and capital – and even more so when it is shared (Malhotra, 2000; Sveiby, 2001). Employees fear that when they share their knowledge they are actually giving away their power. This is not necessarily true, especially within an organizational setting. This is a cultural issue that should be dealt with by top-level management.

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Knowledge is derived from the ability to capture, classify, verify, organize, access, comprehend and apply information efficiently and effectively (Monavvarian & Kasaei, 2007). The conversion of data and information to knowledge can immensely increase the ability of organizations to come up with actions to help in addressing their goals. An organization's effectiveness relies on its ability to access correct information, perform relevant analyses, and to make decisions to respond quickly to situations (Malhotra, 2000).

Government departments gradually classify these needs, irrespective of the obstacles created by management to data and information. The following section explores the distinction between data, information and knowledge, and provides the basics of knowledge-management.

2.4 The classification of knowledge

Knowledge is categorized into several types; and these types might differ given the type of organization and the context. For example, the classification of knowledge in a government

organization may differ from that in a private firm. KM authors separate and characterize knowledge into broad categories. The different types of knowledge include individual knowledge and organization knowledge (Wiig, 1993; Nonaka, 1994; Cong & Pandya, 2003; Monavvarian & Kasaei, 2007). Individual knowledge resides in an individual's mind; whereas organizational knowledge is created during interactions between technologies, processes and people. Similarly, Liebeskind (1996) distinguishes between the technical and strategic types of knowledge: Tacit, explicit and cultural knowledge (Choo, 2002).

Other dimensions of knowledge have been categorised as explicit, implicit and tacit (Krogh *et al*., 2002). However, the most commonly characterized types of knowledge are explicit and tacit knowledge (Nonaka, 1991, Nonaka, 1994; Srikantaiah & Koenig, 2000).

2.4.1 Tacit Knowledge

The concept of tacit knowing originated from Michael Polanyi, a renowned scientist and philosopher (Polanyi, 1958, 1966); and it was expanded on by Nonaka and Takeuchi (1995). It remains a highly discussed subject in the area of KM. Many writers have come up with different definitions. Tacit knowledge is described as human brain power (Teerajetgul & Chareonngam, 2008). It is a form of knowledge associated with individuals, their behaviour and perception; and thus it is highly personal and frequently hard to communicate (Monavvarian & Kasaei, 2007).

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It is further described as the experience and know-how that people have in their minds. Some writers refer to tacit knowledge as embedded knowledge (Madhaven & Grover, 1998); others as see it as practical know-how (Koshinen, 2003); and it is hard to articulate via formal language (Teece, 1998a). It is easy to communicate through media communications, such as correspondence, instructions, building specifications and drawings (Teerajetgul & Chareonngam, 2008). Sometimes, people may not be aware that they have it; or they may not know how valuable it is.

It is obtained from varied circumstances like intuition, perception, senses, physical experience, and others. It can be very valuable, as it provides a context for ideas, experiences, people and places.

According to Nonaka and Takeuchi (1995), tacit knowledge is fundamental for building organizations' knowledge. It is a useful component in work and workplace learning

(Teerajetgul *et al*., 2009). Unlike written knowledge, this type of knowledge is believed to be much more difficult to manage, even though the ability to manage it can promote organizational performance (Palmer & Platt, 2005). Tacit knowledge can only be made available for other employees' benefit through conscious efforts, such as interviews, mentoring programmes, the documentation of decision-making, among other means applicable in gathering insight on how individuals perform their jobs.

New knowledge, or new forms of knowledge, are created from the interaction between the two forms of knowledge – that is, explicit and tacit (Nonaka &Takeuchi, 1995). Even though the importance of tacit knowledge is recognised, there is a general agreement that it is difficult to it share among groups and individuals – as opposed to explicit knowledge.

2.4.2 Explicit Knowledge

Explicit knowledge is referred to as objective knowledge that can be captured and documented or stored in databases and shared through information technologies (Monavvarian & Kasaei, 2007). It can be articulated in words and numbers, and shared through policy statements, procedures and instructions, drawings, white papers, published articles – such as papers, books and others (Liebowitz, 1999). Explicit knowledge differs from tacit knowledge in that it is codified in a form that makes it easier to be transferred; whereas, tacit knowledge is highly personal and difficult to formalize (Nonaka and Takeuchi, 1995).

These two types of knowledge are inseparable, since tacit knowledge is part and parcel of all types of knowledge.

2.4.3 Organizational Knowledge (OK)

Organizational knowledge is knowledge that is shared amongst organizational employees (Liebowitz, 1999). It includes corporate knowledge and shared understanding between individuals (Sveiby, 1997). OK is perceived to be very important in the public sector, since people have been recognized as the main repositories thereof (McAdam & Reid, 2000; Syed-Ikhsan & Rowland, 2004). It is created, managed and distributed by individuals who act separately in a decision domain. It is derived from the interaction between tacit and explicit knowledge (Nonaka & Takeuchi, 1995).

2.5 Defining Knowledge-Management

KM is defined in different ways by various authors across disciplines, with definitions showing variations in scope and content (Wiig 1994; 1997; Monavvarian & Kasaei, 2007). Practically every paper written on the subject matter includes a definition of some sort. The complexity behind defining KM can be attributed to the failure to recognize knowledge itself (McAdam & McCreedy, 1999). Furthermore, different authors have presented a broad range of interests, views and issues on KM (Audrey *et al*., 2001).

The concept KM implies that knowledge can be managed; while in a real sense, the management of knowledge is about managing people. Consequently, some researchers and practitioners define KM as a discipline, albeit, a multidisciplinary field (Jasimuddin, 2006). Others define KM as a strategy, whilst yet others define it as an object. There is also a perspective that presents KM as a process, whereby various steps are applied in the process of managing knowledge. Presenting different definitions, however, could be a step towards understanding the real nature of knowledge.

KM as a Multidiscipline

KM is a discipline that can be described as a multidisciplinary field (Jasimuddin, 2006) that is not systematically organized, but spread into, and associated with many other fields (Despres & Chauvel, 1999; Chong, 2006). In effect, KM has strong roots in organisational theory, cognitive science, anthropology, computer science (Chae & Bloodgood, 2006), human-resource management, total quality management, and information systems, amongst other disciplines (Moffet *et al*., 2003 support this claim). As a multidiscipline, therefore, it has been harder to arrive at a consensus for a standard definition of KM (Jasimuddin, 2006).

KM as a strategy approach

KM is also viewed as a strategy. Management researchers define KM as a process through which an organization creates value from its knowledge assets that are rooted in individual and organizational capabilities which would include skills, as well as experience (Nonaka & Takeuchi, 1995). In agreement with this view, Sveiby (1997) defined KM as the ability to generate value for organizations through the leveraging of knowledge assets. Pan and Scarbrough (1999) defined KM as the capacity to share knowledge, ideas, viewpoints or

solutions between individuals – thereby making it a significant strategic benefit that any organization could attain.

Malhotra's (1998) definition is widely recognized. This author views KM as a strategic approach encompassing three main parts: organizational processes, information technology and people. The organisational processes jointly operate with the information technology to process the data and the information, and would also include the creative and innovative ability of people. A further definition of KM, according to the American Productivity and Quality Centre, describes KM as a strategy used to discover, capture, and leverage knowledge (Monavvarian & Kasaei, 2007), and also to deliver knowledge to the right people at the right time (Ho, 2009).

KM as an Object

Management-information systems researchers, such as Alavi and Leidner (2001), Chong (2006), as well as Seba and Rowley (2010), and practitioners such as Quintas *et al*. (1997) in addition to Fahey and Prusak (1998), among others, consider KM to be a technological issue, and they treat knowledge as an object. Chong (2006) suggests that knowledge is presumed to be an object that can be identified and controlled by computer-based information systems. A further argument presented from this perspective views knowledge as a thing that is easier to store and manipulate (Alavi & Leidner, 2001).

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In an organizational context, for example, KM as a thing would be equated to a managing culture, whereby culture is seen as a complete separate set of components that are attached to an organization, and that can be managed correctly by people (Quintas *et al*., 1997). Similarly, Fahey and Prusak (1998) treated an organization's knowledge as information. Approaching it from this angle, knowledge is seen as an object, or a thing that exists independently, that is easy to capture, to transmit between individuals, to store and also to control it (Fahey & Prusak, 1998).

Thus, knowledge as an object refers to dynamic information that can be acted upon in order to create value (Seba & Rowley, 2010). In a project-based organisation, for instance, treating KM as an object would be using KM systems, such as project-history systems (Maqsood *et al*., 2006) to identify and utilize knowledge assets acquired in projects, such as individual experiences, lessons learned and best practices (Ribeiro & Ferreira, 2010).

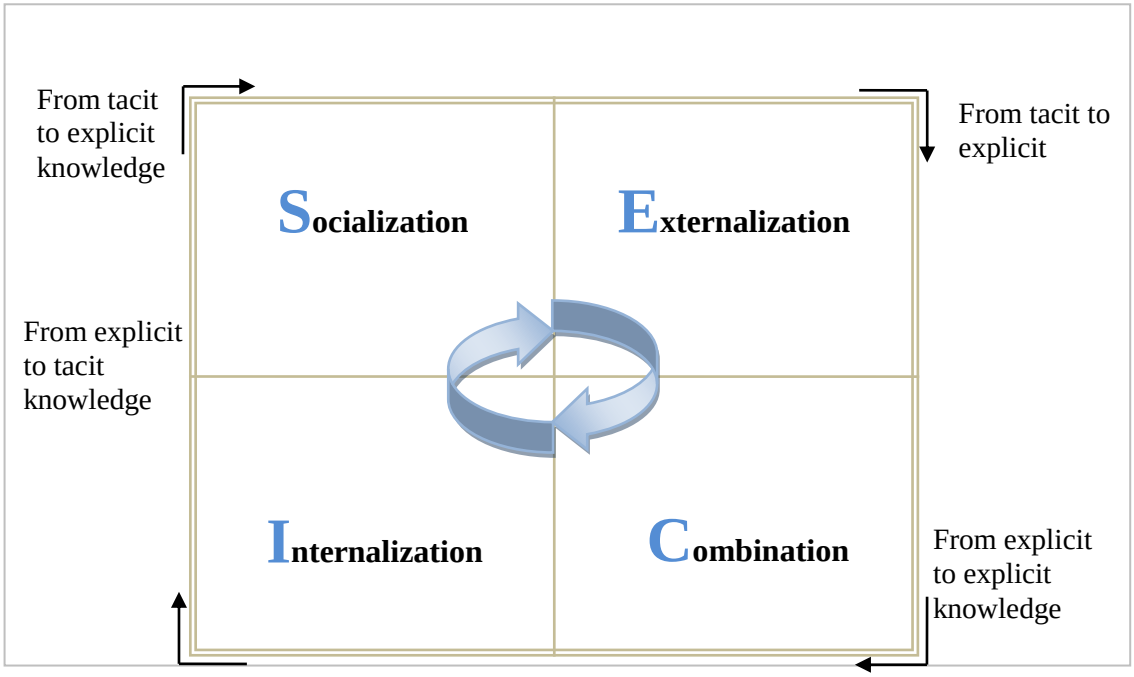
This view appears to oversimplify the KM concept, since KM is not all about the use of technology to manage information. Technology remains an important enabler; but it is not a central component of KM. The creation and sharing of knowledge is made possible by changing people's behaviour, the organizational structure, decision-making, work practices and business strategies.

2.6 Knowledge-management models

In order to understand the contribution of knowledge-management in connection with organizational performance, it is important to consider the different models presented in the literature. There exists a wide range of KM models depicting KM activities, as suggested by various authors. McAdam and Reid (2000); McAdam and McCreedy (1999) assert that KM models can be broadly classified into three main groups: knowledge-category models, intellectual-capital models, and socially constructed models.

Knowledge-Category Models (KCM)

The first category of KM models consists of 'Knowledge-Category Models'. With these types of model, knowledge is categorized according to its distinct parts (McAdam & McCreedy, 1999). In essence, the KCMs provide a conceptual representation of KM, where knowledge management is regarded as a 'knowledge-creation process' (Nonaka & Takeuchi, 1995).



Source: *Nonaka & Takeuchi (1995:59-64)*

Figure 2-4: Nonaka's SECI knowledge-management model

Knowledge creation in an organization is a process that collects pockets of individual knowledge and strengthens it through the application of the Social, Externalization, Combination, and Internalization (SECI). The process is shown in Figure 2-4.

In constructing the model (see Figure 2-4 above), Nonaka and Takeuchi (1995) identified four modes of knowledge conversion in an organisation. The first step in the model is socialization, which assumes that common tacit knowledge can be created through shared skills and experiences by observations and limitations – thereby creating tacit knowledge from group-tacit knowledge. Nonaka and Takeuchi (1995) highlighted the fundamental importance of individual knowledge in the creation of organizational knowledge. Likewise, the transfer of the new knowledge between different individuals within an organisation is vital to the knowledge-creating process.

The second mode of knowledge conversion is the process of externalization, which assumes that tacit knowledge can be converted to explicit knowledge by means of metaphors, models and sketches, and the articulation of best practices, among others. The third combination mode comprises assembling new and existing explicit knowledge into a systemic knowledge – probably with the aid of computer networks and databases. Lastly, internalization is the process of incorporating explicit knowledge into tacit knowledge, like know-how, through the use of the hands-on approach (Riege, 2005).

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To manage the two types of knowledge means working towards the tasks of applying, sharing and developing knowledge successfully – this is the work of KM.

Intellectual-capital models

Another model used to conceptualise knowledge is that of the intellectual-capital models. Bontis (1998) defines intellectual capital (IC) as the collective knowledge embedded in an organization's employees, their practices, as well as the social networks. The IC Model illustrated below in **Figure 2-5** provides a revised version of the original IC model (Bontis, 1998).

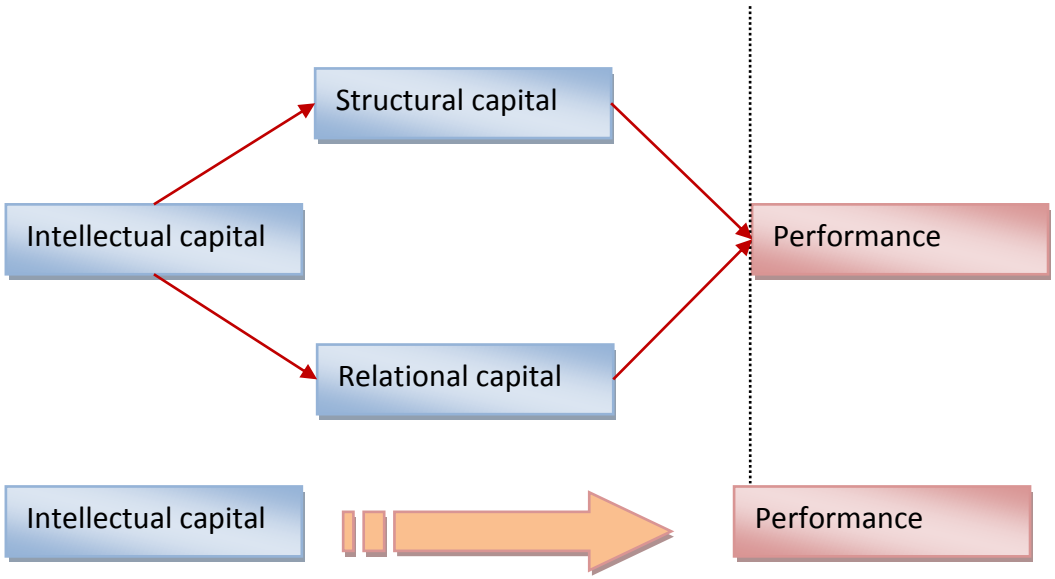


Figure 2-5: Model from the University of Western Ontario *(Source: Bontis, 1998)*

IC encompasses three interrelated elements, namely; human capital, structural capital and relational capital (Bontis, 1998; Kong & Prior, 2008). Human capital involves a mixture of an organization's human resources, the tacit knowledge possessed by either working teams or individuals, and their ability to learn and generate knowledge (Sullivan, 1999).

According to Kong and Prior (2008), the structural capital of Bontis (1998) rests in between the relational and human capital – to provide the supporting basis that enables optimal performance from employees, resulting in the improved overall performance of an organization. For that reason, the structural capital component contains stocks of knowledge and intangible assets derived from organizational structure, along with the activities associated with the technological aspects of information and the development of management systems (Kong & Prior, 2008).

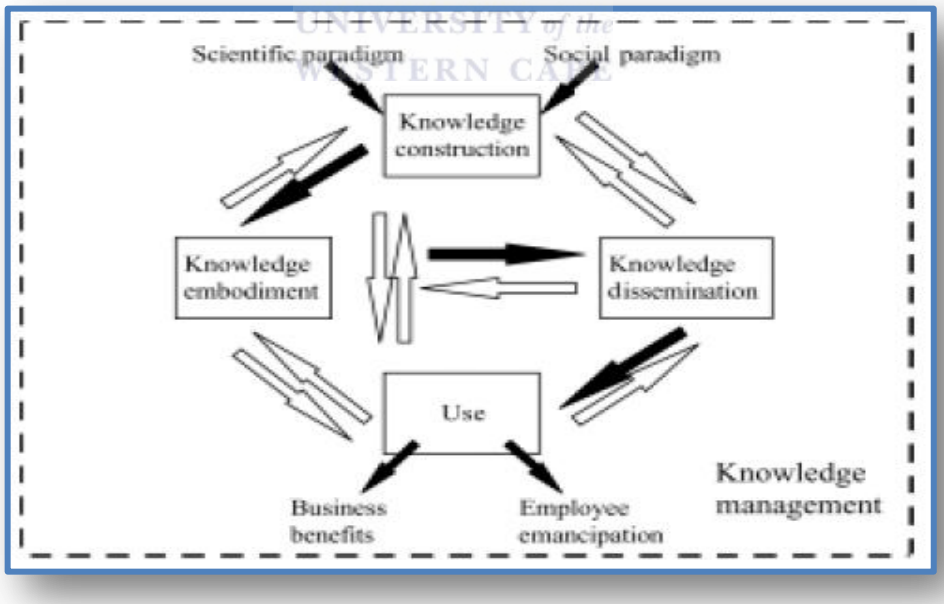
The third component of IC is the relational capital. This is described as the knowledge integrated in the organization and people resulting from the value created from interactions with external relationships, such as business partners, clients and suppliers (Kong & Prior, 2008). With IC capital models, knowledge is seen as any other organizational asset, and as such it can be treated as an asset (McAdam & McCreedy, 1999). When these intellectual capital components are collectively and exceptionally linked in a clear way, this could then help organizations to achieve a competitive advantage (Kong & Prior, 2008).

Socially constructed models (SCM)

With SCM, knowledge is broadly defined and portrayed as essentially tied within the social and learning practices of an organization (McAdam & Reid, 2000; McAdam & McCreedy, 1999). The figure below illustrates a revised example of a SCM of KM presented by McAdam and Reid (2000); and this was initially adapted from Demarest's (1997) model of KM.

The model illustrated in **Figure 2-6** depicts four attributes of KM within an organization, namely: knowledge-construction, knowledge-embodiment, knowledge-dissemination, and knowledge use/benefit.

- Knowledge construction within organizations that encompasses social knowledge construction;
- The embodiment of knowledge within organizations through explicit programmes, as well as social interactions;
- Knowledge-dissemination follows after embodiment, where the acquired knowledge is spread throughout the organization;
- Finally, knowledge is viewed as being of economic use in connection with various organizational outputs.



Source: A socially constructed model of knowledge management (Source: McAdam and Reid, 2000)

Figure 2-6: Modified version of Demarest's (1997) knowledge-management model

McAdam and Reid (2000) used the socially constructed model to compare public sector and private sector KM processes; and they came to the conclusion that ‘‘organizations recognized the need for both a scientific and a social construction of knowledge’’ (2000:327); and the public sector was found to be more advanced in this regard. As for knowledge-embodiment, the public sector organizations were seen to depend on people-based knowledge-embodiment more than did those in the private sector. Knowledge-dissemination in the public sector was also more reliant on people-based approaches. Finally, with regard to knowledge use/benefit, the public sector was found to be more responsive than the private sector.

2.7 Conclusion

The chapter began by giving a wide overview of various concepts, including knowledge and knowledge-management. In particular, attention was drawn to the knowledge-management process, together with three models that depict the process. Knowledge-management in the public sector is presented, as well as its perceived role in this sector. The organisational components crucial in the management of knowledge are identified as enablers, as indicated by various authors in the literature. In the chapter that follows, these components will be discussed in detail; and their applicability will be comparatively presented in the form of project-knowledge management.

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CHAPTER 3: SIGNIFICANT KNOWLEDGE AND PROJECT MANAGEMENT-SUCCESS FACTORS

3.1 Introduction

The preceding chapter presented a common background to knowledge-management in the public sector. The current chapter addresses two main components: knowledge-management and project-management. These two are further subdivided into various logical sections. In the first component, several critical factors that enable or restrict knowledge-generation and knowledge-sharing in the public sector are discussed at length, together with a few examples from the private sector.

The focus of the second component is on health-infrastructural delivery, touching on project-management, in addition to the key knowledge factors that facilitate project success. The challenges encountered in project knowledge and information management are also presented.

In an organizational setting, deciding on the knowledge to be created, used and disseminated, and also identifying the tools and techniques for sharing it, along with the people with whom it is to be shared provides the starting point for managing knowledge. The continuous exploitation and reusing of the shared knowledge eventually creates value for the organisation (Cong & Pandya, 2003).

Knowledge-management is recognised as a primary component for effective service delivery in South Africa. According to the South African Government Information Technology Officers Council (SAITOC) (2004), KM promotes an improved understanding of the public service competencies that are required to accomplish organisations goals. It further assists in meeting citizens' needs, preserving systems and resources, enhancing strategic objectives, assembling organisations' and performance needs, in addition to providing alternative options (SAITOC, 2004*)*.

There exist many KM practices initiated in organizations, which could be generally construed as contributing to the knowledge plan (Davenport & Prusak, 1998). These practices encompass a wide collection of organizational practices connected with the creation, capture,

and the dissemination of expertise and promotion of knowledge-sharing inside an organization, as well as the outside world (Yao *et al.*, 2007).

The two key areas of KM practices are identified as the sharing of existing knowledge and the creation of new knowledge (Skyrme & Amidon, 1999). The creation of new knowledge often proves to be the most valuable practice in the long run (Skyrme & Amidon, 1999).

KM utilizes classical management tools and techniques aimed at promoting knowledge-sharing and knowledge-creation systematically. Organizations implementing KM practices have previously concentrated more on the application of technical tools to address the issue of information accessibility and the reuse of documents (Koenig & Srikantaiah, 2004). When attempting to manage knowledge in a construction organisation, there are three crucial attributes that should be considered: product, process and people (Egbu and Robinson, 2005).

These projects follow technology, people or process inclination. A wide range of practices and processes have been used in this regard; and diverse tools have been employed to realize KM objectives**.**

3.2 Enabling knowledge in public sector organizations

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Knowledge has been recognized as a powerful tool, which has the ability of making changes in public organization in terms of creativity and performance enhancement, among others (Syed-Ikhsan & Rowland, 2004a). In a similar vein, Ribeiro (2009) affirms that improving organizational performance is dependent on KM. However, the application thereof is not as straightforward as it appears – given the various components that drive and underpin its management. Effective KM is thus dependent on a combination of factors presented in the literature, some of which are within the control of the organization, while others are not.

3.3 KM enablers

KM enablers are described as the driving forces in carrying out KM (Yeh *et al*., 2006). Some authors refer to KM 'enablers' as being critical success factors (Chong & Choi, 2005; Chong, 2006); others refer to it as comprising organizational elements (Monavvarian & Kasaei, 2007) or influencing factors (Syed-Ikhsan & Rowland, 2004b). This study prefers to use the term "enablers". These comprise the means by which organizations promote knowledge in a continuous way (Ichijo *at al*., 1998). These factors support the creation of knowledge and its

protection; and they enable knowledge sharing within an organization (Stonehouse & Pemberton, 1999; Lee & Choi, 2003).

If government organizations are to implement a KM strategy effectively, then managing these enablers is critical. A number of models exists that attempt to describe KM enablers (Davenport & Prusak, 1998; Moffet *et al.*, 2003; Chong & Choi, 2005, Yeh *at al.*, 2006; Ho, 2009; Anantatmula & Kanungo, 2010). Even though the models that constitute KM enablers vary, some enablers are common to most of them.

To develop a model for the study, six well-known models were reviewed, as shown in **Table 3.1** below; and five common enablers were selected out of the several presented in various models. Among these enablers are: organizational culture, organizational structure, resources, Information communication Technology (ICT) and leadership and strategy.

Table: 3.1 KM influencing factors

Author(s)	Enablers
Davenport *et al.*, (1998)	• Technology infrastructure; • Organizational infrastructure; balance of flexibility, evolution and ease-of-accessibility to knowledge; • Shared knowledge; • Knowledge-friendly culture; • Motivated workers who develop, share and use knowledge; • Means of knowledge-transfer using various information technology infrastructure; and • Senior management support and commitment.
Moffett, McAdam & Parkinson (2003). An empirical analysis of knowledge management applications''	• Friendly organizational culture • Senior management leadership, commitment • Employee involvement • Employee training • Trustworthy teamwork • Employee empowerment • Information systems infrastructure • Performance measurement • Benchmarking • Knowledge structure
Chong & Choi (2005).	• Employee training; • Employee involvement; • Team working;

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	• Employee empowerment; • Top-management leadership and commitment; • Information systems infrastructure; • Performance measurement; • Knowledge-friendly culture; • Benchmarking; • Knowledge structure; and • Elimination of organizational constraints.
Yeh, Lai & Ho, 2006:795-798 Knowledge-management enablers: a case study	• Strategy and leadership • Corporate culture • People • Information technology
Ho CT, (2009:101-102). The relationship between knowledge-management enablers and performance	• Strategy and leadership • Organizational culture • Organizational incentive system • Information technology
Anantatmula & Kanungo (2010)	• Organizational culture • Leadership • Top management

Table 3.2 portrays the classification of the most common KM enablers extracted from the models presented in Table 3.1 above.

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Table: 3.2 Classification of KM enablers

Author(s)	Organizational culture	Organizational structure	Leadership & strategy	Technology infrastructure	resources
Davenport *et al*., (1998)	X	X	X	X	X
Moffett, McAdam & Parkinson (2003)	X	X	X	X	X
Chong & Choi (2005)	X	X	X	X	X
Yeh, Lai & Ho (2006:795-798)	X	X	X	X	X
Ho (2009:101-102)	X		X	X	X
Anantatmula & Kanungo (2010)	X		X		

Knowledge-management conceptual model

The framework illustrates five important groups of elements, as depicted in Figure 3-2.

- ***KM enablers*** – These elements are said to form a foundation for a KM environment (Davenport & Prusak, 2000), and they underpin KM processes. Although the elements that constitute a KM infrastructural capability vary, some are common to most. Therefore, five main common enablers were selected from the collated elements presented by various authors, as depicted in **Figure 3-1.** These elements are essential for the KM processes to be effective.

- ***KM processes*** – These include a series of activities that support the acquisition, conversion, application and protection of knowledge in organizations, as represented in **Figure 3-2**.

- ***KM barriers*** **–** These are the elements grouped into three categories, namely: individual, organizational and technological barriers deemed to hinder effective KM practices in organizations, as illustrated in **Figure 3-3**.

- ***Knowledge assets*** – These are produced when the KM enablers and processes interact

- ***Organizational performance*** – The expected outcome through the effective management of knowledge assets.

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3.3.1 Organizational culture

A culture is a key element in all social systems, and that would also include an organisation. Organizational culture is shaped by shared values, beliefs and social practices that govern the way individuals act and behave in an organization (McDermott & O'Dell, 2001; Wong, 2005; Leidner *et al.*, 2006; Singh & Kant, 2008). It is a reflection of the way things are done, and the attitudes with which things are done (Nonaka & Takeuchi, 1995). For instance, an individual's tendency to share his/her knowledge is influenced by an organization's culture (Spender, 1996). Organizational culture is believed to be the significant factor for effective KM (McDermott & O'Dell, 2001). This is because it describes not only what knowledge is valued, but also what type of knowledge should be retained in the organization in order to achieve sustained innovative gain (Chong & Choi, 2005).

Understanding the role of culture is crucial in an organization. Culture is considered a significant aspect, as it directly or indirectly influences other factors, like technology and management techniques on the success of KM (Syed-Ikhsan & Rowland, 2004b). In line with the organization's mission, the organizational culture determines the types of knowledge required, as well as the needs to be fostered, along with the types of knowledge-building activities accepted and encouraged in an organization. It is, therefore, significant for organizations to establish the right culture that encourages people to create and share knowledge within and across the organization (Holsapple & Joshi, 2001). The KM research stream in organizational culture has essentially focused on values which support or impede the creation and sharing processes (Alavi *et al.*, 2005). However, a KM-friendly culture takes into consideration several aspects identified as a sharing culture: trust, collaboration, incentives/rewards system and time.

When some or all of the cultural aspects are established in an organization, employees find it easy to share what they know with their colleagues, thus enhancing a sharing culture (Syed-Ikhsan & Rowland, 2004b).

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A Knowledge-sharing culture

The knowledge-sharing practice is generally associated with an organizational culture (Alavi & Leidner, 1999) together with other transitional elements like management support, information and the use of communication technology and human resources (Lin, 2007). A sharing culture and should be considered prior to the deployment of any new strategies (Syed-Ikhsan & Rowland, 2004b). Sometimes a monetary incentive and other incentives may be used to change the public sector employee's attitude; however, without a knowledge-sharing culture, the prospects of creating the willingness to share information and knowledge remain dim.

Culture varies between organizations, as well as between groups within an organization (Yu, 2007). Knowledge workers are influenced by two cultures: the culture of the organization in which they work, and the culture of the society in which they live (Drucker, 1993). Organizations should put more emphasis not primarily on incorporating knowledge in the business strategy, but also through changing employee attitudes and behaviours to encourage willingness and constant knowledge sharing (Lin, 2007).

Trust

Trust is defined as the ability to leniency when making judgment, having the courage to voice one's views, having an interest in the various viewpoints and experiences in an organization (Krogh, 1998). It is a significant characteristic of the knowledge-friendly cultures that encourages the association among individuals and groups, thereby promoting knowledge sharing and transfers (Sveiby, 2001; Alawi *et al.*, 2007; Singh & Kant, 2008; Renzel, 2008). Trust is considered to be present in an organization, when the employees believe in the integrity, character and competence of one another (Singh & Kant, 2008). In general, trust decreases the fear that some employees might take advantage of others' knowledge. It is considered a precondition of a knowledge-sharing culture that relies on mutual understanding between all its employees, in line with maintaining an acceptable level of trust (Yeh *et al.*, 2006). Organizations should strive to create an environment where employees feel safe to own up to their mistakes, experiment and also take risks as a learning curve. How an organization is supported by technology and structure, would depend on the KM initiatives; and without trust, these would also fail (Davenport & Prusak, 1998).

Undoubtedly, the presence of trust creates a conducive environment for knowledge-sharing in an organization. Consequently, public sector employees should develop the capacity to trust the information or knowledge received from external sources through information technologies as well.

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Collaboration

Collaboration is another significant cultural aspect in the success of knowledge-management. It is portrayed by the extent to which people in a group or team help one another in their task (Lee & Choi, 2003). A collaborative culture in the workplace allows for the exchange of improved knowledge, as well as it being a requirement for knowledge-creation (Krogh, 1998). A collaborative culture reduces fear within a team, in turn boosting the openness among the team members (Lee & Choi, 2003). A collaborative environment creates opportunities for knowledge workers to share their knowledge openly – often resulting in successful KM programmes (Fahey & Prusak, 1998).

Incentives and rewards

Incentives can be defined as things that have the capacity to stimulate determination or action by employees within an organization (Riege, 2005). Incentives are believed to be a means of speeding up employee performance (Alavi & Leidner 2001; Riege, 2005; Yeh *et al.*, 2006).

Rewards encourage knowledge-sharing and other activities pertaining to KM (Sveiby, 2007). The reward types are classified as either extrinsic or intrinsic (Yu *et al.*, 2007). Extrinsic motivation refers to the rewarding and recognizing an employee with tangible rewards, such as salary incentives, bonuses, promotion incentives, the offering of job security for any knowledge-sharing efforts. Intrinsic motivation, on the other hand, is intangible in nature (Bhirud *et al.*, 2005); and training is a good example.

These two types of reward are significant in strengthening the positive influence of knowledge-management performance in an organization (Yu *et al.*, 2007). Sometimes motivational incentives do not succeed in knowledge-sharing; however, rewards together with a well-established incentive system, would be a valuable means of encouraging organizational members to create knowledge (Yu *et al.*, 2007).

On the other hand, Lin (2007) argues that organizational rewards that are extrinsic in nature are not significantly associated with knowledge-sharing processes. Employees are able to share tacit and explicit knowledge easily when given some kind of motivation. In such a case, extrinsic rewards should be supported by the organizational culture, in order to achieve the desired results, and prevent employee distrust (O'Dell & Grayson, 1997).

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Government organizations operate on a strict budget, which means that they can only afford to provide limited financial rewards, and in some cases none, due to financial constraints. This may interfere with effective knowledge-sharing (Liebowitz & Chen, 2003). Organizational goals can be achieved better if organizations incorporate the concept of motivation and rewards to their employees (Singh and Kant, 2008). This can be achieved in terms of recognition, visibility, and the inclusion of knowledge-performance in appraisal systems and incentives within an organization (Hariharan, 2002).

3.3.2 Organizational structure

An organizational structure refers to the process in which jobs that need to be done in an organization are specified, and the manner in which those jobs are interrelated is reflected (Chong & Choi, 2005). Flexible and non-hierarchical structures are said to be the most suitable for promoting knowledge-sharing, communication flow and collaboration across an organization (Disterer, 2003). There appear to be many aspects of organizational structure which include the division of labour, departmentalization and the sharing of power. This is

essential for supporting the information and decision-making processes in the organizations (Singh & Kant, 2008).

Nonaka (1994) suggests two types of organizational structure namely; bureaucracy and a task force.

Egbu (2004) suggests that inflexible organizational structures inhibit knowledge-sharing in organizations. Thus, a top-down bureaucratic organizational structure is believed to be unfavourable to the knowledge-creating process, as only top-level management have the authority and capability to generate information, which in turn, is utilized as a simple instrument to make ends meet (Nonaka, 1994). Therefore, it becomes a hindrance to the free flow of knowledge; this in turn, should be discouraged, specifically in knowledge organizations.

In an organization depicting a bottom-up structure, the responsibility for knowledge-creation is basically executed by lower- to middle-level employees. A task-force system, on the other hand, is flexible and easy to adopt, thereby bringing a team or group together to sort out problems (Ang & Massingham, 2007). In addition to organizational structure, KM success relies on a well-established KM strategy and good managerial leadership.

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3.3.3 Knowledge-management strategies

Knowledge-management strategies encompass and identify the directions in managing knowledge activities. For an organization to get anywhere with KM, a strategy that involves individuals' contribution to its formulation and implementation is crucial (Chourides *et al.*, 2003; Du Plessis, 2007). Consequently, to manage knowledge in an organization, it is important to have a KM strategy that is easily understood by all the employees (Syed-Ikhsan & Rowland, 2004). An extensive knowledge-management strategy should include all the relevant aspects, like people, process and technology. It should be designed in such a way that it supports the organizational strategy, as well as the objectives.

Types of knowledge-management strategy for the transfer of knowledge

The KM strategy should be designed to support organizational strategy and objectives. Various researchers have described different KM strategies. Davenport and Völpe (2001) and Hansen *et al.*, (1999) proposed two types of KM strategy – codification and personalization. For Sveiby (2001), these approaches can also be classified as the "hard" and "soft" aspects of

KM. The codification approach is based on the careful coding of knowledge and its storage in a knowledge repository – to be accessed and used later (Davenport & Völpe, 2001). The codification approach is more focused on deployment and the use of an appropriate technology – to gather, store and distribute knowledge all over the organization (Hansen *et al.*, 1999). Often involved in the codification approach is the utilization of information technologies; for instance: document-management systems, intranets, data-warehousing, knowledge repositories, decision-support tools, and groupware (Davenport & Völpel, 2001; Leidner *et al.*, 2006).

The biggest challenge with this approach is that the focus is on organising explicit knowledge, while leaving out the most important element of knowledge: tacit knowledge. This is believed to be an integral part of an organisation's employees (Nonaka & Takeuchi, 1995).

In the personalization approach, knowledge is closely tied to the person who created it. Organizations rely on the interaction amongst people, in order to transfer knowledge among them (Davenport & Völpel, 2001). This approach focuses on promoting a social atmosphere that is essential in the sharing of tacit knowledge (Hansen *et al*., 1999; Davenport & Völpel, 2001; Leidner *et al.*, 2006). Organizations that build networks for linking people facilitate in the sharing of tacit knowledge. With this strategy, organizations can recruit experts, train people on one-on-one mentoring, and reward people for sharing knowledge (Hansen *et al.*, 1999).

The distinction between these two strategies is associated with tacit knowledge, as opposed to explicit knowledge that requires an organization's main approach to be that of knowledge-transfer (Hansen *et al*, 1999). The benefits associated with the codification and personalization approach is that codified knowledge is easily accessible, thus improving task efficiency. The personalized approach is linked to the sharing of individual knowledge, which can improve task quality and competence. These two strategies are equally significant however; and the selection of one rather than the other, is up to the organization involved.

The managerial influence is best explained by the functionality of the leadership.

3.3.4 Leadership

Leadership is closely linked to top management; and it is imperative when selecting a leader to assist in the development of a knowledge culture and the overall success of KM

programmes. Essentially, leadership is expressed as the ability to influence and build up individuals and teams to realize the goals set by the organization. Leadership is generally acknowledged as the key driver to effective knowledge-management in organizations – especially in fostering the creation of knowledge creation and a sharing culture (Yu *et al.*, 2004; Yao *et al.*, 2007; Yeh *et al.*, 2007).

Even though it is argued that grass-roots efforts would infuse KM within an organization (Davenport & Prusak, 2000), top-management support would still be necessary in providing leadership support. In addition, the introduction of a KM programme reflects the need for organizational change; and thus, the level of support from the top management determines whether the program would succeed, or not (Liebowitz, 1999).

Secondly, top management is liable for all the activities at all levels in the entire organization, together with the provision of the required leadership. They express and communicate the vision, mission and strategy of the organization, in turn promoting common agreement on the objectives with managers, teams and individuals (Sveiby, 2007). Therefore, it is instrumental in numerous facets of an organization, like the development of organizational structure, and diverse decision-making processes that are crucial for the successful creation, sharing and use of knowledge (Singh & Kant, 2008).

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Top-management's support is valuable in influencing employee willingness to both share and create knowledge together with other colleagues (Lin, 2007). It, therefore, stands to reason that their actions and words should reflect their commitment to KM efforts.

The managers in government organizations should provide time for communication, and make it possible for employees in the organization to network with each other. They should fund and support the knowledge-management initiatives, recognize and appreciate employees' efforts in the area of KM. In addition, they should communicate the importance of nurturing, enhancing and caring about KM initiatives. However, their efforts can only succeed if they have access to the necessary resources in the form people and finance.

3.3.5 KM resources

The success of KM initiatives requires human and financial capacities. In the KM process, the most significant resource has been identified as the human resource (Ho, 2008). The people component involves the employees of an organization, who usually conform to the

organization culture. People are vital in creating and sharing organizational knowledge; so it is necessary to manage those who are willing to engage in the processes (O'Dell & Grayson, 1999; Yeh *et al.*, 2006). They are directly involved in the management of explicit knowledge and possess the tacit knowledge residing in their heads that is crucial to the organization.

Managing people who are willing to share knowledge is important. The creation of an environment and systems that enable employees to easily share knowledge is among the main drivers of successful KM programmes (Moffet *et al.*, 2003). Any change in the organizational culture places demands on people to also change their mindset to ensure the smooth flow of transition from the traditional thinking (Moffet *et al.*, 2003). The process of managing the knowledge resources can be impeded by the occurrence of high staff turnover within these organizations. Financial resources are crucial for the success of KM implementation.

The performance of KM is pegged to the financial resources dedicated to the initiative. This is because the resources determine what could be expended of KM activities (Holsapple & Joshi, 2000).

Government organizations have initiated various techniques aimed at improving the transfer and the sharing of knowledge. Some of the techniques include: training, creating KM awareness, formal and informal meetings that provide incentives and rewards to encourage knowledge-sharing also.

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Training and Awareness

Training has been widely acknowledged as a significant factor for the implementation of KM (Yeh *et al.*, 2006). It can be promoted in two ways within an organization, specifically by establishing KM training and awareness workshops (Du Plessis, 2007). Employees are likely to participate more if they understand the thinking behind the development of a knowledge-management programme. In addition, training can be used as a means to enhance employees' skills, thereby preventing the loss of knowledge categories that are widely useful to the organization, and also assist in the sharing of tacit knowledge openly (Cong *et al.*, 2007). Government is known to be a big spender on training programmes annually; but when it comes to KM training, there is not enough, or no training budg*et al*located (Cong *et al.*, 2007).

Lack of understanding or awareness of KM in the public sector can cause barriers to effective implementation of KM initiatives in organizations looking for improved performance (O'Sullivan, 2007; Yao *et al.*, 2007; Egbu, 2004; Mason & Pauleen, 2003; Cong & Pandya, 2003). While not listed as an only CSF in this study, it is evident that training is essential for KM success. Organizations intending to use KM practices without instigating proper awareness or understanding are likely to forfeit some or all of the associated benefits (Du Plessis, 2007).

3.3.6 Information and Communication Technology (ICT)

Many organizations today rely heavily on information technology, like the Web, intranets, the internet and others for knowledge-packaging technology (Cong *et al.*, 2007). Technology is not an ultimate solution for knowledge-management. However, it plays a significant role in knowledge-management in organizations (Davenport & Prusak, 1998; Bhatt, 2001; Gottschalk, 2003; Moffet *et al.*, 2003). Technology could support all KM processes, as it is considered an effective means of capturing, storing, transforming, and disseminating information (Monavvarian & Kasaei, 2007). In addition, Information Technology systems form a significant part of the KM infrastructure that supports and facilitates change, creativity and innovation too (Chourides *et al.*, 2003).

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It provides the basic building block of information technology that sustains and co-ordinates KM, such as databases (Yeh *et al.*, 2006).

Many organizations are experiencing uncertainty over the real implications of technology for KM. Some are bent on creating technologically based strategies; and several KM projects that relied to a large extent, or entirely, on the use of technology have failed to deliver the expected benefits (Malhotra 2004). Technology is perceived to be a contributor and an enabler of KM processes (Davenport & Prusak, 1998). Also, it is important for successful KM programmes and strategies (Monavvarian & Kasaei, 2007).

ICT is said to play a variety of roles, in order to sustain an organization's KM processes (Alavi & Leidner, 2001; Wong, 2005):

- It provides ways that enable people to collect, manage, store, and access explicit knowledge;

- People can use a variety of collaborative tools to share their tacit knowledge without having to be physically present; and

- It provides the means to enhance the knowledge access, decrease the time and effort required to record and retain knowledge in its present status, and improve communication among citizens, customers and stakeholders.

Therefore, it is clear that a thoughtful implementation of ICT for knowledge-management in government organizations is a way of reinforcing knowledge-management initiatives. A well designed, technical infrastructure for KM is likely to improve knowledge-processing and discovery capabilities, project collaboration and to speed up decision-making (Moffet *et al.*, 2003). Government employees are no longer expected to be illiterate in the use of ICT. Training on the use of these systems and the tools for KM is crucial for every employee, and its importance should be emphasized.

Knowledge needs to be systematically and actively managed through the application of the necessary technology infrastructure to enhance organizational performance. However, its absence may impact negatively on the organization (Singh & Kant, 2008). Reflected in the diagram below is a proposed conceptual model describing the key enablers that contribute to effective KM practices that impact organizational performance positively.

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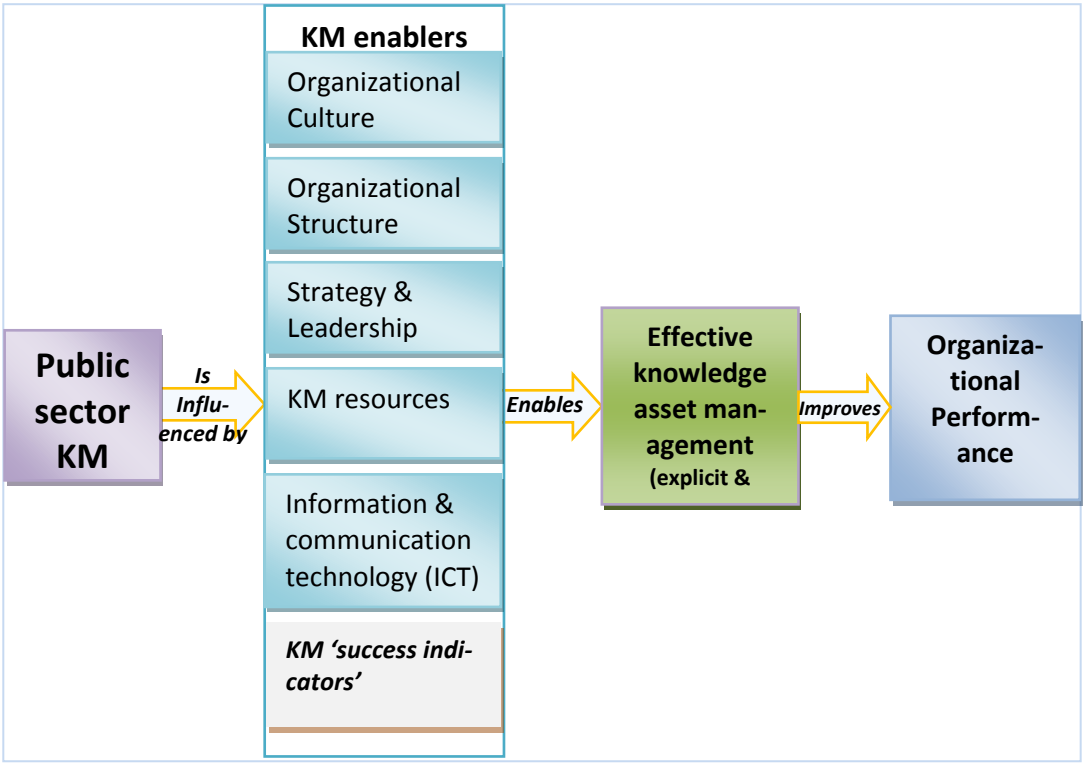

Figure 3-1: A conceptual model for studying KM *(Source: Author)*

3.4 Knowledge-Management processes

Individual knowledge becomes a knowledge asset and creates economic value when it is converted into organisational knowledge through KM processes (Sveiby, 2001; Marr *et al*., 2004; Kong & Prior, 2008). Therefore, KM processes involve the application of a number of activities aimed at leveraging the knowledge assets available in an organization. Researchers have identified numerous key aspects of the KM processes, as presented in the table below:

Table: 3.3 Knowledge-management processes

Author (s)	KM process
Skyrme & Amidon, 1998	Create, transfer, use
Leidner *et al*., 2001	Creation, storage/retrieval, transfer, application
Gold *et al*., 2001	Acquisition-oriented, conversion-oriented, application oriented & security-oriented
Lee *et al*., 2005	Creation, accumulation, sharing, utilization, internalization
Bose, 2004: 463; Monavvarian & Kasaei, 2007	Create, capture, refine, store, manage, disseminate
Cong *et al*., 2007	Identification and capture, storage, sharing, application and use, creation

The researcher reviewed the above-listed KM process models described by different authors. Activities common in most of these models were classified into four broad groups. Together, these four activities summarize the major themes in various models. The activities are classified as follows:

- Acquisition-based elements that include knowledge identification, the capture and creation thereof;
- Conversion-based: storage, retrieval, refine, codify;
- Application-based: Knowledge-application, share, utilization, disseminate transfer and use;
- Knowledge-protection processes.

Acquisition-oriented processes

The first process is comprised of a number of activities, namely: identification, capture and creation. These activities are oriented towards obtaining knowledge. They involve the classification of crucial knowledge, kinds of knowledge, as well as noting those individuals holding valuable expertise that needs to be captured (Cong *et al*., 2007). Organizational knowledge in public organizations is derived from internal and external sources, that is, knowledge generated through various functions internal to the organization and knowledge derived from the activities of other stakeholders (Cong *et al*., 2007).

To share and exchange knowledge effectively, public organizations must have the ability to understand where that knowledge resides or who possesses it. During the identification and capturing process, useful institutional knowledge can be found in annual reports, documented reports about information systems, policy documents, strategic plans and research reports, among others (Cong *et al*., 2007:254). In addition, knowledge maps and audit tools can be utilized for the purpose of knowledge identification (Davenport & Prusak, 1998; Cong *et al*., 2007). Innovation is another aspect that can be used to acquire new knowledge to add to the existing knowledge.

In public organizations, external knowledge is sought and gained from 'best practices' and project knowledge pooled together during partnership projects with outside organizations (Cong *et al*., 2007).

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Knowledge-conversion processes

Knowledge-conversion activities are identified as: refining and storage. Refining activities allow new knowledge to be placed in context to make it available (Monavvarian & Kasaei, 2007). Likewise, storage activities facilitate the codification of tacit and explicit knowledge into a form that can be understood and added to the organization's memory. Then, the knowledge is reviewed and updated periodically. According to McAdam and Reid (2000), people continue to be considered the most important knowledge repository. Without them, an organization is left in a vulnerable position, since people are likely to forget the knowledge learned, and when they leave the organization, it is lost.

For these reasons, having a mechanism that allows individual knowledge to be retained – either in the form of documents, or information systems, is ultimately essential (Cong *et al.*, 2007). Often, organizations store valuable knowledge in a knowledge repository pending it being shared among different entities.

Application-based processes

There are several activities under the umbrella of application-based processes, namely: application/utilization/use; share/disseminate/transfer. The latter activities refer to the utilization of the knowledge stored in various tools, as well as the shared knowledge through internalization, and putting it later to valuable use (Cong *et al.*, 2007). The former activities are utilized to ensure that knowledge is made available in a useful format to anyone in the organization who needs it: anywhere and at any time (Monavvarian & Kasaei, 2007).

Knowledge-sharing activities are used in the transfer or dissemination of common knowledge from one person, a group or organization, to another (Syed-Ikhsan & Rowland, 2004b). Individual knowledge-sharing happens through interaction with other colleagues assisting them to improve their competence. However, for knowledge-transfer to occur, there has to be a willingness of a group or individual to work with others, in order to share that knowledge for the common good (Monavvarian & Kasaei, 2007). The knowledge transferred between individuals benefits both the organisation and the individual competence involved in a specific process (Sveiby, 2001). Knowledge-transfer is, therefore, a significant aspect of knowledge-management; and facilitating the effective transfer among workers is necessary to improve organizational performance (Yao *et al.*, 2007). Knowledge-sharing can occur in an environment where employees are willing to share both institutional and tacit knowledge. However, knowledge – and especially tacit knowledge, is difficult to share. Both formal and informal mechanisms are considered important for sharing knowledge. The sharing of knowledge continues to be an important element that enables the generation and transfer of ideas that allow resources to be utilized efficiently (Sveiby, 2007).

Knowledge-transfer is the practice of conveying knowledge from one place to another, or from one person to another (Major & Cordey-Hayes, 2000). During the process of knowledge-transfer, two or more individuals are involved – from where the message originates and who receives the knowledge. When transferring tangible assets, someone will gain, while the other party loses. Knowledge, which is an intangible asset, adds value the more it is shared; and it loses value if it is not shared (Syed-Ikhasan & Rowland, 2004b). Research shows that a large amount of knowledge is transferred through informal settings that facilitate face-to-face communication (Pan & Scarbrough, 1999; Kim & Lee, 2010).

Furthermore, Syed-Ikhsan and Rowland (2004b) contend that organizational performance can be enhanced by an organization's capacity to transfer knowledge from one part to another.

Public organizations are known to use various approaches for knowledge-transfer, ranging from informal approaches to formal approaches (Sandhu *et al*., 2011). Examples of informal methods include storytelling (Snowden, 2000), the simple sharing of information between colleagues – to casual discussions. More formal activities involve: mentoring, training, coaching, communities of practice (CoP) (Lesser & Fontaine, 2004), after-action reviews, creating knowledge map (Lesser & Fontaine, 2004), job-shadowing programmes, meetings, exit interviews, and process documentation (as discussed in Chapter 3).

KM tools are also considered crucial in knowledge-transfer, such as for example: social networking, online discussion forums, and electronic mail.

Many programmes exist that can be used to facilitate knowledge-transfer and sharing, such as mentoring, communities of practice (CoP), and others. Mentoring is a relationship where people are afforded an opportunity to share personal and professional skills, as well as experiences. Mentorship involves two parties, a mentor who is an experienced performer, and a mentee, a less-experienced one. A CoP is a team or a group of people who come to share information and experience on a common problem, or a topic (Wenge & Snyder, 2000). These types of communities have their meeting places – virtually, or in person – to transfer knowledge between individuals or a group. Another approach recommended for transferring knowledge specifically in project environments is known as after-action reviews (AAR).

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Knowledge-protection processes

Organizations tend to attach more significance to the creation of new knowledge; and they frequently overlook the fact that people and organizations forget. Therefore, mechanisms are required to preserve and to facilitate the storage of acquired knowledge and its retrieval, when needed. Protection processes are those designed to secure knowledge against illegal access, use or theft (Gold *et al*., 2001). Knowledge assets can be protected by providing incentive alignment, job design and implementation of the rules. Organizations can build technology with the capacity to restrict or track critical knowledge (Gold *et al*., 2001).

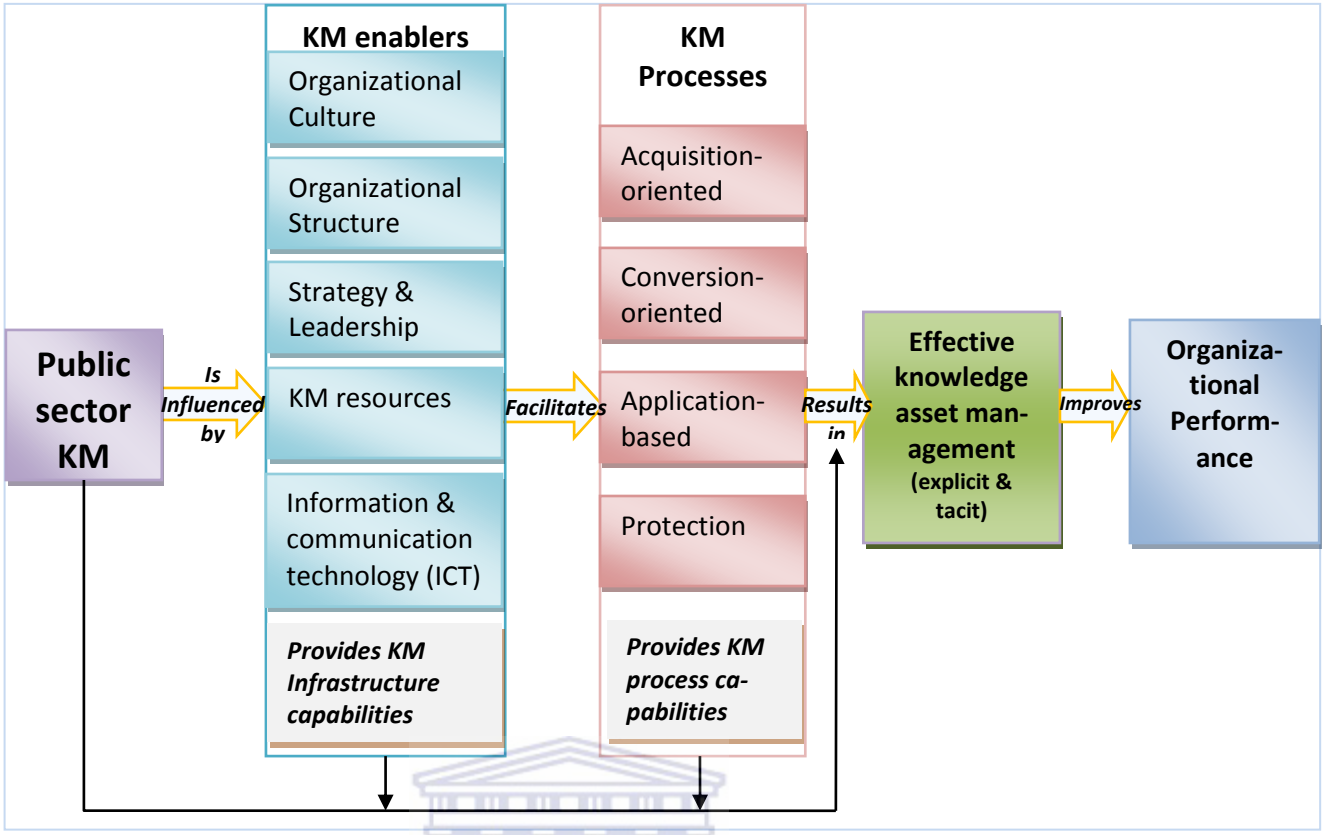

Figure 3-2: Phase two of the conceptual model for studying KM (*Source: Author*)

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3.5 KM barriers

A barrier can be defined as anything linked to human, organizational and technological concerns that have a negative effect on the success of KM (Riege, 2005). Government organisations in the knowledge-based economy are dealing with several management tasks, given the dynamics of intense competition and globalisation, resulting in the re-invention of businesses and pressure for innovation (Mason & Pauleen, 2003; Riege, 2005; Singh & Kant, 2008). The authors have classified the barrier components into three groups, namely: individual, organizational and technological barriers.

3.5.1 Individual barriers

Individual barriers are described as personal elements that largely prevent the sharing of knowledge in an organization, such as culture-related issues like trust, time, motivation, awareness, the lack of communication skills, and social networks.

An organization culture that lacks knowledge-sharing is considered to be the real issue obstructing effective knowledge implementation in government organizations (Egbu, 2004;

Mason & Pauleen, 2003, Al-Athari & Zairi, 2001). The knowledge-sharing barrier is caused by the presence of low levels of trust in an organization. One of the challenges being experienced by government departments in South Africa relates to an organisational culture that is not favourable to knowledge-sharing (DPSA, 2002).

The knowledge-sharing practice in an organization is generally associated with the organizational culture (Alavi & Leidner, 1999). The prevailing organisational cultures reportedly hinder the free flow of information and the ease of integration of people in different ranks. Employees in the government organisations perceive KM as a management responsibility, rather than taking individual responsibility for managing it. In other instances, employees share knowledge only on a need-to-know basis; that is to say, if any form of sharing occurs at all (Cong, 2007).

Trust

Generally, public organizations are believed to have an entrenched culture of not sharing information and knowledge; and this is generally attributed to the lack of, or to a low level of, trust (Cong *et al.*, 2007). Bate and Robert (2002) argue that this behaviour may, in turn, lead to problems in the creation and preservation of horizontal networks across organizations. Individual attitudes/behaviours in an organization are believed to be fundamental elements that affect the creation and transfer of knowledge (Syed-Ikhsan & Rowland, 2004a). Although many individuals have reservations about sharing their knowledge openly with others (Nonaka, 1999), this is usually because the majority of employees perceive knowledge as power (Syed-Ikhsan & Rowland, 2004a).

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They refuse to engage in the sharing process for fear of losing that power. Some individuals view knowledge-sharing as a weakness that negatively affects an employee's position, thereby drastically reducing their power or status within the organization (Yao *et al.*, 2007). Others harbour the notion that sharing knowledge reduces their job security (Lelic, 2001). As a result, a culture of knowledge hoarding is created (Cong *et al.*, 2007). Employees are reluctant to give away their valuable knowledge, despite the fact that much of it may have been obtained from the organization's efforts, such as a training and development programme, and on-the-job experience.

The effect of employees' having the mindset that knowledge is power prevents the flow of valuable knowledge in the organization; and this might seriously hamper knowledge-sharing

(Jùrgen *et al.*, 2003). The sole value of knowledge is given to individuals, instead of giving its value to the organization. It is important to persuade people to give up their knowledge for the greater good, in order to allow for its codification, storage and processing to take place. This procedure is mainly applicable to the simple forms of knowledge that exist on pieces of paper; but when it comes to individual knowledge or expertise, the problem is much bigger. However, knowledge does not diminish in value; and therefore, employees should not feel threatened by sharing it.

The not-invented-here syndrome'

People in organizations can suffer from mistrust towards outside knowledge (Jùrgen *et al.*, 2003, Chong *et al.*, 2007). They become suspicious of external knowledge because they feel that the knowledge in question is fabricated externally; and therefore, it should not be embraced. The constant use of knowledge developed elsewhere creates uncertainty in employees who fear that their roles will be declared redundant. In addition, employees in these organizations find it easier to reinvent the wheel, instead of searching for it (Rubenstein-Montano *et al.*, 2001).

Time

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Time constraints have been highlighted as a barrier to sharing (Egbu, 2004; O'Dell & Grayson, 1998). Managers may be aware of the benefits of knowledge-sharing; but they frequently struggle to implement it because of time restrictions. One of the most basic sets of barriers for KM implementation was reported by a study conducted by Bullinger *et al.* (1997). In this research, insufficient time and the lack of awareness of KM were identified as the most significant barriers to the implementation of KM.

Monavvarian and Kasaei (2007) argue that knowledge takes time to be transferred through the organizational levels; and in this case, employees have less and less time for the process. Employees perceive KM activities as amounting to additional work. The current trends for employees to take early retirement, and their increasing mobility, are not helping either; in reality, the loss of knowledge is increasing (Cong *et al.*, 2007). Time constraints are also indicated as a reason why people hoard knowledge (Leidner *et al.*, 2006). There is a need to manage the increasing complexity of organizations (Civi, 2000). Therefore, implementing a system to support the transfer of knowledge between employees, and also to prevent the loss

of knowledge when employees leave the organization, is quite beneficial (Al-Athari & Zairi, 2001).

3.5.2 Organizational barriers

Organizational barriers include all the issues related to the lack of an incentive system, inadequate support from top management, staff mobility, weak organizational structure, and more.

Rewards and incentives

A lack of rewards and an incentive system within government organizations serves as a barrier, since it discourages employees to create, share, and to use knowledge. Besides monetary rewards, established built-in reward systems, such as future training and development should be significant in encouraging employees to share what they hold already (Cong *et al.*, 2007). The sole purpose of KM is the sharing of the existing knowledge before it becomes obsolete; and sometimes, it is difficult to retain the knowledge owing to time limitations.

Knowledge sharing in the private sector is promoted and rewarded through monetary rewards (Yao *et al.*, 2007). In the public sector, the awarding of financial rewards to employees may be difficult because of budgetary limitations or regulated policies (Cong *et al.*, 2007). The public sector system of administration remains bureaucratic – where employees are required to handle too many transactions, thereby leaving them tired and frustrated (Monavvarian & Kasaei, 2007). In such a situation, KM processes, such as the sharing of knowledge may be interpreted as additional work to their already-existing heavy burdens Cong *et al.*, 2007).

Lack of top-management commitment

The lack of top-management commitment in knowledge-management activities is detrimental to knowledge-creation and preservation. Incompetent management is considered to be one of the major barriers of KM implementation in public organizations (Mason & Pauleen, 2003). As stated by Chong and Choi (2005), the lack of top-management support is the most critical barrier for successful KM implementation, especially in knowledge-creation and sharing. Organizations depend on it to identify their organizational strengths and weaknesses, and also to analyze opportunities and threats from the external environment (Goll *et al.*, 2007).

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It is, therefore, their responsibility to conceptualize a picture regarding the type of knowledge that should be generated and applied in a management system for implementation (Nonaka and Takeuchi, 1995). Successful knowledge-creation and sharing involve lasting commitment and support from top management in the recruitment and retention of the right people (Singh & Kant, 2008).

Staff mobility

Government agencies are dealing with excessive attrition and retirement. As a result, capturing the knowledge of skilled and departing employees is of strategic importance (Edge, 2005; Syed-Ikhsan & Rowland; McAdam & Reid, 2000).

The attrition of knowledge workers has been identified as a major barrier in KM implementation in organizations (Singh & Kant, 2008). Staff turnover has been identified as the major reason of the loss of intellectual assets (Mason & Pauleen, 2003).

Government departments are experiencing high staff turnover due to the frequent transfer of staff between departments, employees leaving in search for better jobs, and retirement. In South Africa especially, a study carried out by Trevor (2001) shows that more than 1000 academic studies have been conducted on labour turnover. In these studies, it was noted that the retention of key workers was possibly the major challenge in human-asset management at the present time (Sutherland & Jordaan, 2004). Knowledge-retention, especially tacit knowledge that is highly personal, happens to be difficult to preserve.

In a study conducted in Finland, it was estimated that almost half of all civil servants would be gone between 2001 and 2011 (Cong and Pandya, 2003).

Government organizations are knowledge-intensive; thus they are expected to be more attentive about protecting their human intellectual capital. The minute an employee leaves the organization, it becomes very difficult to get a substitute of that level. Consequently, the experience and expertise accumulated over the years is then lost by these organizations.

Organizational structure

In essence, government departments continue to be characterized by hierarchical and bureaucratic structures, which interfere with the free flow of information that hinders efficient communication, knowledge sharing and transfer (Liebowitz & Chen, 2003). Pursuing certain

levels of command essentially slows down the system, thereby affecting the decision-making process. The complexity of government organizations may inhibit the implementation of KM practices, which could suffer delay from the administrative red tape relating to national security, privacy or regulatory issues (Yao *et al.*, 2007).

3.5.3 Technological barriers

Even though technology has been identified as a key enabler of KM practices, there are, however, a number of difficulties instigated by the application of IT in KM practices. Riege (2005) has listed several technology-related barriers to knowledge-sharing, such as the lack of integration of information technology (IT) systems, inadequate technical support, lack of maintenance of integrated IT systems, employee resistance to using IT systems, and the failure to offer the required training to employees for new or modified IT systems. An organization with a database that has limited access rights to the employees may restrict the transfer of explicit knowledge (Jùrgen *et al.*, 2001). This is especially common in organizations that are rigidly split into highly autonomous divisions and departments. Without broad access to knowledge, there can be little hope, if any, of it being organized beyond use by a selected group of people – no matter how useful that knowledge might be to the wider group (Jùrgen *et al.*, 2001).

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The findings reported above have suggested that the Integrative model for studying KM in this study should again be amended by new elements. In the final version of the literature review, the integrative model for studying KM in this study, given in **Figure 3-3**, was subsequently used for testing its validity in the empirical setting of this study.

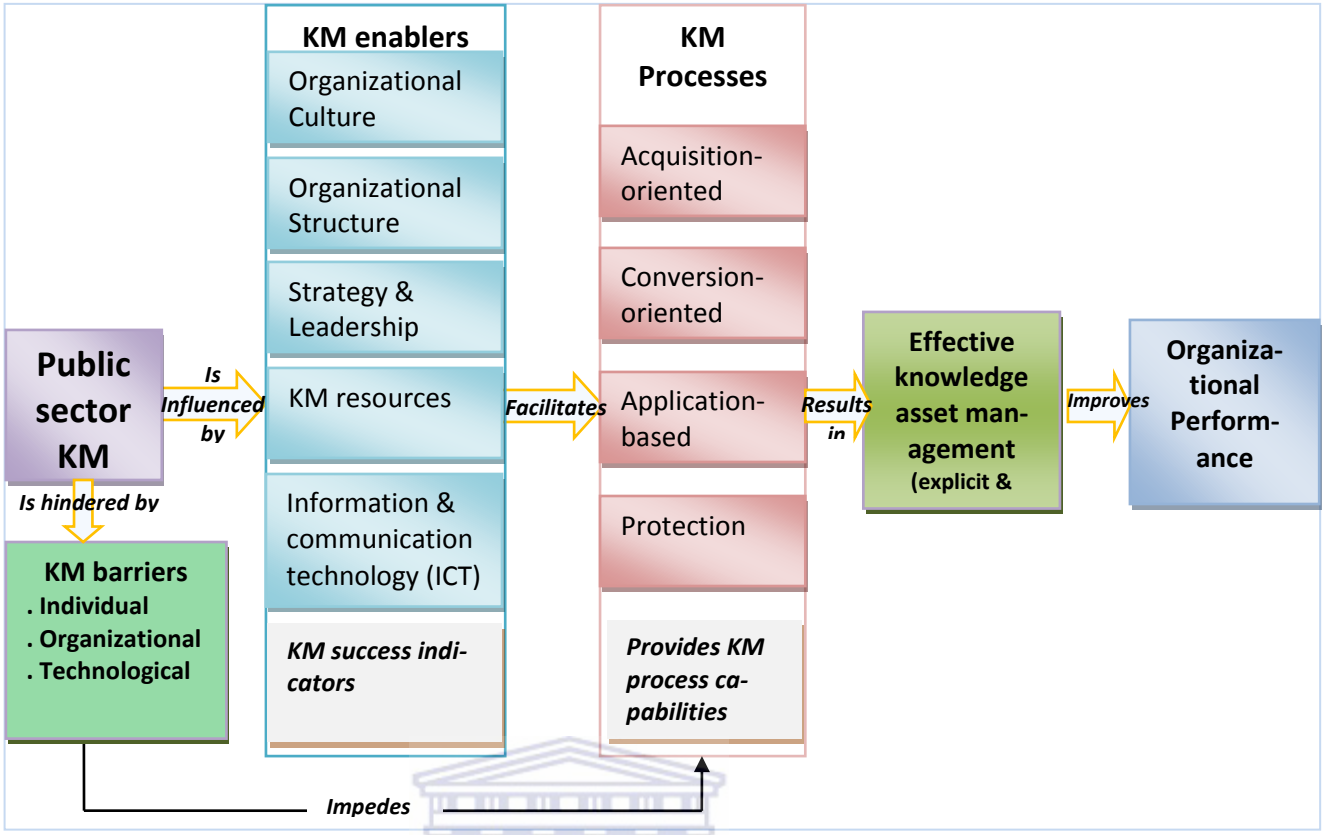

Figure 3-3: Final literature review conceptual model for studying KM (*Source: Author)*

3.6 Construction-based management of project-knowledge

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The Works Health Directorate undertakes various projects, to meet the ever-rising demand of public hospitals in the PGWC. However, the delivery of new hospital infrastructure, in addition to the upgrading and maintenance of the existing infrastructure remains a challenge for the directorate. The target set by the government through the hospital-revitalisation project, shows that about 400 new hospitals are to be revitalised in the country within a period of 20 years (Van Wyk, 2007). These projects differ in size and type; and some of them are considered to be of major strategic value. The delivery process encompasses different parties: the agency, the client, and the contractors, guided by the requirements of the Construction Industry Development Board's (CIDB) regulations and other government Acts.

In this regard, the department employs many experts. One main issue facing the department is how to manage the experts' knowledge.

Even so, WHD assigns these projects to particular separate firms to provide services and hospital buildings, which are custom built to unique requirements. The nature of the work is project-based, which is short-term; time-oriented and requires the creating and disbanding of

project teams upon completion. Tacit knowledge possessed by these people gets lost without any appropriate useful follow-up mechanism. The directorate depends more on skill and on the capability to effectively bring diverse skills together, thus highlighting the importance of workers' skills. In this context, tacit knowledge plays a prominent role in the building directorate and the entire department because of its invaluable innovation and skill development (Pathirage *et al.*, 2007).

In order to promote collaboration and the efficient delivery of hospitals, the significant role of knowledge should be considered during changing situations. Therefore, constructing a strong knowledge-management foundation, aimed at assisting in the documentation and sharing of best practice, is the key to the directorate (DPW, 2010). Progressively, a systematic process is necessary to put together the existing and new knowledge assets originating from hospital infrastructural projects.

Construction-based project knowledge-management challenges

Several research investigations have been conducted to ascertain the factors considered to be significant in realizing the success of projects. Increasingly, more researchers have highlighted the need to identify some common success factors that could be applied by construction professionals and project managers to determine the success of their projects (Toor & Ogunlana, 2009). However, different perceptions are presented on the issue; and the general consensus is that every project has a specific set of success factors that might not be transferable to another project (Nguyen *et al.*., 2004 cited by Toor & Ogunlana, 2009).

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In the construction-based projects, people are said to be their greatest assets; that is work teams, project manager, experts and others (Carrillo *et al.*, 2000). Nevertheless, people are said to be the most difficult resource to manage (Pathirage *et al.*, 2007). Their value is of the utmost significance, since the industry depends on skill and on the ability to transfer diverse expertise collectively and effectively (Drucker, 1998). KM assists the project team in lessening the need for re-invention, as well as providing time reduction in project planning (Lierni & Ribie`re, 2008).

Construction-based projects rely to a large extent on expertise knowledge to carry out their project-management tasks. The expertise in question is mainly personal, and generally comprises tacit knowledge (Maqsood *et al.*, 2006). This type of knowledge is rarely documented, and its dissemination occurs in unstructured ways, such as by word-of-mouth.

Also, in process-based methods, the lessons learned from the completed projects are gathered by using a variety of approaches that include: project review/project audits, post-control, post-project appraisal, as well as after action reviews (Maqsood *et al.*, 2006).

On the other hand, documentation-based methods are used to collect project experiences in the form of micro-articles, learning histories, and RECALL approaches (Maqsood *et al.*, 2006).

There exist, however, difficulties connected with this type of organisation. Managing knowledge in a background where learning is essentially project-based encounters numerous challenges (Bresnen *et al.*, 2003). Projects vary considerably – thereby creating major disconnection of flow in terms of personnel, materials and information. Additional disconnection is caused by the divide of the construction-project team into various professional disciplines (Dave & Koskela, 2009). Integrating their knowledge base and language to ensure effective knowledge-codification and transfer may be challenging to the organization.

In a project setting, the emphasis is placed on exploring the tacit knowledge and situated nature of knowledge, and how it is embedded within particular social groups and situations (Ribeiro, 2009). The problem here, however, is that this knowledge becomes very much more difficult to exploit, even when it can be clearly articulated, because it requires a shared system of meaning, in order to understand, accept and deploy it.

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Professional experts manage, distribute and utilize knowledge, based on the nature of the project (Ribeiro, 2009). Large amounts of construction knowledge, therefore, by requirement, exist in the minds of these individuals operating in the area. The management of project-knowledge is essential, particularly within the construction companies, where projects are implemented temporarily, and then dissolved after completion of the project. At the end of the construction phase, the individuals working in the project are likely to move to a new project without the acquired knowledge being captured (Pathirage *et al.*, 2007).

For an organization, if knowledge is embedded, it may as well be stepping out of the door (Chong *et al.*, 2007). When employees walk out of the organizations' doors, their embedded knowledge departs with them. Before this happens, a programme must be put in place to encourage employees to share their knowledge with others – either in person, or by way of documentation. Knowledge-retention should be managed, and not left to chance (Arif *et al.*,

2008). Similarly, organizations should be ready to build structures suitable for extracting and retaining such embedded knowledge in repositories or filing cabinets.

Another area neglected in the practice and management of construction-based projects is the documentation of the acquired knowledge and information (Dave & Koskela, 2009). After the completion of a project, project managers quickly move on to the next task, taking with them any important knowledge. With today's advances in technology, information systems exist that can be used to capture the knowledge acquired in these projects.

Time remains a challenge in managing projects – from their inception to their completion stage. The pressure to complete the projects within a limited time regularly brings about problems linked with project scope (Dave & Koskela, 2009). Some technology consultants have reported that many projects are generally given a brief planning period, followed by extensive design and development time to meet the due dates.

In an organizational setting, there are constant and well-recognized institutions like functional groups, departments, divisions – where knowledge and experiences are obtained, accumulated and distributed. Any question regarding knowledge can be asked through these institutions; while knowledge and experiences can be recovered, despite the consequences of the specific type of collections, such as documentation, employee competence and embeddedness in the work processes (Disterer, 2002). There are people or structures that can provide answers.

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When it comes to projects, such structures are not often present to provide the knowledge and experiences gained and gathered for the duration of that project (Disterer, 2002). After the completion of the project, the project team member takes – off without leaving any address to provide access to the acquired knowledge within the duration of that project. In some projects, the documented knowledge may exist; however, storage place is likely to be unknown (Disterer, 2002). In a different scenario, the knowledge resulting from projects is seldom captured, retained or indexed, so that external users can retrieve and apply it for innovation and for other future tasks (Disterer, 2002).

The result is the reinvention of the wheel; and more resources are incurred in this process.

Once an organization fails to systematically secure the knowledge obtained in projects for later use, it risks losing valuable knowledge and useful experiences at the end of the project.

3.7 Conclusion

Individuals and organizations derive considerable benefits from KM. Therefore, to succeed in the process, conscious management of any existing and new knowledge assets is imperative. However, the implementation effort is not precise – given that it is reliant on numerous factors that drive and underpin knowledge-management, as discussed in this chapter. These factors are specifically recognized and defined as enablers or critical success factors for knowledge-management initiatives in organizations. Likewise, when managing knowledge in projects, similar applicable critical factors are identified – most of which are associated with the construction environment. These issues have been discussed in detail in this chapter as well. This section also presents the conceptual model that addresses the identified factors and their management. The conceptual model, based on the input of the reviewed literature, is then used for the empirical testing KM processes, enablers and barriers, in order to produce the final KM model for managing knowledge in the researched public department.

After laying out of the theoretical background of the knowledge and project management in public organizations, the next chapter focuses on the research methodology, its justification and relevance in the study.

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CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

This chapter describes the research design and methodology used in the investigation of KM practices in a South African public organization. The chapter begins by stating the research assumptions and the related paradigms. It starts by discussing the philosophical underpinnings and identifying the specific paradigm that guides the selection of the research methods used in the study. This is followed by a discussion of the different research methods and the research design selected for the study. A further discussion includes the data-collection methods, validity and reliability issues, as well as the ethical considerations, which are also presented. .

4.2 Research assumptions

A research philosophy is a belief about the manner in which the data on a phenomenon should be gathered, analysed and utilized. The different philosophies guide the researcher in understanding the interrelationship of the main elements of research, and it includes the methodology and the research methods. In addition, these different approaches bring about a better understanding that enables the researcher to avoid confusion, especially when discussing theoretical debates and the various approaches to a social phenomenon. Finally, they help researchers recognize contributions made by others, as well as also defending their own position or belief (Lincoln, 2005).

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There are three underlying philosophies that can be applied in this research, namely: *ontology*, *epistemology*, and *methodology*. Ontology is involved with understanding the nature of reality and being (Glesne, 2011). It is the starting point which would in all probability lead to a researcher's theoretical framework. Ontology addresses the issue of whether the world exists; and if it does, then in what form (Potter, 1996). A researcher, for instance, might think the world exists as matter, and that meanings can be observed and measured. Alternatively, the researcher might see the world as being moulded by the mind as it perceives, classifies and interprets things.

These different views influence the types of questions asked – as well as what is largely considered to be knowledge.

The term epistemology, on the other hand, refers to the potential means of obtaining knowledge of a social reality, what it is that needs to be understood (Glesne, 2011). In other words, claims about how what is assumed to exist can be known (Glesne, 2011). It is also concerned with the relationship between the research participant and the would-be researcher (Ponterotto, 2005). The perception of knowledge is used to justify the methodology chosen for the study. The researcher's view influences the interaction with what is being researched and depends on his or her ontological view.

The researcher's approach, for instance, becomes entirely objective if the perception is that knowledge is governed by the laws of nature. On the other hand, the approach changes to a subjective one if knowledge is seen as something that can only be interpreted and invented by individuals. These two views affect the choice of the research methodology.

Formally defined, methodology is the procedure employed to discover knowledge while carrying out the research (Bryman, 2008). The significance of methodology in a research is to help identify the practices and theories of those who use different types of method.

The above-mentioned assumptions inform one another by answering the following ontological question: What is out there to know? In this study, the ontology refers to the KM practices used in managing project knowledge by the DPW, more specifically by the WHD. The epistemological questions of what and how can we know about the researched subject will be answered in this study – by selecting a credible methodology that can be employed. How can we go about acquiring knowledge is a methodological question that was answered through selecting the case-study methodology, which was considered appropriate, given the nature of the studied research problem and the nature of the research questions.

Quantitative or qualitative research methods are based on some underlying philosophical assumptions about what constitutes appropriate research, and which research methods are suitable. Together, the ontological and epistemological assumptions constitute a paradigm. A paradigm can be defined as: The "*basic belief system or world view that guides the investigation*" (Guba & Lincoln 1994:105). According to Glesne (2011), the research paradigm can be classified as *positivist*, *critical theory* and *interpretivist*.

The following section discusses the three mentioned paradigms and places case studies as a research methodology within one of them.

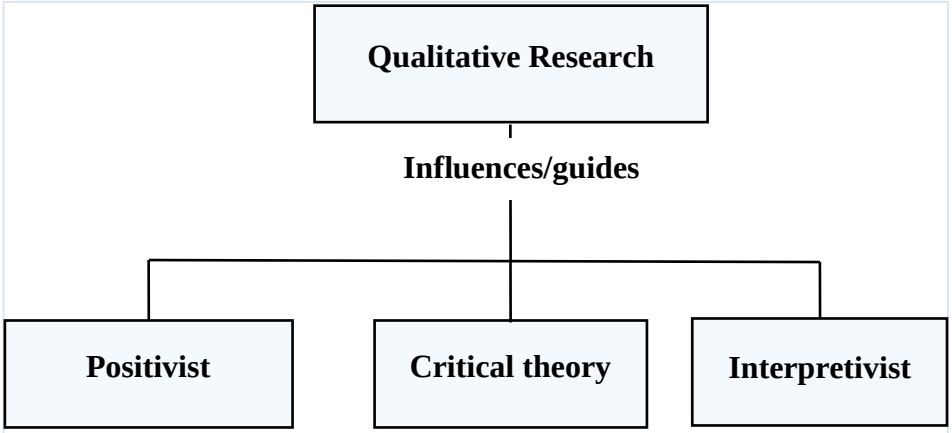

Figure 4-1: Underlying epistemology (*Source: Glesne, 2011*)

4.2.1 The positivist paradigm

The positivist perspective is based on the idea that reality exists in isolation from the individual observer. This means that the physical and social world, and the human knowledge of it, are two distinct and independent things (Glesne, 2011). Reality is perceived to be distinct in this approach. Based on the positivist stance, the behaviour of human beings is simply determined by their social world, which is subject to patterns that are empirically observable. Thus, the positivist researcher's focus is on the facts and the commonly tested theories – in order to understand a phenomenon (Orlikowski & Baroudi, 1991).

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Positivist researchers tend to use certain kinds of quantitative research methods in their work, experiments, surveys, and field studies.

The positivist research is concerned with the empirical testability of theories, in order to discover the general principles or laws which govern the natural and social world (Orlikowski & Baroudi, 1991). Any scientific inquiry is assumed to be value-free, so that the researcher remains detached, neutral and objective. A case-study research from this perspective is designed and evaluated, according to the criteria of the natural science model of research: controlled observations, controlled deductions, replicability and generalizability (Lee, 1989a).

Although manipulation of the variables – in the experimental sense – is not possible in case-study research, theoretical constructs can be defined and empirically evaluated and measured, and naturally occurring controls can be identified (Lee, 1989a; Cavaye, 1996). Literal and

theoretical replication provides for the generalizability of the case-study research findings (Lee, 1989a; Yin, 1994).

The positivist paradigm fits well with the research problem that is central to this study. Qualitative research itself encompasses at least two traditions: the positivist and the interpretivist. Positivist work seeks to identify the qualitative data with propositions that can then be tested or identified in other cases; while interpretive work seeks to combine the data into systems of belief, whose manifestations are specific to a particular case.

4.2.2 The Critical-Theory paradigm

In the critical-theory paradigm, it is generally accepted that multiple social realities exist, which are constructed by groups involved in the research. This makes the truth knowable only in a particular social group's constructed reality (Easton, 1982). The relationship between the researcher and the participants is seen as interactive, and that knowledge is value-mediated; and thus it is perceived to be value-dependent (Guba & Lincoln, 1994).

The critical-information systems researcher aims not only to understand or give an account of behaviours in societies, but also to change these behaviours. Critical theory assumes comprehensible social realities that incorporate structures over time. Critical theory researchers critique and transform social, political, economic, ethnic, and gender values. Research inquiries can entail long-term ethnographic and historical research of organizational processes and structures. The paradigm is not suitable for this research, since the researcher is not looking for multiple realities.

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4.2.3 The Interpretivist paradigm

The main difference between the interpretivist and the positivist paradigm concerns the viewpoint on epistemology. The interpretivist approach is founded on the premise that the knowledge of reality and the individuals who observe it are inseparable. Reality is understood as subjective, where people assign meanings and values to their unique contexts by using language, shared meanings, tools, and documents (Walsham, 1995). Reality is seen as a social end-result that is created and construed by humans in relation to their beliefs and value systems (Glesne, 2011).

In an interpretive research study, there are no prior classifications of dependent and independent variables, but the focus is more on understanding the complexity of human

nature as the situation emerges (Glesne, 2011). Human variables are complex and intermingled, and difficult to measure. The interpretivist research tries to get an intense understanding of the subject under inquiry; and it also acknowledges the individual's subjectivity, as an element of this procedure. It simply means that in order to understand the world of meaning, one has to interpret it.

The research methods used in the interpretivist approach involve interacting with people in their social settings to discuss with them their perceptions. The interpretivist research method used includes ethnography, life history, grounded theory, case study, and action research (Glense, 2008).

4.2.4 The paradigm guiding the current study

A researcher can base his or her research work on certain philosophical views; a single, or more than one, paradigm can be adopted – depending, on the work that is being carried out. From the above discussion, the philosophical assumptions underlying this study mainly use an interpretivist approach. The study also has its footprints in the positivist view – representing the objective stance in the research. This investigation of a WHD is an examination of employees' perceptions of the KM practices. Initially, the study was designed to seek casual relationships, as in the positivist paradigm; and in-depth meaning, as in the interpretivist paradigm.

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How the research problems appeared to the stakeholders of a WHD could well be captured by positivist research methods, like survey (Hirschman 1986; Orlikowski & Baroudi 1991). However, the lack of enough response from the questionnaire drove the researcher to adopt a single interpretive paradigm for the study. The researcher sought to understand the research problem by reflecting, probing, understanding and revising meanings, structures and issues of the managerial experiences of a WHD. This study assumes that the participants' perceptions and beliefs and the context together constitute the reality. The interpretivist approach provides a methodology for investigating the beliefs of individual participants.

The epistemology chosen is a case study that falls under the interpretive paradigm, and uses the qualitative methodology. A case-study design based on the interpretivist perspective focuses on in-depth, long-term interactions with relevant people in one or a number of locations. The value of an explanation is judged in terms of the extent to which it allows others to understand the phenomena and makes sense to those being studied (Walsham,

1995). Part of the empirical work of this research is, therefore, focused on collecting the data concerning relevant interviewees' subjective perceptions, beliefs, and views on KM in relation to the organizational setting.

This paradigm is more suitable for exploring complex social phenomena that require working with people and real-life experiences, and where the researcher seeks to understand the research problem by reflecting, probing, understanding and revising meanings, structures and issues (Hirschman 1986; Orlikowski & Baroudi 1991). In other words, not all research issues allow an entirely value-free, one-way mirror between phenomena and the researcher. The interpretivist approach provides a researcher with a larger scope to tackle issues that influence and impact, in addition to providing some leeway to ask the "why" and "how" questions (Yin, 1994).

Walsham (1993) affirmed that the purpose of the interpretive approach in information system is to produce an understanding of the context and the process, whereby information systems influence and can be influenced by the context. Thus, the researcher adopted an interactional stance on the reality being investigated.

4.3 The research design

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A research design can be considered as the logic sequence or overall plan of a research that sheds light on how the study is to be conducted. It shows how all the major parts of the research study are tied together, namely: the research methods, activities and techniques; and it also works jointly with other designs – in an effort to address the research questions (Scott & Garner, 2013). A study-research design connects the empirical data collection to the study's preliminary research questions, and eventually to its conclusion. Yin (1994) equates a research design to the blueprints that deal with four main issues, namely: what questions to study, what data are applicable, what data to gather, and how to analyze the results.

Some examples of typical research design that are utilized to obtained data include: survey research, experimental research, historical research, content analysis, case studies, and others.

In this study, the researcher started answering the fundamental questions by reviewing the pertinent literature that was followed in the selection of an appropriate research methodology, which guided the process of the data collection and analysis. The analysis of the research data resulted in the discovery of the main themes or categories. These then helped to answer the

main research question: "*What are the factors that influence [the] poor management of knowledge in health-infrastructure service, and what is the way to manage the project knowledge more effectively?*"

Research questions

The main question was useful in establishing the sub-questions that were aimed at giving direction to the empirical findings. These questions include:

- What are the factors that influence the poor management of knowledge in WHD health-infrastructural projects?
- What factors would motivate the adoption of knowledge-management in WHD?
- What are the enablers and barriers that influence effective knowledge-management practices?
- What KM processes are considered essential in transforming knowledge into a valuable organizational asset?
- How can knowledge be acquired, converted, applied and protected within the directorate?
- What are the potential benefits of adopting knowledge-based strategies in the department?

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4.4 The Research Methodology

A research methodology is an approach used for enquiry that goes beyond the underlying philosophical assumptions of research and the data collection (Meyers, 1997, 2009). The selection of research methods determines how the data are collected, the research skills possessed, the assumptions and the practices adopted. For this reason, research methods are commonly classified into quantitative and qualitative approaches. On the one hand, quantitative and qualitative methods provide the distinction in the nature of knowledge – that is, how one understands the world – as opposed to the ultimate reason for the research. On the other hand, the discourse refers to the research methods that define the way the data are collected and analysed, in addition to the kind of generalizations and representations obtained from the data.

Yin (1989) and Creswell (2003) both argued that the choice of the research methodology in a study is determined by the nature and objectives of the research problem or question. Additional factors that influence the selection of the research methodology involve the methods for collecting the data, the knowledge of the researcher, and the time needed to conduct the research. Given the fact that this study is investigating KM practices and the implementation in a public sector organization, it is conceived as a two-stage research design. During the first stage, the researcher conducted an exploratory (literature search) study to get first-hand information on how KM is perceived and implemented in public organizations.

The information obtained was used to inform the following stage of the research that involves an in-depth case study of WHD – using a flexible method that allows tapping into the context – to gain an understanding of how the organization is striving to manage knowledge. It is during this stage where the secondary data were collected by evaluating multiple documentary sources – both published and unpublished – on the changes taking place in the public sector. Also, further context information was gathered on the organization's vision, mission statement, organization and operations.

4.4.1 Quantitative methodology

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Quantitative research methodology originates from the natural-science field designed to study natural phenomena; and it is associated with the positivist paradigm. The assumption underlying the quantitative research methodology is that only one reality and truth exist. Reality is perceived as objective, simple and positive, thereby proving that human beings are influenced by their social settings – with established patterns that can be socially observed. The research methods employed for the data collection and the analysis through quantitative methodology include: survey methods, observations, documentary methods, laboratory experiments, spatial analytical methods, and numerical modelling. These methods are used for generating results that are considered valid and reliable, which in a way control any effects of inconsistency in the procedures employed by the social researchers (Bryman, 2008).

4.4.2 Qualitative methodology

Qualitative research is a form of scientific research developed in the social sciences to help researchers study social and cultural phenomena. The research methods are informed by the interpretive paradigm. Qualitative research examples include: ethnography, grounded theory, case study, action research, and life history (Glense, 2008). Examples of qualitative

approaches to data collection are: participant observation, semi-structured interviewing, audio and video tapes, observation, questionnaires, field work, archival research, photography, document collection and text analysis (Bryman, 2008).

Both quantitative and qualitative research studies are conducted in the field of information systems. Neither of the methods supersedes the other; the suitability of application of one over the other is determined by the context, purpose and the nature of the research study in question (Campbell, 1975). Furthermore, some researchers prefer to use a mixed-methods approach, thus taking advantage of the differences between quantitative and qualitative methods, and merging the methods into a single research project (Creswell, 1994).

Both quantitative and qualitative methodologies reflect different characteristics. A study based on the quantitative approach investigates the phenomena by theory-testing, using variables measured in numerical units and analysed by statistical techniques. The investigation seeks to determine the truth through predictive generalization. Qualitative analysis, on the other hand, is an enquiry process used to understand the social, cultural or human aspects of the phenomenon by gathering information from the informants in their natural settings (Creswell, 1994).

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Qualitative research approaches are considered more personal and exploratory; while quantitative approaches are anonymous and definitive. A qualitative approach provides in-depth understanding that enables the researcher to obtain insight into the behaviours and trends; while in contrast, quantitative approaches allow for the measurement of levels of occurrence, patterns, and action.

4.4.3 Justification for a qualitative research

Many scholars contend that when humans are used as the subject of study, the qualitative approach is best suited for this kind of investigation (Domegan & Fleming, 2007; Richardson, 1995). Guba (1981:76) suggested that, "it is proper to select that paradigm whose assumptions are best met by [the] phenomenon being investigated". The proposed study is investigating human understanding of KM practices and the influence they have in improving overall organizational performance. In addition, qualitative research is more focused on the processes involved, rather than on the simple end-results. However, when using the qualitative method, such as a case study, for in-depth empirical study, sometimes both qualitative and quantitative methods tend to overlap.

For instance, a mixed case-study method allows for interviews and questionnaire techniques to be used in the same study for data collection when the researcher is looking for triangulation.

The term triangulation refers to the combination of qualitative and quantitative methodologies in the study of similar phenomena. The purpose of this study is to investigate, without manoeuvring, the KM practices gap – while combining the interviews. In particular, it was suggested that the scientific method associated with the philosophical position known as positivism was not well-suited to the study of humans and their societies (Bryman, 2008).

Therefore, a qualitative case study research was chosen because it is a qualitative research methodology that attempts to understand the interviewees' in-depth understanding of the phenomenon in a social setting where the boundaries are not clearly evident.

Research methods in knowledge-management studies

Most research methods adopted in knowledge-management studies are predominately qualitative in nature with mixed case-study research designs. For example, Cong *et al.*, (2007) conducted an empirical investigation on knowledge-management in the Chinese public sector by adopting a qualitative case-study approach. Interviews and a questionnaire were used as the main methods for the data collection. Al Nawakda *et al*. (2008) used a case-study approach to explore the implementation of knowledge-management (KM) in the Ministry of Health (MoH) in the Kingdom of Bahrain. The data were collected by participation, observation and interviews. Squier and Snyman (2004) conducted qualitative research using a mixed case-study design in South Africa on KM in three financial organizations.

The study builds on the abovementioned methodologies in knowledge-management studies by adopting an interpretivist approach and qualitative methodology to address the research questions. Selecting the right research methods is an essential component in the research process (Cameron & Price, 2009). The study utilized two complementary research methods, which were largely qualitative through interviews and examination of documentary evidence.

The data collected through survey instruments were not used for descriptive analysis, but rather to support the informants' views gained from the qualitative interviews. In general, the data were analysed by way of qualitative methods.

Having decided on the general approach of the research, the next step involved the identification of one or more specific research designs for adoption, in order to obtain the essential data.

4.5 The case-study strategy

A case is a bounded system, such as a person, a group, an organization, an activity, a process, or an event (Christensen *at al*., 2011). Cases are used for many reasons in research. One major reason, which is directly associated with this study, is to apply it as a basis for scientific research that is acknowledged as a case-study research in qualitative inquiry. However, a case-study approach is directed towards understanding a specific issue. Thus, different definitions of the case-study method exist. Gillman (2000a) defines a case study as an investigation carried out to answer specific research questions that seek a wide variety of different evidences from the case setting. Additionally, a case study is an empirical enquiry suitable for investigating the existing phenomena in a real-life environment, where the boundaries between the environment and the phenomena are not clearly evident (Yin, 1994).

A case study is concerned with the thorough and in-depth account and analysis of one or more cases.

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The purpose of a case study, according to Leedy (1997:157), is to "shed light on a phenomenon, be it a process, event, person, or object of interest to the researcher". Case studies are primarily used to investigate predefined phenomena, focusing on the in-depth understanding of the phenomenon and its setting (Yin, 1994). The case study becomes especially valuable in circumstances where the contextual conditions of the occurrences being investigated are crucial, and where the researcher has no control of the occurrences, as they unfold. Case-study research is the most widely used qualitative research method in information systems (Darke *et al*., 1998).

Yin (2003) describes when a case study method should be considered in the following summarised points;

- The focus of the study is to answer "how" and "why" questions; in this study the researcher has answered the how question by exploring how KM practices can be successfully applied in the health-infrastructural delivery services; and the why

question has been answered by explaining why the suggested changes in the KM practices are needed.

- One cannot manipulate the behaviour of those involved in a study; in this study, the researcher avoided any kind of influence of the interviewees' answers by refraining from asking leading questions. Also, to reduce the risk of participant bias in this case, the interviewer selected interview candidates with no personal attachment, and also by consenting to utilize the interview data without disclosure of the participants' personal details.

- One wants to cover contextual conditions because they are relevant to the phenomenon under study. In the proposed study, the researcher studied the public sector and the role KM is playing in enhancing government performance.

- The boundaries are not clear between the phenomenon and context. Some of the study elements cannot be separated from the context, such as for example, the willingness to share knowledge; and therefore, the researcher took this into consideration.

The case study method is used in this study to shed light on how KM is perceived and implemented in the WHD, in order to uncover the knowledge gaps.

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4.5.1 Categories of case studies

There are three recognized classes of case studies: descriptive, explanatory, and exploratory – as suggested by (Yin, 2004). Likewise, Stake (2000:437) differentiates three types of case studies: intrinsic, instrumental and collective[2]. Descriptive case studies are often employed to explain events and their specific contexts. Explanatory case studies try to find a connection in an event with the outcomes, and those that are appropriate for exploring causality. This method examines the data closely: both at the surface level and at a deeper level – with the intention of fully researching the phenomenon in the data.

Exploratory case studies are regularly utilized to describe research questions and hypotheses. They are used in circumstances where the researcher is planning to investigate any phenomenon in the data that might serve as a point of interest to the researcher. The questions asked what is meant by opening the door for further examination of the

2 *Intrinsic* – when the researcher has an interest in the case; *Instrumental* – when the case is used to understand more than what is obvious to the observer; *Collective* – when a group of cases is studied.

phenomenon observed. This study employs an exploratory case study, since only a small-scale data collection was conducted before the research questions were proposed. The data helped to prepare a framework of the study, as suggested by Yin (1984).

Case studies are often perceived as similar to the qualitative, or "soft" research. Despite the fact that the case study is a recognised method of choice in qualitative research (Creswell, 2007), it is not limited to the qualitative evidence alone. Thus, case-study evidence is not necessarily purely qualitative in nature (Eisenhardt, 1989; Yin, 2003). There is a belief that the qualitative research approach is more frequently used, since it is difficult to express the vagueness and complexity of these cases by way of precise equations (Gummesson, 2007).

Notwithstanding this, case-study evidence can be based on the purely quantitative data coming from questionnaires, or on purely qualitative data, or on a combination of both data sets. On the other hand, quantitative elements can be part of a case-study approach. Both the qualitative data-collection method and analysis (which are concerned with words and meanings) and the quantitative methods (concerned with numbers and measurement) may be used (Yin, 1994).

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In this research, a combined approach employing both quantitative and qualitative approaches was used to gather the evidence, despite the stance displayed in favour of the qualitative approach.

Quantitative methods were used to get a general view from a wider employee base in the directorate regarding their awareness and perception of KM practices. Alternatively, the qualitative approach was utilized to seek an in-depth meaning associated with the actions and knowledge of the participants working in different managerial levels. By adding quantitative measures to the concept of qualitative in-depth case studies, the researcher was aiming to create a triangulation. This is a complete process that not only takes into consideration the nature of the data, but also links the methods used for the data collection, whereby in a case-study situation, multiple methods are recommended (Eisenhardt, 1989; Meredith, 1998; Yin, 2003).

The parallel application of numerous research methods and sources allows for data triangulation, and thus contributes to the improved internal validity of the study.

4.5.2 Design of the case study

The case-study method has been widely criticized due to its lack of rigour as a research tool; and therefore, crafting a good case-study design is ultimately important. Yin (1994) suggests that a case study can be based on a single-case or multiple-case design, depending on the question to be addressed. A single-case allows the researcher to study and understand one unique or exceptional case – to foster understanding or otherwise inform the practice for similar situations (Leedy & Ormrod, 2013). Single cases enable a researcher to investigate phenomena in-depth, in order to give rich description and understanding (Walsham, 1995).

Single cases may be applied with the aim of verifying or disputing an existing theory, or to represent a unique or extreme case (Yin, 1994).

A researcher may decide to study two or more cases. This is generally known as multiple-case studies. In this form of study, several cases are examined to understand the distinction and similarities among cases, to develop theory, or to recommend generalizations (Yin, 1994). The purpose of multiple-case studies is to either: "(i) predict similar results – a literal replication – or (ii) to predict contrasting results; but for predictable reasons – a theoretical replication may be called for" (Yin, 2003:47). In situations where there are no other cases for replication, then the researcher can adopt the single-case design.

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For example, this study is based on a directorate in the DPW responsible for health infrastructural delivery; and it liaises with the DoH; and the events are limited to a single occurrence. The DPW is a large complete organization with different directorates, which are further separated into several units catering for the delivery of various services. This study focused on the WHD, the only directorate charged with the health infrastructural delivery. The WHD is a core section at the DPW, where significant knowledge is at risk of being lost: both institutional and tacit knowledge. It was not possible, therefore, to look into the entire DPW for replication purposes since WHD services are focused on the construction of buildings.

In addition, the division provided a remarkable case study for KM because of its complex operation, involving interaction with a number of different areas, both inside the DPW, and externally. This includes the DOH and private contractors and consultants.

4.5.3 Case selection

This section describes the number of cases, the industry under analysis, how a participant organization was selected, and the number of interviews, as well as the interview protocol. Once one has determined that the research question is best answered by using a qualitative case study, and the case and its boundaries have been determined, then it is necessary to consider what type of case study will be conducted. In this study, the case was selected because of an emergent interest in understanding how KM practices are applied in the public sector.

In an attempt to profoundly understand the phenomenon, a single case-study design was chosen. As a research method, the case study is applied in various situations, in order to add to the body of knowledge about an individual, group, organizational, social or any other associated phenomena. The case-study research method is used in many fields, for example: in education, political science, information systems, and in others.

The researcher was also looking for an approach that would allow for the gathering of the data by using a range of data sources to help identify the different aspects of complexity, and to understand where the problem lies in wider organizational issues. Similarly, to apply a method that would help explain what was happening by studying the evidence. Consequently, "a case-study research is an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident; and it relies on multiples sources of evidence" (Yin, 2009:18).

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The case study research focus is intended to yield a deeper understanding of the real-life phenomenon, in which case that kind of understanding would involve key contextual circumstances. The phenomenon under investigation is clearly defined and does not involve the manipulation of any of the variables (Cavaye, 1996).

When choosing the case-study approach, the researcher realised that in order to generate any meaningful results, the study could not be separated from the organizational context. The study focus is based on establishing the role that KM plays in the directorate's performance, thereby leading to the need for gathering the data from a range of different sources and stakeholders. It was not about understanding the existing KM practices, but to also

understand employees' perception of the practices, and their effect on the daily performance of the various tasks.

A single-case study is used in a research project when the following specific requirements prevail:

- The case must be a critical one for extending, challenging or confirming theory;
- The case is rare or extreme; or
- The case provides unusual access for research (Rowley, 2002 & Yin, 2003), which applied in this study.

It can also be used in a study aimed to establish why a certain situation prevails. Bearing the above in mind, the case was started in 2009, when the researcher visited the department once a week to observe and interact with some managers, when they were conducting their activities in a public setting. It was during this period that the preliminary data were collected on the challenges faced by the WHD (discussed in Chapter 1) in the delivery process were identified. The data helped the researcher to formulate a research problem.

4.5.4 Case-study strengths

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There are a number of advantages in using case studies. Firstly, when using a case-study approach, a researcher is able to examine those issues that are within the context in which the activity takes place. Secondly, a case study encourages a researcher to employ multiple methods of data collection, such as: surveys, observation, interviews, and document reviews among others. Multiple data-collection methods provide much more detailed information than that which is available when other methods, such as survey methods, are used. While case studies may, and often do, use quantitative data, the key difference with other research methods is that case studies do not attempt to control the context (Yin, 1994).

There are, however, some limitations and a downside in using a case-study method, as described next.

4.5.5 Limitations of case studies

Despite the above discussed advantages, case studies have received criticisms as a research method. Some authors in their evaluation of the case-study method, have shown concerns

about the case study being less rigorous than other methods, such as a survey (Kyburz-Graber, 2004). A proper case-study method is particularly difficult, since it entails collaboration between the different parties involved for triangulation purposes, data analysis and interpretation survey (Kyburz-Graber, 2004). A common objection concerning case studies is that it is not easy to generalize a case from one to another because they tend to use small numbers of subjects, and are frequently conducted with only one subject (Tellis, 1997). Others argue that case studies have been subject to overgeneralization, stemming from the selection of a few samples from one case study, followed by the assumption that they are representative of the entire population – without carefully considering the evidence (Glense, 2011).

Cases are not sampling units; but rather, they are appropriate for theoretical or analytical generalization of the findings, such as for developing theories or testing previously developed theories (Dark *et al*., 1998; Yin, 2006).

This study employs a case-study approach to investigate and establish the perceptions and potential directions for addressing performance improvement in health-infrastructure delivery. The findings from the research, therefore, are only directly applicable to DPW. Although a case study is used, the sample size is small; and therefore, there is a possibility that the results may not be generalized beyond the specific population from which the sample was drawn. In essence, the development or theory building may not be affected. Even so, the study may present insights for directions, in which KM might proceed in other government organizations. Thirdly, several studies investigating the implementation of KM concentrate more on the private sector – with being little done on the public sector.

From this view, the information guiding the current proposed study is limited.

Consequently, Yin (1984) stated that frequently the case-study researcher holds biased views that could influence the direction of the findings and the conclusion. Case-study research proves to be difficult in a number of ways; it is not easy to design and scope a case study research project to ensure that the research questions are appropriately and adequately addressed. This method is particularly time-consuming, tiresome; and often it results in the build-up of large volumes of data (Yin 1994; Cavaye, 1996). There is a perception that a case study is lengthy, since it involves providing detailed information, which might be

discouraging to the intended reader. In writing up case studies, it is therefore, important to include rich information in a manner that is understandable.

The availability of suitable case-study sites may be restricted, as businesses and other organizations are not always willing to participate in case-study research.

4.6 Sampling design

Sampling design describes the procedure of selecting a subset of units from the entire population for the purpose of the study. The aim is to secure a sample that would represent the characteristics of the population. Generally, two broad types of sampling exist, namely: probability and non-probability sampling (Leedy & Ormrod, 2013). Probability sampling is a term used in the random selection of a sample from the overall population by applying various techniques (Cole & Ormrod, 1995). Probability sampling examples include: simple random sampling, stratified random sampling, proportional stratified sampling, cluster sampling and systematic sampling (Leedy & Ormrod, 2013). These methods are more scientific and useful.

In non-probability sampling, it is difficult to predict whether every element of the population will be represented in the sample. Examples of non-probability sampling are: convenience sampling, quota sampling and purposive sampling (Leedy & Ormrod, 2013).

This study employed a purposeful sampling method to construct a representative sample from the total group. Through this approach, the researchers intentionally selected participants who had experience with the key concept being investigated by this study. As mentioned earlier in section 4.7.3, concurrent forms of data collection were also used. Consequently, this entailed the same people who were selected for the qualitative and quantitative samples. However, since the quantitative part of the study was looking for a wider view, additional participants were randomly selected from various levels of the organization to increase the size of the quantitative sample.

There are specific issues that arise from researchers concerning the convergence or comparison of the data derived from mixed methods if the sample size used in both methods differs. A common practice with mixed-methods researchers involves selecting the same participants for both the quantitative and qualitative data collection, in order to make it easier to converge or compare the data. Selecting different participants would probably introduce

personal characteristics that might confuse the comparison. For the purpose of this study, the data collected by using the quantitative research methods were not used for comparison or convergence, but rather for supporting the qualitative data.

4.7 Data-collection techniques in the study

This study followed a non-empirical and empirical research design. The literature review was used to identify any relevant non-empirical secondary data that were supportive of research conducted in this study. The data were gathered from published studies (books, journals, and articles), mass-media reports (documentaries, newspaper, articles) and the Internet search engines. Chapters 2 and 3 of this study offer a comprehensive literature review on significant concepts and theories in KM field. Most of the reviewed articles originate from Malaysia, Australia, the United Kingdom, the United States, Canada, and a few from China and the South African public sector.

The findings from the literature review further provided a theoretical framework for the empirical research that was conducted.

The empirical research, on the other hand, consisted of a single case study. As discussed previously in this chapter, case studies are known to be qualitative in nature; and they can be used to give an in-depth description of the identified phenomenon. Yin (1994) identified a variety of data-collection methods in case-study research, such as: interviews, archival records, observation, questionnaires, and document and textual analysis. In a case-study research design, a combination of sources and methods of data collection can be applied. The data for this study were collated from three data sources: semi-structured interviews; questionnaires and documentary analysis.

4.7.1 Documentary analysis

Various documents were studied, in order to acquire a general insight into the focal areas of study. Construction reports, approved shop drawings, minutes of meetings, and other relevant documents were therefore gathered, in order to extract information about knowledge utilization and experience transferred. All such documents were used as a basis for starting and developing an interview guide, and thereafter, portraying the study sites.

4.7.2 Interviews

An interview is a qualitative research technique, which involves conducting thorough individual interviews with a selected small number of respondents; it is aimed at investigating their views on specific ideas, programmes or situations (Leedy & Ormrod, 2013). Interviews were selected, since they are a method commonly utilized in data collection in a qualitative research project. This was highlighted by Bryman and Burgess (1999) in their claim that interviews are one of the most intensively utilized techniques for data collection in a case-study research. Interviews can yield considerable amounts of helpful information, since researchers generally ask questions about facts, feelings, motives, behaviour and more. For instance, participants may be asked about their perceptions, experiences and expectations associated with a particular programme. Interviews are a widely utilized technique, because it is believed that they give much richer information than a questionnaire (Cameron & Price, 2009).

Interviews allow the researcher to search for meanings – instead of simply accepting written answers (Christensen *et al*., 2011).

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As a method of inquiry, interviews differ considerably in their degree of structure. In effect, interviews conducted in a qualitative research might be open-ended or semi-structured. When conducting open-ended interviews, a researcher uses standard general questions for all the units involved. This type of interview generates numerical data that are analysed by using statistical methods. The semi-structured interviews are highly flexible qualitative research techniques used for collecting more in-depth data than the researcher was possibly seeking. This type of interview allows the researcher to rephrase questions, to draw out discussions, or to go through the questions out of sequence – if that is the way in which the discussion develops. Being the main instrument for data collection, semi-structured interviews allowed the researcher to collect rich data from managers in the WHD.

4.7.3 Interview technique adopted for the study

This study adopted semi-structured, face-to-face interviews. Neuman (2012) maintains that face-to-face interviews generate the highest response rates; and this is one of the most common approaches used for conducting interviews in qualitative research. The interviews were conducted in November 2011 through to January 2012. To ensure consistency in the data collected, an interview guide was formulated. Before the interviews were administered,

some predetermined questions were prepared. These were meant to guide the interviewer and also to ensure that the subject addressed is within the scope and content of the main problem.

The first part of the interview guide contained the introduction to the research topic and the objectives. The second part covered four sections addressing KM-influencing factors, processes, drivers and benefits (See Appendix II). Even though the questions included in the interview guide were predetermined, the follow-up questions were generated by means of probing and prompting. The questions enabled the respondents to determine the direction, as well as the content of the interview, in a wider structure determined by the interviewer. The researcher ensured that the discussion remained within the purpose of the interview, as suggested by Glense (2011).

Table: 4.1 The interview questions

Interview Questions	
Section 1: Managers' background Information	What is your level of education? What position do you hold in the department? How long have you worked in the department? What division/unit are you working under?
Section 2: Knowledge-management awareness	What is the main purpose of the unit? What are the key functions/work processes performed in the unit? What are the knowledge and skills needed to perform these functions/work processes? What tools are used to assess and determine that the functions/work processes are properly performed, and that the knowledge requirements to perform the tasks are met? What do you understand by the term 'knowledge-management'? Has your organization adopted KM practices? If yes, what are the reason(s)? What would you say are the main components of a KM process in the directorate? What are some of the knowledge-management benefits that you have identified in the directorate?

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Section 3: Investigating factors enabling or hindering knowledge management in the directorate	What factors influence knowledge-management in your organization? What do you think are the major barriers for sharing knowledge in your organization?
Section 4: how knowledge-management can be implemented effectively in the directorate	What strategies are there for effective knowledge-sharing? How do you ensure that your employees have the relevant knowledge needed to carry out their tasks? How does the organization ensure that this knowledge is adequately captured and utilized? Are there programmes used to facilitate knowledge transfer? What measures have been put in place to protect organizational knowledge from leaving the organisation?

The researcher adopted the method of purposive sampling, a non-probability technique to select the participants for the study. Fifteen managers were chosen through this technique; and the interviews were limited to the WHD directorate in the DPW. The directorate was deliberately selected to administer the interviews, because of accessibility, and the fact that it is a public organization handling knowledge from an array of temporary projects.

The selection of managers was also based on their willingness to participate in the interviews. Another measure used to determine the suitability of the participants for the interviews was a one-year criterion. That is, participants should have worked for at least one year in the organization. The one-year eligibility criterion was based on the assumption that during this period, the participants would have familiarized themselves with the overall organization's operation and gained some knowledge in the process.

A total of nine interviews were conducted: with five senior managers, a specialist project manager, a librarian and an information-management line manager. The questions formulated during the course of the interview were open-ended; and they were conducted repetitively, to ensure that the participants' own opinions were saturated and all relevant aspects were covered. All the interviews took place in the participants' offices in the DPW. The interview appointment was secured through emails, telephone calls and reference. During the interview

process, the interviewer assessed the attitudes and opinions more readily by recording non-verbal, as well as verbal behaviour.

The interviews session lasted for a minimum duration of one hour. The researcher took notes and recorded the interview proceedings, according to the agreement made before commencement. Once an interview was completed, the results from handwritten notes and the recorder were assembled and transcribed in word format. If any misunderstanding was identified after transcription, the respective informant was contacted telephonically for clarification. The data gathered provided a wealth of knowledge regarding KM awareness and adoption in the directorate.

4.7.4 Questionnaire

A questionnaire that allows for structured close-ended responses from the participants was formulated to gather useful information from a large number of relevant informants. An online questionnaire was developed through the literature review during the same period that the in-depth interviews questions were designed. The questionnaire was composed of four parts (See Appendix IV). Part one of the questionnaire included general questions enquiring about the respondent's demographic information and profile-related information. This was followed by section two, which enquired about the KM status in the directorate, based on the respondent's perception.

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Part three of the questionnaire posed questions about the KM influencing factors; and the last part asked about the processes required for enabling KM in the directorate.

The questionnaires consisted of two types of design. The first section of the questionnaire required the respondents to 'tick' from clearly defined information provided in a tubular format the answer that best described their personal details. Section two consisted of a check-list requiring the respondents to select 'yes' or 'no', and to give a single response without any elaboration. The rest of the sections were based on a five-point Likert scale described as:

(a) 1 = strongly agree;

(b) 2 = agree;

(c) 3 = disagree

(d) 4 = strongly disagree; and

(e) 5 = no opinion.

In this section, the respondents were given the leeway to include their personal view, where this was deemed necessary. A Likert pre-coded scale was used extensively to measure the opinions, beliefs and attitudes, since this facilitated the data analysis.

A web address link was sent via email to 30 representatives, that is, 5 respondents in each unit as follows: project-management, information and knowledge-management, engineering units, information-technology management and human resource in the directorate. A detailed covering letter explaining the purpose of the study to the respondents was also attached. The online questionnaire was designed in such a way that the researcher could keep track of the responses. After a few weeks, the respondents were reminded by e-mail to complete the questionnaires. A total of 7 of the 30 e-mailed questionnaires were completed, which is a 23 per cent response rate.

4.7.5 Gathering procedure

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It is important to note that the two types of data collection techniques were used concurrently. An online questionnaire link was distributed via email to the selected population. This was followed by face-to-face, semi-structured, or telephone interviews with managers (senior, acting or line). The concurrent data collection was meant to create triangulation, where the data were collected during the same timeframes independently of each other.

The online questionnaire included a letter explaining the purpose of the study, as well as the objectives of the study. The researcher ensured that informed consent to conduct the research was sought and granted before kick-starting the data-collection process. A follow-up email reminder was sent to all the managers, asking them to complete the questionnaire. The researcher was able to view the progress online.

During the same timeframe when the questionnaire distribution was in progress, arrangements were made for interviews. The data-collection procedure in this case involved conducting interviews with the aid of semi-structured interview guides with nine managers in the DPW, some working in the WHD in the examined Provincial Government. Fifteen individuals, holding various managerial positions, were contacted in the department of public works in the WHD; but only nine participants agreed to take part in the interview process. The interviews'

purpose was to discover the participants' understanding of knowledge-management and the overall approach employed in the directorate.

As discussed in Chapter 5, the choice of the participants and the precise number were greatly influenced by the knowledge-management insight gained. The managers interviewed were all located in the Department of Public Works, and the majority of them were working in the WHD, which is the focus area of this study. The interviews were conducted with the subsequent stakeholders of KM in the department: KM managers, a librarian, information-management managers, project managers, managers in architectural, mechanical, civil and structural engineering. Before conducting an interview, every interviewee was provided with information about the study; and at the beginning, the interviewee was offered a consent form to sign if they agreed to participate in the process. In addition, permission to record each interview was obtained from the respective participants.

The interviews lasted between 40 minutes to 1 hour and 53 minutes. In instances where an interviewee declined to allow the recording, notes were taken instead. Almost all the interviews conducted face-to-face or telephonically were recorded; and for the rest, notes were taken. The interviews were transcribed immediately, after using Microsoft word application to ensure that all the data, including any impressions were captured, in order to avoid the issue of forgetting.

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Where clarity was required, the interviewee was contacted either telephonically or requested to attend an appointment; and in both instances, they were given an opportunity to make amendments when these were considered necessary. The transcription of the data was followed by checking for data completeness, consistency and reliability – a step applied to try and eliminate many problems during the data-analysis procedure.

4.8 Data analysis

The collection of the data was followed by the data analysis. Data analysis is a procedure used to examine, categorize, tabulate, or otherwise amass the evidence to address the initial proposal of a study (Yin, 1994). It enables a researcher to obtain valuable information from raw the data (Christensen *et al*., 2011). This study used the Content Analysis Technique approach to analyse the textual data obtained from the interviews. The researchers regard content analysis as an objective flexible method used for analysing the textual data (Cavanagh, 1997). In broad terms, content analysis may be defined as "any technique for

making inferences by systematically and objectively identifying the special characteristics of messages" (Holtsi, 1968:608).

It entails the systematic examination of the contents of a specific body of material with the intention of discovering patterns, themes, or biases (Leedy & Ormrod, 2013). It is generally applied to available materials, such as books, newspapers, legal documents, transcription of recorded verbal communications, among others – and especially produced for a particular research problem. The content analysis used in this study was designed to examine the detailed data collected from a single case. Babbie (1992) suggested that the materials of a content analysis can be analysed – by using either the manifest or the latent contents. Manifest-content analysis involves counting the number of the visible and surface contents; while the latent-content analysis requires the researcher to study the underlying meaning of the contents. This study chose the latent analysis to delve deeper, in order to find the meaning from the transcribed reports containing varied perspectives from the participants.

The content analysis of the interview transcripts was carried out in three stages. During the first stage, the transcripts were analysed individually to identify the main themes. In the second stage, the common themes shared between participants were extracted from the data. Meaning-condensation techniques were used to present the meanings expressed by the participants in a to-the-point formulation (Steinar & Svend, 2009). The key themes derived from the transcript were mapped in a content-coding manual, a reference document created to help in the overall organization of the data.

This format is in line with the Cameron and Price (2009) description for coding the text. This helped in the translation of the key words into the expressions that people use to communicate similar information. This process supported the identification of the types of KM enablers, and any barriers associated with the managing of knowledge effectively, the KM drivers, the processes, and the perceived benefits.

During the analysis procedure, the researcher extracted key themes from the individual interview transcripts, according to the research questions. These themes were categorised in a coherent way, and placed in a tabular format, as shown in Table 4.2 below.

Table: 4.2 Example

Question	*Categories – sorted according to themes' relevance*
What do you think are the major barriers for sharing knowledge in your organization?	Attitudes, I have got power, people don't trust others, repeating work, poor management, systems not speaking to each other, culture, ignorance, and others.

Problems encountered in the data collection

It was not easy to obtain support from managers during the completion of the questionnaire, since the managers were often quite busy and felt that the research claimed their most limited time, which could not be expanded for non-work related matters. Consequently, the questionnaire response rate was poor, considering the number of employees who received a copy. The timing of the data collection was not appropriate either, given the fact that the questionnaire was sent in November – December when managers are writing their end-of-year's reports, and working under pressure to meet their deadlines. The data collection was then extended to the month of January; and it was still not possible to get enough results. Consequently, the study used the few responses received to support the interview data, which helped in realising the objectives of the study.

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4.9 Validity and reliability issues

Research is believed to be valid when the conclusions reached are true. The term validity in research refers to the integration of numerous basic important components to the study design to largely improve the study quality or its trustworthiness (Baxter & Jack, 2008). This determines the quality of the answers provided, when all the components in a research study, its parts, the conclusions drawn, and the applications based on it, can be of a high (or a low quality), or somewhere in between (Bryman, 2001). Reliability, on the other hand, refers to repeatability. It focuses on the data-collection procedure to ensure the consistency of the results.

The objective of reliability is to decrease random errors and biases in the study, enabling subsequent researchers to arrive at the same insights, if they were to conduct the study along the similar lines again (Denzin & Lincoln, 1994). It is possible that during the course of the study, the population could change, and so could the KM practices in the public sector. Thus, the answers derived from the study are only valid and reliable for a short period of time.

However, they offer sufficient exploratory information for identifying the critical factors and processes for KM implementation – which remains the objective of this study.

The point of view in validity changes within the context of quantitative and qualitative research methodology. The measure of validity in quantitative methodology is particularly considered under the internal validity, external validity and the constructs validity (Yin, 2003). Internal validity refers to the presence of causal relationships between the variables and results. It focuses more on the way the results support the conclusion. External validity or the generalizability of the results is the ability to apply with confidence the findings of the study to other people and other situations, and to ensure that the conditions under which the study is carried out are representative of the situations and time in which the results are to apply (Leedy & Ormrod, 2013). The construct validity of a procedure refers to the extent to which a study investigates what it claims to investigate, that is, the extent to which a procedure leads to an accurate observation of reality (Denzin & Lincoln, 1994).

The validity of the measurement frequently depends on rational decisions and external opinions articulated by an expert. The study conducted preliminary unstructured interviews with government managers aimed at understanding the status of KM in the Department. Qualitative questions and quantitative questionnaire were designed accordingly. Particular consideration was taken to ensure that the two sets of questions exhibited some similarity and complementarity. Various people were consulted to evaluate the instruments in relation to language, structure, methodological error, and content and general presentation. The feedback obtained was taken into consideration and incorporated accordingly, before the pilot study.

In qualitative research, validity and reliability use four criteria to ensure the trustworthiness, namely: credibility (in preference to internal validity); transferability (in preference to external validity) and generalisability; dependability (in preference to reliability) and conformity (in preference to objectivity) (Guba, 1981; Yin, 1994). To ensure the trustworthiness in qualitative research the following issues should be considered: (i) triangulation; (ii) probing questions; (iii) the rewording of questions to test whether the participant was truthful; (iv) in-depth methodological explanation presented in the study; and (v) an examination of the prior findings (Shenton, 2004).

In view of the above discussion, this study adopted qualitative and quantitative research methods; and therefore credibility, transferability, dependability and conformability were

considered for the qualitative data. Establishing trustworthiness from the quantitative data was not possible, as a result of the low response rate – requiring the researcher to utilize the data to supplement the qualitative data.

4.10 Ethical considerations

This study followed the ethical principles, as prescribed by the University of the Western Cape, in relation to using people as subjects of research. Social science researchers have highlighted the significance of looking at the required ethical principles when using human subjects in a research (Leedy & Ormrod, 2013). This is because when working with human participants, ethical requirements like confidentiality, anonymity and trust arise. This study fell under three categories of ethical issues, suggested as voluntary and informed participation, the right-to-privacy and honesty (Leedy & Ormrod, 2013). The responsibility to observe ethical principles in this study was particularly important, since the subject under consideration comprised highly placed people in the DPW, who were charged with protecting the government's intellectual property.

The ethical considerations observed for this study began by requesting permission from the DPW authority and permission from the rights office. The permission was granted via email communication. The first part of the questionnaire explained to the participants the reasons for the study; and the opening statement for the interviews clearly explained the nature and the purpose of the study, as well. Each participant was asked to sign a consent-agreement form before the beginning of the interview. The participants were informed that their involvement was voluntary, and that anonymity and confidentiality were going to be respected. The researcher assured the participants the results of the findings would be available in the library of the University of the Western Cape, and to the directorate – on request, to enable all the participants to relate to the findings.

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4.11 Conclusion

This chapter has outlined the methodological structure of the study. The two main schools of thought intended to guide the various research methods were the positivist for quantitative research methods, and the interpretivist for qualitative research methods. However, based on the data-collection outcome, the researcher adopted a single main school of thought, that is, the interpretivist paradigm. The interpretivist considers the world to be socially constructed and allows in-depth study of the phenomena; while the researcher becomes a significant part

of the study progression. Selecting the right paradigm was dependent on the philosophical assumption of the researcher, given the research questions; hence, this study was mainly informed by the Interpretivist school of thought.

CHAPTER 5: CASE-STUDY FINDINGS AND DISCUSSION

5.1 Introduction

This study has used the conceptual model presented in Chapter 3 that identified KM enablers and processes that influence the implementation of KM, and its success in organizations as a guideline for research. The study has used documents and semi-structured interviews for the data collection. The findings from the interviews are presented in a narrative format; and direct quotes are provided in some areas. The content-analysis technique is used to extract both the themes identified by the literature review and the emerging themes from the empirical study.

5.2 Organizational characteristics of the directorate

As explained in detail in Chapter 2, this study is centred on a government organization charged with the provision of health infrastructure. As an implementing agent, the directorate's main function revolves around managing the appointment of professional consultants and contractors, design work, as well as the forming of teams for each project.

5.2.1 Function of the units in the directorate

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In order to understand the scope of operations in the directorate, the participants were asked to state the purpose and the main functions of their directorate. The reason for this question was to find out the level of involvement for each unit in the knowledge-work during the health infrastructural delivery, and hence the kind of knowledge-generating activities performed. This is in line with the literature that recognises government organisations as knowledge-intensive and utilises knowledge-workers to create, share and use knowledge in executing various tasks (Godin, 2006). The participant's responses are mapped in the table below, indicating the various units, as well as their functions.

Table: 5.1 Functions of units in WHD

Unit		Purpose
Knowledge-Management		To manage institutional knowledge embedded in organizations' processes, procedures and services. In addition, KM is important for departments – specifically in the management of employee's skills and experience; these are collectively known as tacit knowledge.
Architectural services		The function is responsible for all services on the site, including the design of site works, embankments, retaining walls, driveways, parking and other paved areas, footpaths, drainage, stormwater drainage and water reticulation, and the like.
Civil Engineering services		Pursue and consider contractors' health and safety plans for approval prior to site handover; ensure that contractors' health and safety plan are implemented and executed on sites, and assist in training works inspectors in the Occupational Health and Safety Act.
Information-Management		Supporting existing systems and users, managing access and security.
Project Management	Project office manager	The project office management function is responsible for the data-management (a core component of a knowledge-management unit) of all the projects run by the department of transport and public works. Besides the project-management skills, the manager is required to have business-analytical skills to be able to interview employees about their activities, in order to ensure that what they are implementing is in line with the best practices of project management methodology. In addition, the information gathered is analysed and mapped in the form of process maps.
	Rational Portfolio-Management System (RPM) project manager	The function of project-management in relation to the use of the RPM system is to manage, control and co-ordinate the professional team, who ensure that public work staff are provided with the relevant training for the system, project-information is captured on time, and according to the described quality, as well as the provision of the normal support and maintenance of the system.

5.2.2 Background of the participants

The nine participants interviewed were all located in the DPW; and the majority of them are working in WHD, which is the focus area of this study. There was a fairly good mix of participants from senior and middle management working in various units. The interviews were conducted with a top-level manager, five participants holding head managerial ranks in

electrical engineering, the senior manager for works health, the manager in architectural services, and the information-systems assistant manager and manager respectively. For the remaining three participants, one holds a middle-managerial position in the KM unit; another one is a specialist project manager, and lastly, one is a librarian. To preserve the confidentiality, each participant was given a code, based on their positions held, the level of education, the unit/directorate they work under, the designation held, and the experience expressed by the number of years worked in the department.

The breakdown is illustrated in Table **5.2** below. The participant in the top-level position was coded as A1; head-managerial ranks were coded as B1, B2, B3, B4, and B5; the coding for mid-level ranks was signified by C1 and C2; and the specialist position was coded as D1. The following section provides the breakdown of the members interviewed in the directorate.

Table: 5.2 Participants' background information

Position	Level of Education	Unit/ Directorate	Managerial level	Experience (Years)
A1	University Degree	KM unit	Senior	7
B1	University degree	KM unit	Manager	7
D1	Bachelor Tech	WHD	Project Manager	6
B2	Master degree	WHD	Acting senior Manager	9
B3	University degree	WHD	Acting Senior Manager	14
B4	University degree	WHD	Senior Manager	3
D2	University degree	WHD	Consultant	2
C1	Diploma	IT	Assistant Manager	4
C2	University degree	DTPW	Librarian	2

The information provided indicates that almost all the participants either hold the designation of managers or assistant managers. All the participants who contributed to this study were professionally placed at either the middle- or senior-management level. The implications of this information to the research are that certain level of accuracy and credibility in the data collected was reached. In addition, these interviewees were allocated for the interviewees by the departmental officials.

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5.2.3 Experience

Experience and number of years worked are important elements, since more and more knowledge is built up by employees through their years of work experience, as well as the number of years worked in a certain organization. It is clear that the majority of the participants had already had significant experience after working in various areas in the department for more than two years. Consequently, those individuals within the organization were able to generate and share their knowledge effectively. The fact that every participant interviewed had worked from two years and above may be an indication that they had acquired a wealth of knowledge that if well utilized could bring value to the organization, as well as a degree of improved performance.

Therefore, experienced employees are believed to have more knowledge; which, in turn, influences the way they handle problems (Syed-Ikhsan & Rowland, 2004a). Furthermore, "*experience changes ideas about what should happen into [the] knowledge of what does happen*" (Davenport & Prusak, 2000:8).

Level of education

An employee's level of education is significant, particularly when discharging services to the public. From the literature review discussion in Chapter 3, employee educational level is believed to have an impact on their willingness to share knowledge. The personal data obtained from the participants indicates that a bachelor's degree is the minimum qualification. About 90 per cent of the participants interviewed were graduates, with an educational background in project and information-management; electrical, structural, mechanical and architectural engineering.

Some of the participants had studied beyond the bachelor's level to obtain their Masters' degrees. Others held professional degrees in information-management, project-management and information-science. Each of the participants had some experience of working in the infrastructural service delivery of projects in different units. This is supported by Windrum and Koch (2008) suggestion that public sector organizations usually employ highly educated people.

Riege (2005) has demonstrated a causal connection between educational level and the ability to share knowledge. The study concluded that an individual with an educational background

different from the rest of group members was less likely to participate in knowledge-sharing. Individual sharing intentions improved when employees believed that sharing knowledge with colleagues was a basic part of the workplace culture (Wang & Noe, 2010).

The work performed in WHD is mostly handled by people coming from special professional fields, like engineering, architecture, project-management and information-technology and/or information-systems. When asked if there were plans in the pipeline to further their education, a few indicated that they were already in the process, while others felt it was necessary to study further for personal gain, and for work improvement; but they considered time to be a major limitation to their progress.

Public servants are government department's knowledge agents – meaning that their knowledge growth, acquired by formal and informal education, is important in tackling challenges in the public sector, and that they are central for the sector to function and progress.

5.3 KM program in WHD

KM practices are no longer exclusive to the private sector, but they have been recognized by the public service sector in South Africa. In effect, the South African government initiated KM activities through the DPSA in 2003 in various departments – in an effort to improve service delivery (see Section 2.2.3). It was not until 2003 that the DPW embraced the concept of KM that then led to the laying down of the necessary structures. The DPW realised the significance of exploiting people's experiences and skills as being essential in advancing the department's core activities of providing better service to the public.

As part of its strategic plan, DPW established a KM unit centred on supporting KM initiatives that could be adopted within the organization – and with external partners. The delivery of health infrastructure is multifaceted; and thus it involves many stakeholders working together to ensure its success. Therefore, WHD works closely with the department of health and the contracted people who deliver the actual buildings. Part of the KM unit's responsibility is to supervise and deal with KM issues in the department in general. Its other obligation was to introduce the concepts of knowledge and KM activities within the DPW.

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KM policy

The study was concerned with finding out whether formal policies and systems that encourage the acquisition, sharing and the distribution of knowledge existed in the WHD. The majority of the participants stated that a formal KM policy existed. Two of the participants stated that there was not; and only one participant was not sure. The study shows that the department does have a formal KM programme. Knowledge-management strategy encompasses and identifies the right directions in managing knowledge activities (Syed-Ikhsan & Rowland, 2004a).

5.4 Different categories of knowledge in the directorate

The findings on different categories of knowledge in the WHD confirm the views of a number of authors that public servants are the key knowledge repository, and that knowledge resides in the head, as do the skills and experiences of staff members and consultants (McAdam & Reid, 2000; Riege & Lindsay, 2006). The knowledge types revealed during interviews include legal knowledge, registration knowledge, hands-on knowledge, the regulation, hospital blueprints, tender documents, policy information, lessons learned, best practices and others. Knowledge is also embedded in organizations' routines and administrative procedures that are codified in the form of manuals, debriefing, work-flow diagrams, and strategic plan reports.

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In view of the different knowledge types, this study classifies knowledge into two broad categories: *explicit* and *tacit* (implicit) knowledge. This is because the elements of explicit and tacit knowledge run through different categorizations of knowledge, as indicated by various researchers (Nonaka & Takeuchi, 1995; Pathirage *et al*., 2007). Similarly, knowledge of different kinds cannot be treated in quite the same way; and this would depend on its use and management. Tacit knowledge in WDH is the knowledge accumulated by employees after working in an area for a number of years; it is also lesson learned from projects, the skills and expertise of consultants, expert opinions, design-knowledge and policy and procedural knowledge.

The interviews indicated that services commonly offered by the WHD are considered to be tacitly knowledge-intensive in nature; and that involves a wide range of professionals all working as part of the inter-disciplinary team to deliver health infrastructural products like public hospitals, emergency and community centres, and others.

Explicit knowledge is objective and often observable and examinable. It is regularly communicated as information (Wiig, 2007). In the directorate, explicit knowledge is that category of knowledge that is easy to document on paper; and it is directly accessible to those who wish to transfer it. This knowledge can be codified and stored in a computer system. Examples of explicit knowledge include standard documents (e.g. tenders, registrations), legal knowledge, and strategic plan and work-flow diagrams.

5.5 Knowledge-management awareness

In order to access the research participants' perception and awareness of KM, the following question was asked: *How would you describe the term 'knowledge-management'*? All nine research participants gave different views of their understanding of the term. The responses presented by the participants to the question were associated with their awareness and understanding of KM. These responses were analysed, according to the KM definition that is being used in this research (Chapter 1, section 1.2). Only very few government officials in WHD asserted that they understood the KM concept; while most of government officials conceded that they listened to the word, but did not know much about it.

When looking at the level of familiarity, the participants in both senior and mid-level managerial positions displayed some knowledge of the term KM; but they were unclear on the department's formal definition. Some senior managers seemed to have a better understanding compared with mid-level managers.

Some of the responses gathered from the participants on the meaning of KM indicated that the employees had some understanding of what it is; while others were still struggling to make sense of it. Some of the participants defined KM as the practice of applying a system, such as Livelink to manage KM processes: *"I see it as managing the knowledge of the enterprise; I think I see this as part of the broad picture, and how one collects, stores and distributes knowledge through the organization using livelink".* Another participant defined KM as "*…taking the entire information sitting in people's heads and on their computers, and taking all these islands and managing them because it is actually intellectual property; it is actually owned by the department*".

There is also confusion on the term "knowledge" and "information": "*KM to me is about information; that is how I understand it. KM is about managing the information that you have at that time*" was stated by a participant. In summary, the primary themes that emerged from

the interviews describing KM as the process of managing were: information, information systems, tacit knowledge, using best practices, improving communication, among others. This was a clear indication that KM is still unclear among the managers in the directorate; and that there was a dire need to create more awareness, in order to acquire the subsequent benefits. The interviews also showed that there is a lack of/or inadequate awareness and a poor understanding of KM, as well. This confusion of terms might misinform an organization that is grappling to make sense of KM (as discussed in Chapter 2). This is not surprising; some studies show that KM in public organizations is crucial for the performance of the daily activities; however, in most cases it is unconsciously managed (Hansen *et al.*, 1999; Cong & Pandya, 2003).

One of the reasons can be attributed to a lack of consensus on the KM definition. There is also the issue of complexity behind defining KM. This is partially contributed by the failure to recognize knowledge itself (McAdam & McCreedy, 1999). It is also evident from some of the published literature that the public sector has been slow in adopting formal, comprehensive and systematic KM practices, as opposed to the private sector (Chong, 2006).

The reasons for the slow adoption have been cited as the lack of sufficient resources, in terms of finances and time (Cong & Pandya, 2003). The evidence from the study shows that the initiatives already in place have not succeeded in creating a deeper understanding and commitment to knowledge-sharing at all levels of WHD. For instance, the participants ranked in level C revealed that the concept of knowledge and knowledge sharing is not new; these terms were discussed in meetings and sometimes in informal settings. However, it was not clear to them how it worked or what its role was in the WHD.

In general, almost every interviewee pointed out that the major difficulties facing WHD in the area of KM comprised a lack of: (i) Any widespread understanding of what knowledge is; and (ii) how to contribute to or participate in a knowledge culture. Here is an illustration: "*I also think that it is a new term for government you know, a lot of people don't know and understand what KM is or what it entails; and they don't understand; they don't understand it…"*

Concluding the discussion in this section, it may be stated that the public organizations have the potential to benefit more, since they rely on knowledge in discharging their services.

5.6 Factors that would motivate the adoption of KM practices in the directorate

During the interview, the participants were asked to present their individual views on the factors that would possibly motivate the adoption of KM activities in the directorate. The study extracted from the interviews a broad range of factors. Among the most frequent were: (i) Teamwork; (ii) knowledge-protection; (iii) the reducing repetition of activities; (iv) the access to knowledge and experience.

The directorate was investigated, in order to establish if it was experiencing similar changes that are driving public sector organizations around the world, compelling them to adopt KM – even though they were still grappling with the concept. The interviews showed that different participants came up with different drivers of KM in the directorate. The following are some of the responses from the participants with regard to the factors that may motivate the adoption of KM.

5.6.1 Fostering teamwork

Some participants indicated that fostering team work would definitely motivate them to adopt KM. Most of the work done in the WHD is project-based; however, the employees tended to embrace individualistic culture for fear of losing their power if they were to share knowledge. The fear drives them to share the bare minimum with their colleagues. A tool mostly used for communication among employees is the e-mail. It is a significant tool for communication; but very little can be exchanged through it. Face-to-face meetings remain an important practice for sharing ideas and finding solutions to problems (Cong & Pandya, 2003). It also emerged during the interview that teamwork plays an important part in achieving most of the organizations' goals.

The sharing of knowledge extends to the client, the directorate itself, the consultants and the constructors hired for the physical delivery of hospitals. One participant indicated that: "*teamwork is definitely encouraged in the directorate…*" considering the nature of the work processes carried out in the WHD.

5.6.2 Knowledge-protection

One of the key motivating factors for establishing KM practices, as indicated by the participants, was to protect the loss of intellectual capital. The department was faced with the

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continuous problem of staff turnover – leading to the loss of crucial knowledge assets. Much knowledge is lost through the normal channels of employees job "hopping". The department is working with professionals from many disciplines, such as engineering; and the skills in these areas are highly sought for all over the globe.

Noting that the government is not in a position to cater for the "*asking price from these professionals"*, they tend to move to the private sector or other greener pastures that offer better pay. This is detrimental to the government whose resources are limited. "*I guess we need to come up with better ways of retaining this knowledge*". Knowledge becomes a key directorate issue, since the staff turnover is large, and a serious need arises to find means to transfer knowledge to a new generation of workers.

WHD realised that large amounts of core operational knowledge were held by experienced employees approaching retirement age, and who were expected to leave the organization soon; while others had left already. Analysis made in various countries indicates that many civil servants would become eligible for retirement within the next 5-10 years. For example, 71% of the US civil servants will be retired by 2007; and in Finland 85% will have retired by 2012. It is generally agreed that the brainpower of the people in an organization has an unlimited capacity for information and knowledge, whether this is tacit or explicit. Therefore, a need was identified to mitigate the risk of losing it.

Knowledge and other intellectual capital are key enablers for an organization's performance (Wiig, 2002). For that reason, the department has recalled some of the retired professional back to help in transferring their experience and skills to young people. For example in 2006, mentorship programmes were introduced and a discussion-forum facility was set up.

It is evident, from the empirical findings of studies of public organizations that there is a dire need for organizational sustainability and the capturing of individual knowledge. Public organizations are highly susceptible to the loss of employees' knowledge – resulting from the brain drain (Public works, 2004). The directorate recruits employees with specialised skills in engineering, architecture and information systems. These types of personnel are sought after worldwide. An employee remarked: "*I realize that the organization's knowledge and expertise are gone when my responsibilities are doubled or tripled*". Another interviewee indicated that the biggest problem faced by the department to date was the "*loss of manpower*". The shortage of skills is more pronounced in this area.

Employees are working under a lot of pressure, because they have to compete with the private industry. The private sector can afford to offer better remuneration; while in the directorate the payment standards have been fixed.

In some instances, the challenge is not the unavailability of expert knowledge or skill; but the issue is how this expertise is managed. The reality in almost all departments is that there is a lack of managerial expertise and skills. The managerial staff that exist in State departments are either underqualified for their current position, or their expertise lies elsewhere in the management landscape, or they have to manage areas where they have little or no expert knowledge.

5.6.3 Retaining knowledge in-house

Another major driver is to protect knowledge resources stored explicitly in computers and normal databases. The directorate utilizes the necessary legal protection by instituting patents and copyrights, along with technological protection, through the installation of security safeguards like usernames and passwords; but still this is not enough. In addition, new employees are subjected to a confidentiality agreement; however, this may not be adequate, as indicated by a participant:

> *"There are no tools in place at the moment. But we signed an agreement when we joined to say that any classified information that we have should not be leaked out of the department into the public domain; it must remain confidential; we all got a confidentiality agreement; but then apart from that, when the technicians leave here, they will download this computer. I have no way of knowing or stopping them, with their external hard drives and the little pocket memory stick, there is no stopping. There is no knowledge repository, where all the knowledge is kept; and people are given access".*

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The directorate handles special types of data in the form of hospital drawings, plans and others. This crucial knowledge needs to be stored in a central repository.

5.6.4 Repeat of activities

The participants indicated that minimizing the duplication of efforts between directorates and units is a significant factor motivating the establishment of KM practices, such as the

designing of new hospital blueprints every time a new design is needed. The knowledge from the past could help to improve the future performance within a department.

5.7 KM influencing factors

This part was divided into the following two sub-questions to address the issue of success indicators, that is, enablers as well as barriers.

- What are the enablers that influence effective knowledge-management practices?
- What are the barriers that influence effective knowledge-management practices?

KM enablers

This section of the study considers the factors that enable KM activities from the participants' point of view. As discussed in the literature review in Chapter 3, there is a growing body of literature that has revealed several factors and their role in allowing KM projects to prosper and attain the desired outcomes. Among the factors commonly discussed from the organizational culture were (Davenport *et al*., 1998; Anantatmula & Kanungo, 2010): top management and leadership (Chong & Choi, 2005; Ho, 2009), technology infrastructure, KM strategy, and resources (Moffett *et al*., 2003; Yeh *et al*., 2006; Ho, 2009). These factors that directly or indirectly influence KM projects are further grouped into five broad categories, namely: ICT, culture, top management and KM policy, and KM resources.

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Thus, the findings are presented in relation to the five background enablers that influence KM; but they would also include other factors that emerged from the study.

5.7.1 Information and Communication Technologies

Chapter 3 highlighted the importance of ICT as an enabler of KM initiatives in the organization. ICT is believed to facilitate rapid access and the retrieval of information, and it can support teamwork and communication among organizational members. When questioned about their understanding on factors enabling KM in the directorate, most participants automatically limited their discussions to ICT, and other formal processes, such as user training on the system used. They associated KM practices with the implementation of information systems that would enable the transfer of best practices systematically. This makes KM practices in WHD technology-centred, because the focus is on deploying KM tools and systems to manage information and knowledge artefacts.

The WHD utilizes many different systems for their information and knowledge needs. The department's documents relating to projects are stored in servers. Such documents include drawings, specifications, programmes, tenders, legal documents, and correspondence, among others.

Some participants suggested that ICT is important for the support of communication and the storage of data. Advances in ICT are a major reason for the current interest in KM (Yeh *et al*., 2006 & Cong *et al*., 2007). Generally, the introduction of ICT has dramatically changed the method used by public works for the processing and delivery of infrastructural services. The adoption and the use of ICT is moving beyond the automation of the existing practices to innovate concepts and applications, such as the Internet, Internet deal room, extranet, document and content management, online dispositions, real-time chat, portals, groupware, expert systems and KM (Dave & Koskela, 2009).

It is evident from the literature that ICT is one of the key enablers in implementing KM (Lee & Choi, 2003; Migdadi, 2009; Anantatmula & Kanungo, 2010).

KM management activities in the department are more technology-centred where the focus is more on deploying the right tools and systems to support rapid search, access and the retrieval of information and knowledge artefacts. There are examples of systems 'labelled' as KM systems. These would include the Livelink system, dashboard, e-works, intranet, Rational Portfolio Manager (RPM), Computer Aided Design (CAD) systems, and Microsoft SharePoint. These systems are used in different areas to support the department's information and knowledge needs.

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5.7.1.1 Systems and tools used to share explicit knowledge in the WHD

The systems identified that fall under this category include: the Livelink system, dashboard, e-works, the Internet and the intranet.

***Livelink* system:** Livelink system is an enterprising content-management system used for managing electronic documents. The information is stored in a central server, making it easier for people who work together in groups, on projects, on documents, or on policies to collaborate and share information. The system provides sound record management, e-registry, work-flow capabilities, sound networking capabilities; and it also has an instant messaging feature, and a discussion forum facility. The systems is integrated with a variety of

features that support the storage of all kinds of information, such as reference materials that include policies and procedures, rules and regulations, financial instructions, and all the communications that come from the head of the department.

It provides access to documents by multiple authorized people at the same time. If changes are made in a document stored in a Livelink server, the changes are reflected and updated on the system.

Livelink is a prominent system used – essentially for managing knowledge; hence, it is called a KM system. The Livelink system is used both as a document-management system and a collaboration tool. The system supports collaboration and communication among employees. "*…people can work together in a team, so it is a collaboration tool…*" It is also utilised for record and document management, in addition to serving as an information-management service.

Dashboard: The Premier dashboard contains information about ongoing projects in the department. This information is replicated from the RPM system, and is manually captured, since there is no integration with the RPM system. This represents a scenario of re-inventing, due to the lack of communication between systems, thereby forcing the organization to use more resources.

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E-works: E-works system is interfaced with the Ratio Portfolio Manager (RPM). The system is largely used by the administration people in the department to access project information stored in the RPM, such as the type of project, the contractor or consultant, and the payment details. The E-works system is used to process the payment information, and to forward that information to the basic accounting system where the final payment occurs.

Internet: The interviews also confirmed that the Internet is a major source of knowledge, and it supports employee-information exchange. The Internet is recognized as key, since it has eliminated borders, thereby making communication easier. A participant stated, *"… the Internet, the computers, the communication technology have levelled the playing ground, we are exposed to the rest of the world; it only makes sense to find a common way of doing things".* Some participants believed that in a project environment, standard communication systems, like the e-mail or telephone, are treated as given.

The organization has focused on adopting advanced and specific technology for supporting communication and knowledge-processes.

Intranet: The department's intranet is simply a private Internet. A variety of Internet-type services have been installed onto the department's internal computer network that allows it to provide web pages, and other related services, such as e-mail, discussion boards, access to shared documents and databases, and collaboration tools, such as shared calendars and project-management tools. This network is used to communicate information in many forms, such as web pages, documents, tables, spreadsheets and images, in addition to hosting applications, like gateway portal and databases. One of the most important services provided by the network is to enable connectivity that supports collaboration between people located in different geographical areas.

Some government managers maintain that the WHD uses emails as a means of communicating with colleagues and clients, and the World Wide Web as a means of gathering information and knowledge.

Participants indicated that the intranet is a powerful tool that continues to assist them in sharing information and knowledge in many ways:

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- It makes access and the use of information easier because of its user-friendly interface and the low cost involved.
- It helps people access external information and knowledge, and to store it in their computers.
- It allows people working in various units within the department to connect, and it simplifies communication through the application of email.
- It provides a "one-stop knowledge shop" by providing a single access point for internal information and knowledge.

The extranet is another system used for sharing an organization's documents with external parties that include clients (in the DoH), contractors, suppliers, consultants, and other stakeholders. The directorate shares the department-wide intranet that is accessible from all offices, supporting employee's communication across through the use of bulletin-boards. It also includes a Cape-gateway portal used as an information resource to promote transparency and prevent miscommunication between the people and the government.

5.7.1.2 Systems and tools used for knowledge-capture and codification in the WHD

Rational Portfolio Manager (RPM) system: The RPM is a central project-management system used to capture all aspects of project knowledge. It allows for the centralization of all project-related information. It enables work groups and project teams to share documents, and to exchange messages from different locations in "real time". For example, when a group is working on a shared document, such as project method, the system makes the document centrally available, allowing the people involved to make changes, to synchronise the changes made, and to ensure that the latest version is instantly available. The RPM system supports the capturing of knowledge on projects, to archive this knowledge, and to eventually move it to the Livelink system.

The RPM system has brought many benefits in comparison to the older system used for project management, such as E-works. This is mainly due to its ability to provide:

- Better controls to management with regard to the management of over- or under-expenditure per project;
- Integration with financial systems that ensures effective process control;
- Transparency on all levels with regard to project progress, issues and risks;
- Enhanced communication to client departments regarding project progress;
- Quick response times to produce project-related reports at all levels within the Department;
- Assistance to the entrenchment of standardised Project Management Methodologies;
- More effective contract, contractor management, and informed decision-making on performance by external resources involved in projects;
- Early adoption of the Provincial Dashboard was ensured due to disciplines put in place by capturing project information on RPM.

By introducing this system, the DPW has reduced the costs of carrying out its business processes; and it has improved its management of project information and knowledge.

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CAD (computer-Aided Design)

Auto CAD (computer-Aided Design) is a special system used for knowledge creation; and it produces blueprints for hospitals, clinics, emergency stations, and for other community centre drawings in computers. So, at the end of the job, the drawings are captured by using a CAD disc; but they may need to be recaptured – and sent to a central repository for the storage of information.

Microsoft project

The Microsoft project system is a sample of the project management tool. It is basically used for communication systems like email, or the internet; but those are the systems that everyone uses. With other types of communication systems and the basic RPM, the documents eventually get archived in Livelink and Microsoft project.

While KM should never be regarded as an ICT project, experience is required, in order to ensure that its technological possibilities are exploited fully. Yeh *et al*. (2006) and Cong *et al*. (2007) describe technology as an enabler that supports and co-ordinates knowledge management. Organizations should have a well-built technology that is accessible, and where it is easy to leverage knowledge-management. As organizations become more sophisticated in their use of technology, more and more information and knowledge will be captured and stored in a digitized electronic format.

The public has traditionally expected transparency and accountability from government (Yeh *et al*., 2006). New technology and increasing exposure to Internet-based tools for information and knowledge-management will increasingly create emerging expectations for better information gathering. Better management of knowledge in this medium would promote better organization, better retention, and the re-use of organizational knowledge.

Sharing expert and experience knowledge

The Project-closure phase, as mentioned in Chapter 1 (section 1.5), produces lessons learned from expertise and individual experience that reside largely within project team members' memories. It surfaced from the interviews that the directorate lacks adequate means of capturing information. If appropriately exploited, ICT may provide advantages such as:

- Easier access to information;

- Assistance in providing a scope for KM efforts to enhance decision-making;
- Facilitating the integration of various pockets of knowledge;
- Identification of new pockets and nodes of knowledge;
- Leverage knowledge already created, and others.

The only challenge limiting the implementation of better KM systems is financial limitations.

5.7.2 Culture

During the interviews, it became clear that cultural factors are of fundamental significance for the success of KM. The majority of the participants felt that a knowledge-sharing culture is crucial; and in the same breath, they indicated that a knowledge culture is lacking in the directorate. KM is managed by the library team, which is an external body. There should be a culture within the organization that stimulates and nurtures the sharing and use of knowledge, as the organizational culture is a crucial function that facilitates knowledge creation and sharing. Some of the participants indicated that culture plays a big role in moulding employees' mindsets, particularly in events where new management approaches are adopted.

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Knowledge-management represents new approaches in doing things differently from that to which the employees are accustomed; and this type of change presents a high risk, if not managed properly. One interviewee stated that "… *a culture without management-support holds little meaning to the overall course*". Thus, the organization should appoint individuals from the managerial levels to steer the design and follow-up processes. Also, the management support should be geared towards the creation of adequate awareness within the organization; and it should also support people in learning and engaging with new practices.

Additionally, an organization should raise enough internal awareness of what it does and the impact of such a practice. In addition, a trusting collaboration needs to be built and sustained. This would eliminate the belief that public sector managers are usually oblivious of the activities performed by other employees placed in other parts of the organization (Cong *et al*., 2007). Training is an important activity for facilitating awareness, the creation of new knowledge, and learning.

5.7.3 Top-management support

Top-management support was indicated as a fundamental influencing factor of KM activities. The establishment of a knowledge-management programme is considered to be a form of organizational change; and the degree of support by the top management determines its success or failure (Yeh, *et al.*, 2006). The very first approach designed to manage WHD knowledge assets was the recruitment of a KM director in 2006, to provide leadership in this key area. Having a KM leadership is a sign that knowledge is being recognised as an important resource (Drucker, 1998).

The study established that having one or two KM management individuals championing the initiative would be essential for its success. These individuals should ensure that KM is part and parcel of an organization's operations; and they should also encourage managers to become actively involved – by ensuring the employees know the significance of participating in the process of knowledge-management. The support given to the KM process by top management is essential for ensuring that knowledge is embedded in an organization. Managers should encourage the employees to share knowledge, to embrace new technology, and to utilize the resources allocated for KM activities.

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Senior managers need to recognize the value of knowledge-management, and thus should participate in initiatives, such as Communities of Practice (CoP). In addition, they should be prepared to support and play an active role in decision-making. Better-quality decision-making is to be expected when managers are better informed.

5.7.4 Resources' influence

KM is about people; they carry tacit knowledge that is significant for an organization's operation; and they should show a willingness to share it. On the issue of people as an important resource driving KM, the participants agreed that the KM programme has the necessary leadership to drive its success. The success of KM initiatives requires enough human capacity, in addition to the necessary awareness created, to ensure the success of KM implementation.

Sound financial resources are crucial for the success of KM, as those resources put a ceiling on what can be expended of knowledge activities. During the delivery of the health infrastructure, the information regarding the budgets is managed by the national treasury that

allocates the resources directly to DOH (DOF, 2000). Other financial support is acquired through donor funds from private institutions to assist with the provision of the necessary infrastructure. The infrastructural budget, therefore, is controlled by the DOH; while the DPW is liable for executing the necessary work.

A lack of stable financial resources has forced the DPW to reduce their spending and restructure their priorities. This has created serious implications for KM activities, since it is not easy to get additional resources to deal with additional workloads. In the WHD, one of the key areas affected by the budget constraints is in the KM unit, thereby influencing the overall performance and also the outcome. As one of the participants stated: "*The greatest challenge we are facing in public works is the lack of dedicated resources to drive learning and knowledge-management*".

It becomes an organizational issue when the budget is being challenged – demanding more delivery with less resources. As a result, it has become difficult to organize workshops, to train employees, and even to hold formal meetings to create enough awareness about KM. This echoes Holsapple and Joshi (2000); whose suggestion was that people and financial resources strongly influence the use of KM in an organization.

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5.8 KM Processes

To determine the participants' understanding of KM processes, the participants were asked to describe the main components of a KM process. The participants presented their detailed views in this area; and some new themes emerged; while others were related to the topic and the key words. Some of the primary key words highlighted in the interviews included: *knowledge-retention, creation, capture, transfer* and *sharing*. These concepts are illustrated below:

C1: "... capturing information to mitigate [the] risk of losing it..."

B2: "... building systems to protect government information ..."

B4: "... letting your colleagues know what [things] you are doing ..."

D1: "... using systems like Premier dashboard to show project information ..."

D1: "... using systems to manage project information ..."

B4: "... it [requires] translating information into other languages to bring understanding ..."

B3: "...before you capture, I guess you need to know exactly what data are needed ..."

B2: "...find a way to capture hospital designs on systems rather than storing them on paper..."

In this study, several KM processes were described in Chapter 3. A generic KM process consists of knowledge-creation, capture, codification (translation), distribution, transfer and sharing – all of which were highlighted in the research interviews. The study further highlights the process of managing both tacit and explicit knowledge. KM processes should be treated as distinct from KM enablers. They could be thought of as structured co-ordinated activities utilized to manage knowledge effectively (Gold *et al*., 2001). The KM processes can be improved by fostering the appropriate KM enablers (Stonehouse & Pemberton, 1999].

Knowledge-sharing

The participants believed that knowledge-sharing occurs all the time: *"If you take a few moments to watch people both at work and at play, you can see the evidence daily: in corridors, by the coffee machine, on the phone, by e-mail, at the pub ...people are freely sharing knowledge all the time",* stated one of the interviewees. Others noted that people like sharing knowledge because they want to make a valuable contribution to their organisations. They like to see their knowledge being used; they want to help their colleagues; and they want to learn from others. This was supported by a participant's comment:

> "*I am an ... old man ..., who has worked, retired, and [was] then recalled to offer further services. There is not much left for me; the knowledge I have will be useless and it kind of feels important when the young people are getting something from me. Sometimes, it is not optional; it is part of the agreement to bring these young people up to speed. If I am consulting out there, it would be difficult to give my tools of trade to other people – whether to youngsters [or to any others], without a price".*

Research participants highlighted several additional components of a KM process – besides the ones discussed in the literature review. One research participant, B2, highlighted KM objectives, and indicated that there is much knowledge, and data exists – meaning that the organization is required to specify what it is trying to achieve. This study also revealed a number of important concepts regarding knowledge sharing:

- It is also important to understand the reason for the need to retain knowledge.

- Knowledge awareness refers specifically to making employees aware of the knowledge, where it is held and communicating about it.

- Knowledge filtering refers to the fact that there is so much knowledge and information available that the knowledge-management process must facilitate filtering of the volume, while knowledge summarisation allows for a high volume of knowledge to be summarised – before it is captured into the knowledge repository.

- Knowledge tagging supports the allocation of a usefulness indicator for ease of search.

- Knowledge quality refers to understanding the quality of information that you have not generated yourself, and knowledge validation refers to the auditing of knowledge and information prior to submitting it to the knowledge repository.

In addition to the implementation of KMS, the study also shows that one of the fundamental aspects of KM, that is knowledge sharing, is only practised to some degree. This indicates that the belief of the participants that knowledge should be shared still differs from the organisational practice of knowledge-sharing where knowledge is shared on a need to know basis.

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5.9 KM tools/techniques

In order to ascertain the research participants' perception of KM tools/techniques, the participants were asked to describe the tools used, technical or non-technical, to facilitate KM processes.

The South African government introduced into its operations a policy to recall retired professionals who had worked in the department for many years to re-join the public sector; and the DPW was no exception. The procedure aimed at making use of the experience and skills from these employees who were charged with sharing and transferring what they know to the current employees. However, the process obviously comes with cost implications, since the retirees are treated as consultants – meaning they get paid a fee. The long-term benefits are additional to the original costs, as the government organization makes a considerable saving in training programmes and red tape.

Recognizing the importance of sharing organizational memory, the department has come up with innovative approaches, some of which are formally recognized, while others are not. Some of these approaches focus on knowledge and skill transfer, in addition to retaining the expertise. The interviews revealed that the department has a well-established mentoring programme that engages the services of retirees who have specialized skills and expertise in areas, such as engineering, and who are capable of transferring those skills to young graduates.

The programme is operated as a government initiative, rather than a knowledge-management system. The programme is essential particularly in facilitating knowledge transfer. It targets individual retirees interested in sharing their expertise and acquired skills in infrastructural delivery. The willing individuals are, in turn, awarded contractual employment. Their responsibilities include the passing of knowledge to young graduates or to entrepreneurs owning small companies, and who are often used to construct new buildings, or for maintenance purposes.

Mentoring: formal and informal

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Mentorship is viewed as a means by which knowledge in an organization can be transferred. Nissen (2006) describes mentoring as the pairing of an experienced employee with a novice, in order to assist the person in acquiring skill deemed essential for future operations.

It surfaced from the interviews that the department has a mentorship programme that is larger in scope designed for knowledge transfer. This is known as *Mzashaki isizwe,* a Xhosa term meaning "*Let's build the nation*". A centre has been established to develop professionals in engineering and the built environment fields believed to be vital for economic growth. The programme offers bursaries to students taking degrees or higher diplomas in the disciplines of architecture, civil engineering, electrical engineering, mechanical engineering, construction management, quantity surveying, and town and regional planning.

This programme is aimed at addressing the issue of skills shortages in these areas. The programme is more focused on giving 'on-the-job training' to graduates. Mentoring is becoming increasingly common; and it could be an effective way to facilitate knowledge creation and sharing (Bryant, 2005). It is beneficial to organizations that are willing to preserve their institutional memory. In the WHD, knowledge-transfer is particularly important, because of the knowledge loss resulting from retired public servants.

"*Employees in the special fields like engineering do not stay in one organization; they are moving to other organizations or [to the] private sector*" Another interviewee said, "*we are under pressure to attract new skills, new experience*". An additional point was raised to enforce the issue of knowledge-retention by an interviewee, who stated that: "*the department does not have a knowledge-retention policy; it is a total loss of brain power, of skills given… we train them and other people get to benefit and pay them big money…*"

Knowledge-retention is in effect the act of creating an organization's memory. It involves the three activities important for the retention process, namely: knowledge-acquisition, storage and retrieval (Walsh & Ungson, 1991). The acquisition of knowledge refers to the practices, processes, and tools utilized to move knowledge to a place where it can be easily accessed for future use (Bairi *et al*., 2011). For example, enlisting the services of an expert to transfer what s/he knows to an individual or a group, capturing best practices in a database, or incorporating the best practices in an employee's training programme.

Knowledge storage is represented by the processes and resources used to preserve knowledge and information about animate objects, such as people, or inanimate objects, such as culture, work process and knowledge repositories. Knowledge-retrieval encompasses the activities utilized to access and re-use knowledge and information, such as recalling a past experience or searching a report from a database, among others. The above discussed activities are used to characterize the organizational memory (Bairi *et al*., 2011).

It is evident that knowledge-retention is linked to organizational memory; and it may also mean that knowledge is lost, thereby degrading the existing organizational memory. It is, therefore, crucial to manage the process – instead of leaving it to chance. Individual knowledge loss can be alleviated and replenished through the application of better management of knowledge (Monavvarian & Kasaei, 2007). "*Without adequate knowledge continuity between employee generations, organisational 'forgetting' drains [the] intellectual capital and squanders the knowledge asset*".

Other programmes include a discussion forum that enables employees to share knowledge. The study found that workers share knowledge or information by preparing written documentation, such as lessons learned, training manuals, good work practices, articles for publication, and more suchlike in organizations.

5.10 KM barriers

This section discusses the factors that surfaced from participants when answering the question of factors that would hinder their organization from using KM practices successfully. Among the factors widely discussed as barriers in public organization, one should include organizational culture, trust and collaboration (section 3.4 in Chapter 3). Each of these factors has a significant influence on the implementation and sustainability of KM. In addition to the largely discussed factors in the literature, the study identified employee context-specific factors, namely: time, attitude, ignorance, and the lack of training programmes.

The identified barriers were classified as individual, organizational or technological.

5.10.1 Individual barriers

These barriers are identified by the participants as: (i) Time allocation; (ii) the desire to retain power, and (iii) ignorance.

5.10.2 Allocation of time

Time allocation was cited as a major inhibiting factor to knowledge-sharing. "*Time is the main enemy of knowledge-management*". Nearly all the participants revealed that the dynamic of work and work pressure meant that time is limited for enhancing knowledge-sharing in their organization. It was evident from the interviews that most employees have more responsibilities than usual, as a result of the manpower and skills shortages. A response from one of the interviewee was that: "*Everyone is working under pressure to meet their deliverables within the allocated time and budget … with government's limited resources; the organization cannot afford to exceed the targeted time while engaging in those other activities*".

Employees perceive KM as an additional undertaking to their already full and strenuous workload.

> *"Oh! And another thing, the time has become of essence. Everything done regarding hospital building has to be done now and fast. A hospital-maintenance necessity is identified; there are patients who need the facility; the work has to be planned and managed quickly; there are more patients than the hospitals [required] to host them in [the] Province; you understand, then we don't have enough time all the time to finish the work in time and engage in other initiatives in the department. ... KM is a best*

practice; but to manage knowledge we have [to] set aside time to fully understand what it is; how it is done; to integrate it into our work, Aah, but there is no time, time is not enough".

Time pressure has been cited as a barrier to knowledge-sharing, as employees argue that they do not have sufficient time to perform any extra activities (Donnelly, 2008). In general, employees argued that KM responsibilities ought to be assigned to the top management; and not necessarily to expect every employee to be responsible for KM. Some of the participants had a theoretical understanding of the importance of knowledge-management from organized formal meetings and organization's reports; but they don't know exactly how it can be used to add value to their work, without affecting their daily performance.

Others appeared not to have ways of dealing with overloaded information coming from many sources, such as e-mails.

Time allocation is widely recognised as essential for employees as a way of empowering them to train new staff, to work together as a team, to generate new knowledge, as well as to share it with others. Therefore, reserving time for KM practices is pivotal in building a culture of sharing. For example, companies like 3M and Sencorp allocate employees 15 to 20 per cent of their job time for new knowledge-creation (Krogh *et al*., 2000). Some of the participants highlighted that the significance attributed to knowledge-sharing by managers plays a major role in time allotment. The time spent encouraging employees to interact in informal or formal settings, and to share what they know, has been found to be crucial to KM practices.

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For example, Sencorp, a U.S.A-based corporation has empowered the middle managers to initiate knowledge-creation in the organization (von Krogh *et al*., 2000). Organizations should invest time and effort in communicating to the staff members about the potential benefits of sharing knowledge.

5.10.2.1 Desire to retain power

The fear of losing power emerged in this study as a key participant concern. Participants felt that KM is a practice that requires a level of confidence inside the department, in order to encourage individuals to share knowledge, and to generally get involved. Given the prevailing circumstances, they were unsure about the implications of sharing what they knew with others.

Other participants felt that it was not the power of having knowledge, but the general attitude towards sharing what they know with others. As stated, *"…the person thinks that I will keep this information to myself; if I keep this information I have got power; it is a human thing, wanting to use it as power, if we get rid of the attitudes…"* Others want to cling to their knowledge because it makes them better than their colleagues.

> *"…also remember, in this department, we are dealing with building hospitals, there is nothing special about it. But some people are not willing to share their experience with others, because they want to keep it to themselves. And they don't want them to become better".*

Another participant stated that: *"I think that people don't want to share information; they want to have their little empire; and they want to be in control"*. From the literature (Chapter 3 section 3.4.1), many of the employees in government departments view 'knowledge as power', which eventually prevents them from sharing their knowledge from the fear of losing that power (Yao *et al*., 2007). Individuals, especially the ones whose intention it is to climb the career ladder, may view the sharing of their knowledge as a way of placing them at a disadvantage. *"Transparency always makes people threatened. People might think they are going to lose their jobs because they have this information, that no one else knows about it; and then they feel they might be easily replaced"*.

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Other individuals are afraid to share knowledge based on the notion that it could reduce their job security, if they are not aware of the sharing objectives and intention of their senior management (Lelic, 2001). The effect of employees' having the mindset that knowledge is power prevents the flow of valuable knowledge in any organization (Sinclair, 2006).

5.10.2.2 Ignorance

On this point, some participants presented a different view from the "knowledge is power" barrier. It appears that ignorance is a big barrier to knowledge-transfer in the directorate. In most cases, the participants stated that the person requiring knowledge is not aware of anyone else in the organisation that has it. Similarly, it is difficult – particularly in a public sector setting – to know if somebody else is interested in the knowledge one has. Therefore, both the source and the recipient of the knowledge suffer from ignorance, rather than knowledge hoarding. One interviewee stated that: "*It is possible to find an employee who only understands what they do, and not what the next person in [the] line does*".

This is supported by the suggestion of Szulanski (1994) and O'Dell and Grayson (1998) that ignorance is among the biggest barriers to knowledge-transfer.

5.10.3 Organizational barriers

These barriers are identified by the participants as: (i) Training; (ii) the lack of skill-retention measures; (iii) the lack of KM incentives or rewards; (iii) trust; (iv) collaboration; (v) communication flow; and (vi) inadequate awareness.

Training

It emerged from the interviews that there is insufficient training for KM; and the budg*et al*located for the practice is not enough. However, the interviews revealed that the directorate was involved in training some consultants on how to carry out work related to the building of hospitals or clinics.

> *"… These people, they supposedly have knowledge; but they don't have the core face; they have been doing other works; and all of a sudden, we say to them: Hey! We want you to build a clinic, or a hospital; and these are special types of buildings… We see that they don't know the job; we take them on, and then we train them… These are what I would call transferring knowledge to consultants".*

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Most participants indicated that the directorate spends substantial amounts of money yearly in training programmes. However, the training programmes are geared toward gratifying the acquisition of the appropriate operational knowledge. Among the programmes mentioned there is; induction training, short courses, workshops, seminars, and debrief meetings. While acknowledging that some knowledge-acquisition took place to improve operations, participants were adamant that these programmes are not under the umbrella of KM activities. Many could not pinpoint a single programme designed and facilitated by a KM unit in the department. Some participants indicated that most of the short courses were not facilitated by the mandated unit, but rather by the human-resource unit, and others by the information technology unit.

People are lacking the necessary skills and experience to implement KM. It became apparent that even though KM policy is present, the directorate has failed to put some of the necessary structures in place, like the introduction of formal training. A strong organization requires the constant development of its competent employees (Wiig, 2007).

An organization should have proper training to assist employees acquire new knowledge and contribute to the creation and transfer of knowledge required for its operations. Pre-professional education and in-service training are believed to be vital in preparing civil servants, and for developing them to become knowledge-workers (Monavvarian & Kasaei, 2007). Therefore, it was important for the study to establish how the directorate ensured that their employees obtained the appropriate operational knowledge. Although there are different factors influential in "changing the attitudes and skill levels of the public employees" and "generating greater managerial capacity at top levels", training was considered as an important factor.

Under the circumstances, it would be hard to effectively communicate information and knowledge to people lacking similar skills or experience (Chong *et al*., 2007).

Lack of skills-retention measures

The organization lacks proper measures to preserve the much-needed knowledge. Participants feared that critical knowledge is leaving the organization, especially the highly sought-for-skills in the different areas of engineering. The intellectual capital of all departments is not co-ordinated well, leading to its loss. It is true that important documents that could inform various processes and decision-making are not traceable. One participant indicated that *"... hospital blueprints are intellectual property"*. These drawings are regularly improved to keep them current, in accordance with the building standards; and sometimes the additional information is not documented.

This means that important knowledge is lost, leading to the need for re-invention in future operations when similar knowledge is needed for re-use. Lack of proper documentation is not the only challenge for the directorate. The problem, to a large extent, is that this knowledge is not documented appropriately; it is not co-ordinated, thus remaining inaccessible for sharing. This results in the costly duplication of efforts (re-inventing the wheel), as each department embarks on a solution-finding task, instead of learning from one another's achievements, mistakes and failures.

Another major hurdle is finding ways to retain the transferred skills acquired through such programmes as *Mzashaki isizwe*. However, a constant difficulty experienced by the directorate is the retention of the transferred skills. Once the graduates get the required skills, it becomes extremely difficult to retain them – partly due to the many opportunities presented

to them in the private sector. Another factor driving the young graduates to leave is the remuneration. The salary packages offered in the public sector cannot compete with the amount offered to these people in the private sector.

> *"The big problem here, far more than any other in the department, is manpower. It is a huge problem; and this manpower is linked to [the] payment scale. It says: if you have got so much experience and you are an engineer, you get so much, if you are a trainer you get so much. So we can only offer them a certain salary, and they laugh at you, and say: Is this all you can offer me, ya, it is not".*

Critical institutional knowledge is also lost when an ageing workforce retires. Many of the public servants that are in leadership positions, specialized positions, or on long tenure with the organization possess valuable knowledge and experience that gets lost when they leave. This may have a negative impact on the organization (Egbu, 2004). One participant pointed out that: "*… it becomes difficult to find a person who could take the place by having at least similar qualifications*." Loss of knowledge is expensive for any organization. This has resulted in the departments failing to deliver on their mandates; and if they do deliver, the quality of the services rendered is questionable.

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Government organizations have various programmes set aside to provide employees with the necessary skills related to their work activities. However, the study indicated that employees were not aware of any formal or informal KM training programme aimed at improving the internal structures, as well as their individual skills. Some of the participants claimed that the administration of KM activities is arranged externally; and little was done to follow up on the execution, and also to understand the performance internally. Lack of awareness of KM and its importance, can be explained by the lack of formal or informal training; and this remains a huge challenge to the organization in the face of managing knowledge.

Lack of KM incentives and rewards

Knowledge-sharing is an important KM process. Lack of rewards or insufficient rewards, could interfere with the sharing of knowledge among employees. Participants recognized a few incentives believed to be present in WHD; but these were not directly related to KM practices, namely: monetary, promotion, performance-based recognition, and peer appreciation. The greatest challenge is not having dedicated resources to enable learning and to facilitate knowledge-management, a situation that places the responsibility on passion-

driven rather than motivated people. It becomes difficult for the majority to look for an effective KM programme when the incentive mechanisms are missing.

The department has tried to prevent the loss of skills transferred to graduates, but without success. As stated by one participant: They are not winning in this regard: "*No, the only way we try to keep them is to make a counter offer. But they got big salaries on offer from the private sector; that is why government cannot compete with the private sector, so you know it is a sad story…"*

Employees would have no motivation to share what they know with their colleagues if their efforts are not acknowledged and rewarded (Yu *et al*., 2007). The situation may worsen if it is accompanied by the fear of losing a job, if they share too much information. Managers are charged with the responsibility of ensuring that knowledge is shared with the organization; however, the issue of rewards is complicated – particularly in the public sector. Some researchers suggest that having efficient reward practices are crucial to knowledge-sharing (Fathi *et al*., 2011).

Some public organizations are using measures such as incentives to encourage knowledge-sharing, and using these in performance evaluation (Yao *et al*., 2007).

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Trust

Another factor that surfaced from the interviews is the trust issue among individuals, and between employees and management; and this constitutes the major barrier to knowledge-sharing. Employees refrain from sharing what they know with each other – not because they are afraid to reveal confidential information – but because of the lack of interpersonal trust. When there is an established system of trust, employees are not only willing to listen to others, but they are also able to share their knowledge with others (Alawi *et al*., 2007).

Most managers in the B category considered the level of trust in their organizations to be low, or altogether lacking in some areas. One interviewee said:

> "…*most of us are behaving like we are all thrown into this bottomless sack, and we can only survive if we strictly protect what we know, the attitude is blocking any form of sharing information*". Another one said: "*Trust is a big word, and surely a major*

concern in my line of work, I cannot afford to trust other people recklessly … knowledge is personal".

Other participant commented that it was like giving yourself away when you are asked to share knowledge. Trust between employees is considered key in encouraging employees to share what they know with each other (Sveiby, 2001; Alawi *et al*., 2007; Singh & Kant, 2008; Renzel, 2008). Trust forms the basis for the establishment of a knowledge-sharing culture at both personal and organizational levels; and this is followed by creating a fostering environment within the organizations (Edmonson, 2010).

Collaboration

Collaboration is recognised as an aspect of any knowledge-'friendly' culture. In the literature, an obstacle to sharing may be caused by fear of collaborating with the wrong people and simply being used without any recognition or reward (Edmonson, 2010). In a study conducted by Sveiby and Simons (2002), public sector organizations appeared to possess a worse collaborative environment than private sector organizations. This could be attributed to hierarchical organizational structures. In effect, the most difficult barriers to overcome in implementing KM projects in the public sector are culture and contracts that hinder, rather than support, the collaborative and improvement-focused culture (Milner, 2000).

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In a different study, Amidon (1997) showed that collaborative practices continue to be considered more beneficial to organizations, particularly in leveraging the skills of highly skilled professionals.

Communication flow

The participants cited poor communication flow within the department as a big hindrance to overall performance. "*Red tape has jammed [the] communication progress; if we can get rid of this problem, the department will be in a better position than ever before"*. Government departments are said to be characterized by hierarchical and bureaucratic structures that, in turn, prevent the free flow of information (Liebowitz & Chen, 2003). Flat structures are acknowledged to favour KM (Sinclair, 2008). This poor communication in the department may hinder the flow of knowledge – both within and externally.

Inadequate awareness

When it comes to KM practices, most participants maintained that it is a practice that only exists in a document. The management have failed to create enough awareness of the practice, in addition to failing to inform the employees on what they are expected to do. The interviews revealed that employees are encouraged to participate in training sessions and other programmes designed to empower employees. As a result, employees gain skills and experience, which are not fully recognized or used – thereby causing the loss of these assets – along with their potential benefits.

The organization seems to be incapable of utilizing all the knowledge and experience of their employees if they are not aware of the structures put in place to support the impartation of knowledge.

5.10.4 Technological barriers

Some participants acknowledged that technology was a major motivating factor in the directorate. Collaboration with the DoH means that the directorate exchanges large amounts of information. Some of the participants indicated that the deployment and the use of the right technology would help them utilize knowledge more efficiently. ICT provides new capabilities and practices that change much of the nature of the public sector and interactions at large (Wiig, 2007). The WHD has implemented technological systems, such as Livelink to capture, store and transfer explicit knowledge. The lack of a knowledge repository is a huge problem in the directorate.

The departments do not know 'what they know', because there are no databases that give them a grasp of their own knowledge base, that is, any co-ordinated understanding of what their workers know. Importantly, the intellectual capital or knowledge of institutions is in its employees' heads. These systems are not suitable for extracting tacit knowledge embedded in employees' heads. As discussed in section 5.7.1, the departmental approach to KM is focused on finding technological solutions. Tacit knowledge has been recognized as a crucial asset to organisations in a knowledge-based economy; and therefore, it is critical to establish a mechanism for retaining this type of knowledge asset.

It is important to identify ways of developing and utilizing the human side of KM processes. The drawback of the lack of understanding on what WHD knows, of what public officials

know, is complex – in that there is no proper transfer of skills; resources are wasted, as competencies are duplicated; and people are discouraged – because they do not feel valued.

Others were of the opinion that relying heavily on technology could dilute the real meaning of knowledge-management, when in reality, people play a major role in exchanging knowledge through non-technical means, such as formal and informal meetings. In effect, KM is practically a deeply social process that should consider both the human and other factors (Mason & Pauleen, 2003). Investing heavily in information technologies does not necessarily translate to better KM.

5.10.5 Political factors

Political factors, such as political changes, ethical codes, behaviour, and command and control are identified as barriers to KM transfer efforts in general. Managers underlined the fact that most of the portfolios in the department were held by government appointees; and when there are political changes in a country, there could also be changes to the department, such as putting different policies in place. This could hugely affect the existing knowledge-transfer structures and the overall initiatives. In addition, the government has in place a code of conduct or ethics that deter employees from being honest about specific activities.

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The divulging of such information is considered a breach of the code of conduct. This was put into perspective by a manager who maintained that:

> "*… we talk of preserving knowledge in the way we share information … our hands are tied almost all the times … it is difficult to share "classified" information with others unless they have previously been released by the Department or approved in that format".*

Clearly, political factors have a significant relationship with the performance of knowledge-transfer, as well as knowledge assets. Their existence may have a negative impact on the overall KM efforts.

Likewise, the structure of government, with its emphasis on command and control, could be a barrier to the free flow of information. The implementation of KM programmes might suffer delays from administrative red tape on national security, privacy or regulatory issues. And political changes can endanger or stall new programmes.

5.11 KM benefits

When asked about the potential benefits their organization would be likely to get by managing knowledge successfully, most participants felt that it was saving the knowledge of employees who leave and protecting strategic information that was key. Other benefits were associated with the technology that enables easier access and viewing of information indicated as follows:

> *"I have no answer to that question. I only know it started here in 2006, so I don't know there are obviously benefits; but I can't quantify them. I can briefly say that with the Livelink system, I can almost get any information I need that is within my access right. Another thing is that the Livelink system has come at the right time, when other people put in new information, I can see that immediately".*

The government's new development in the form of a reduction in the budgetary allocation for the main expansion projects, the mobility of talented employees, and the shortage of skills, among others, has placed considerable pressure on the DPW operations. Most of the participants stated that they lost core competencies when staff leaves to join other organizations or units. The WHD relies heavily on the expertise of consultants who offer expert knowledge in most of their specialised building areas, such as engineering.

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This knowledge is lost; and this loss is often attributed to the lack of a well-structured and developed KM system.

Bearing the above issues in mind, KM practices – if applied appropriately – provide improved results to individuals and the organizations alike. From an individual position, employees get a chance to share their experiences, knowledge, and to learn from each other's mistakes, thereby resulting in an improvement in their performance and skills. On the other hand, organizations benefit in the efficiency, quality, productivity, in addition to better decision-making (Cong & Pandya, 2003). The acquired knowledge by individuals and the lesson learned from projects should improve the performance of the directorate when applied well.

5.12 Conclusion: The answer to the research question

In this chapter, the case-study findings from the semi-structured interviews were analyzed and discussed. A significant issue in the implementation of successful KM initiatives is the

preliminary preparation of the organization to acquire, convert and utilize new KM processes. Preparing an organization for KM initiatives also requires establishing an enabling environment for the core KM processes – by adapting a sharing culture, strategy, the right tools and techniques, resources, and leadership. In addition, the existing challenges impeding KM success should be identified, in order to realize the benefits. This study has employed non-empirical and empirical research to understand the existing KM principles and practice in the WHD, as well as to answer the research questions.

The first sub-question was answered by examining the relevant literature and the empirical findings. It was established from the preliminary study conducted through unstructured interviews in section 2.2.4 that the directorate is facing several challenges in the process of delivering a health infrastructure. These problems included: (i) The nature of the projects; (ii) communication flow; (ii) the loss of project and institutional knowledge; (iii) information and knowledge overload; (iii) skills shortages; and (iv) advances in the use of ICT.

As a result, the directorate has been compelled to acquire and put in place ways of managing knowledge more effectively – with the key aim of becoming more innovative, adaptive and to improve the delivery of a health infrastructure. As a result, the WHD, as with public sector organizations elsewhere in the world, is now recognizing the potential benefits of KM as an important asset – with the capacity of offering sustainability and survival in the knowledge-based economy, as well as assisting in the need to improve government services, in order to deliver effective health-infrastructural services. In answering this sub-question, it has also meant that the first sub-objective has been achieved.

The second sub-question on the motivating factors has been has been answered by examining the relevant literature in section 2.2.1; and this was confirmed in the empirical findings in section 5.8 that public sector organizations' reasons for KM are more related to the provision of improved services. The participants indicated that the fostering of team work, knowledge-protection, retaining knowledge in-house, and the prevention of repeat activities comprised the key factors.

There is, however, evidence that many public sector managers have not come to terms with the actual meaning of KM as a concept and a strategy. Although the directorate has a formal KM policy in place, it was clear that KM initiatives are mainly associated with the implementation of ICT, which is merely the technical aspect of KM. Thus, most managers

describe KM as information-management or document-management, which may be perceived as a positive issue, since information forms the basis for the formal implementation of knowledge-management practices.

KM enablers are considered a requirement for the success of KM practices. As in other public sector organizations elsewhere in the world, KM initiatives have been present in the WHD for quite some time, as was discussed in Chapter 2. KM is about people, as much as it is about systems.

This study concludes that organizational culture, organizational structure, leadership and strategy, ICT, and KM resources are five critical enablers for effective KM from previously published literature on public organizations, as underlined in section 3.3. Government managers understand that ICT plays a major role in KM. The study also indicates technical support, and that facilities in the directorate are at a fairly good level of implementation. KM systems, like Livelink, can be used for managing content and for collaboration.

The directorate should, however, refrain from focusing their KM efforts too much on the technical aspect; but they should consider the social aspect, which is so vital to the successful KM initiatives. The WHD requires a flexible and easily adaptable KM culture. This is because the existing culture is still at a low level; and it needs to be boosted to facilitate other cultural aspects, such as the willingness to share knowledge, trust and collaboration. Also, incentives and rewards should be set aside to encourage a knowledge-sharing culture. Through the case study of WHD, in the leadership and strategy, getting the support of the top managers is given more emphasis.

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The government managers believe that effective KM implementation requires all top-level managers and KM agents to come fully on board in their understanding and support of the efforts. The department is adequately aware of the significant role played by leadership in KM projects. The KM unit is headed by a senior manager who promotes the values and practices associated with its practices. For the resource-enabler, people are believed to further the KM vision and mission if they understand the underlying objectives of the KM project.

Having enough human capacity and promoting individual learning through formal training for the employees are key factors. It is also important to have a dedicated KM budget to drive the learning and KM. On the aspect of human resources, the department is grappling with staff turnover – particularly in the different fields of Engineering. This not only affects the

organization's memory negatively; but it also interferes with the effective provision of services to the public.

This section addresses the KM barriers extracted from the literature and from the empirical study believed to obstruct effective KM. Government managers have in the study identified certain weaknesses that exist in the system. These are generally labelled as individual, organizational and technological. For instance, they acknowledge that time constraints, trust, a knowledge-sharing environment, rewards and incentives, communication flow, insufficient training resources, and the lack of system integration exist as the main barriers. In the light of the study, a new barrier resurfaced, namely: political changes.

The barriers to effective KM are largely due to the lack of awareness and the lack of time. Employees often work under significant time constraints, thereby affecting their ability to create or apply knowledge effectively. The lack of time could be interpreted as a lack of awareness of KM's importance. On the whole, the participants are certain that the culture in the department is not favourable to KM. Some indicated that it does not exist at all. Employees at WHD are already sharing knowledge to some extent on an informal basis. The literature agrees that knowledge-sharing can only function successfully if the culture of the organization supports it, or the employees have mutual trust. Employees share knowledge on a need-to-know basis, or from individual choice. It is difficult to measure "culture" directly, as stated in Chapter 3; thus, the presence of KM enablers in organizations is seen as indicating the existence of KM practices.

The results clearly indicated that the existing rewards and incentives did not encourage knowledge-sharing. Rather than offering non-attractive, meaningless incentives, the organization should invest time and effort in explaining the potential personal and organizational benefits of sharing tacit knowledge to motivate staff support and involvement, and then to offer appropriate rewards aligned with staff values.

The loss of critical knowledge was cited as a barrier to effective KM. The department is placed at the risk of losing employees through retirement, job-'hopping' and crucial knowledge from building experts. It was also noted that there are insufficient numbers of people who are adequately trained to replace retirees and people lost to attrition. There is insufficient KM training for all employees – meaning, that the present expertise is already

being lost. There is no official or encouraged forum for disseminating knowledge to other individuals.

KM processes should be treated as distinct from KM enablers. As discussed in section 3.4, KM processes can be considered a structured co-ordination of activities for the purpose of managing knowledge effectively, as it is enhanced by the appropriate use of KM enablers. The literature established four main KM processes as in: acquisition-oriented, conversion-oriented, and application-based, along with protection activities. The results from the study also confirmed that government managers have an understanding of what these processes entail, although not entirely. With respect to knowledge-application, the government officials were concerned about the threat that large-scale departure of staff posed to the inventory of organizational knowledge.

Knowledge, unlike data or information, exists solely within people, originating from their training and experience, and it comprises essential components, such as judgment, values and insights. Knowledge of this type is not easily replaced. However, some of the tools and techniques, like mentorship, a knowledge repository – if well utilized – could prevent the loss of crucial knowledge from leaving the organization.

In an era when knowledge and information are considered essential strategic tools for enhancing performance, the emphasis on the conscious management of these intangible assets is crucial in facilitating the achievement of the KM-associated benefits.

The following conceptual model, illustrated in Figure **5-1** presents the factors recommended as fundamental in adopting successful KM initiatives.

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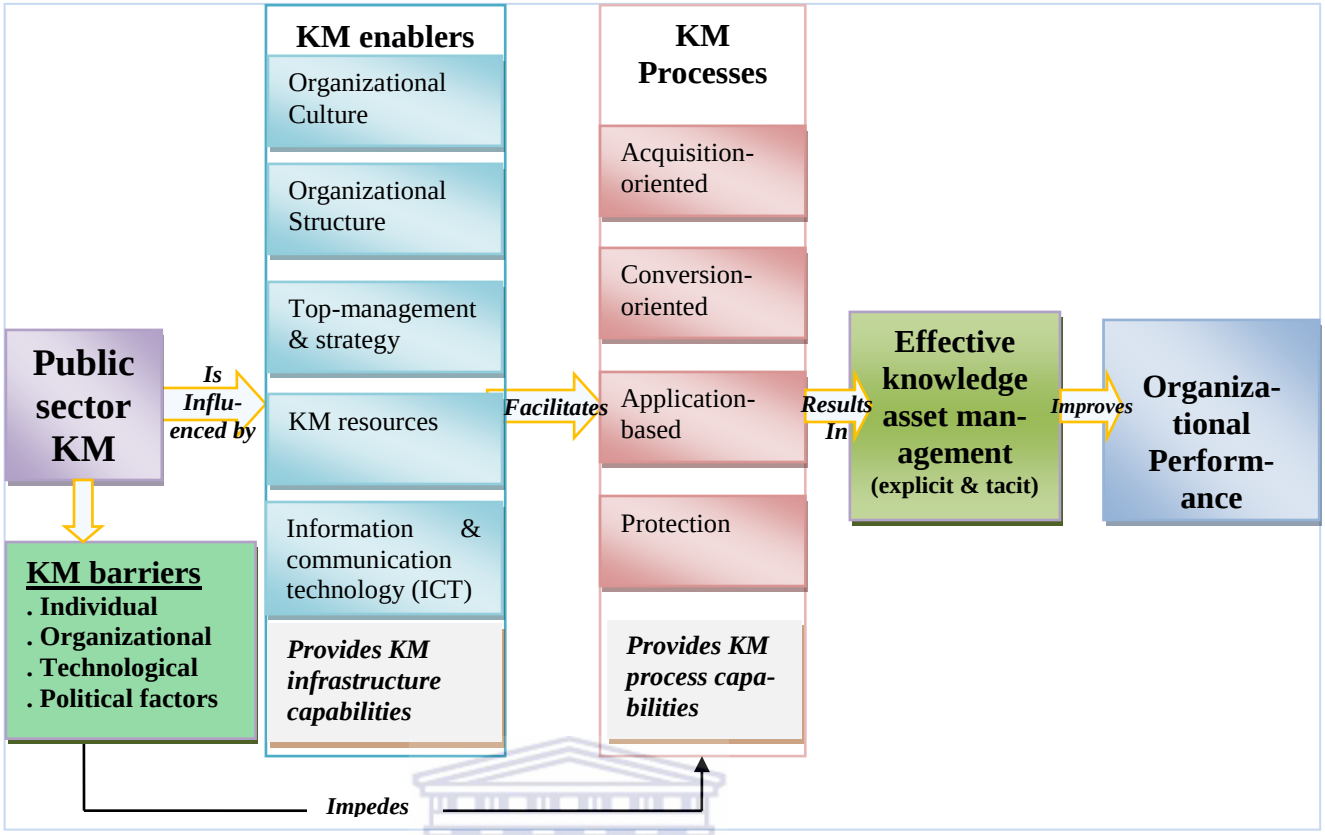

Figure 5-1: The **final proposed KM framework based on the study's outcome**

(Source: Author)

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CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The main objective of this study was to empirically investigate the critical factors that influence knowledge-management's effectiveness within organizations, which in turn, would have a positive influence on the overall performance of the organization. The purpose was to answer the main question of whether the public sector in the WHD is practising KM. This was to be done by investigating the presence of KM enablers, processes, barriers and benefits. KM enablers are considered as KM success indicators from various sources in the literature that provide a KM environment for KM processes to occur.

To achieve this, the following objectives were addressed:

- Determine the factors that influence the poor management of knowledge in the WHD health-infrastructural projects;
- Establish if there exists a KM policy or strategy supporting KM practices in the WHD;
- Identify the factors that would motivate the adoption of knowledge-management in the WHD;
- Determine the enablers and barriers that influence the effective delivery of KM;

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- What KM processes are considered essential in transforming knowledge into valuable organizational asset?

- Identify the tools/techniques that can be utilized for knowledge-acquisition, conversion, application and protection in the directorate;
- Investigate the potential benefits of implementing knowledge-management practices in the WHD;
- Recommend KM strategies for improving hospital-infrastructural delivery – based on the findings of the study.

6.2 The factors that influence the poor management of knowledge in the WHD health-infrastructural projects

The WHD is a knowledge-intensive division in the possession of knowledge assets that if well managed could contribute immensely to the efficient delivery of health infrastructure. These knowledge assets can be broadly categorized as tacit knowledge and explicit knowledge. A

structured way of managing knowledge is lacking; and as a result, the WHD is faced with challenges relating to the delivery of new infrastructure, along with the upgrading and maintenance of the existing hospital infrastructure (Van Wyk, 2007).

These challenges include, among others, project-management, communication flow, staff turnover, institutional knowledge, scarce skills and comprehensive ICT.

Every construction project is a unique endeavour to produce a large body of knowledge that can be shared and re-used in the construction organization in association with projects broadly (Egbu, 2004). To improve project performance, therefore, requires employees to share and use best practices, lessons learned, experiences, and insights – along with the construction of new knowledge (Krogh, 2002). An organisation's ability to innovate and implement continual improvement is based on the capacity to share and utilize its intellectual capital (Egbu, 2004).

6.3 Establish if there exists a KM policy or strategy supporting KM practices in the WHD

In the literature, a successful KM strategy allows an organization to differentiate between the different types of assets: which to develop; and which ones to abandon. It should give the ability to combine knowledge assets with other resources needed to create value (Teece, 2000). The study describes KM policy as equally essential in providing a guideline for the KM direction in an organization. A strategy or policy should be aimed to address the current needs, and to sustain the future knowledge needs of the organisation, in order to achieve its strategic vision.

6.4 Identify the factors that would motivate the adoption of knowledge-management in the WHD

The question pertaining to the drivers of KM is addressed in 2.3 of the study. The following three main reasons were identified as driving the directorate, in order to achieve best practices and leverage information and knowledge:

- Successful KM can lead to various positive impacts within the organisation. One of the driving forces is to foster teamwork, since this plays a significant role in attaining most of the organization's goals. Encouraging team work can lead to employee learning, and hence improved individual performance, which in turn, can be directly or indirectly linked to improved organizational performance.

- The loss of lessons learned from projects every time a project is completed. Being in a position to leverage this expertise knowledge would mitigate the risk of losing it; and it would also reduce the cost incurred in improving hospital design every time a new hospital needs to be built.
- The reduction of duplication of efforts between directorates and units is another significant factor motivating the establishment of KM practices. The designing of new hospital blueprints every time a new design is needed drives the organization to incur monetary and time costs. The knowledge from the past could help to improve the future performance within a department.

6.5 Determine the enablers and barriers that influence effective KM in the WHD

This objective was met by examining the literature related to KM-influencing factors that involved both enablers and barriers. Several KM enablers were found to be critical to the effective use of KM in section 3.3. This study was based on the premise that KM enablers provide an organization's infrastructural capability. The key-enabling factors, like organizational culture, structure, KM strategy and leadership, KM resources, and ICT all have a positive influence on KM practices. However, the research findings indicate that only organizational culture, ICT, top management, KM policy and KM-resource factors are considered to foster KM practices, and thus facilitate the improvement of health infrastructural delivery within the context of the public works sector.

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Enablers, such as organizational structure, were hardly mentioned – although some participants pointed out that poor communication flow that is closely related to organizational structure that was blocking the channels of communication in the organization. These factors should be explicitly noted in an organization, because they not only support knowledge acquisition and conversion, but they also promote its application – along with enabling a secure environment for protecting it.

Some of the conditions in the directorate at present are not encouraging KM to thrive. Most of the barriers reported by participants are the ones commonly highlighted in the literature review in section 3.4 of the study. The common themes extracted from the empirical findings (as discussed in section 5.12) are grouped in to three groups, namely: individual, organizational and technological barriers.

In regard to individual barriers, the lack of trust was underlined as a major barrier to knowledge-transfer between individuals. In section 3.3.1 of the literature, trust was highlighted as being pivotal to knowledge-sharing. However, it is clear that within the present institutional context, a lack of trust exists among the managers – preventing them from sharing what they know. Some managers believe that trust exists only when knowledge has to be shared on a need-to-know basis. The participants attribute this problem to the management who have failed to highlight the significance of knowledge-sharing.

The next group of barriers to organization-oriented KM, namely: training, time, incentives and rewards, and knowledge-retention. The department allocates significant resources for user training, but a similar level of support is lacking in the KM unit. Evidence of this was found from the manager's lack of consistency, when describing the knowledge-management concept and its meaning to the department.

Time is a said to be a "key enemy of KM". Many difficulties are compounded by the time factor, because staff members spend most of their office time executing routine daily activities that must be completed, in order to meet the department's public-service obligations. Time, as a resource, has inhibited the gathering of lessons learned from projects as well. Whether it was a shortage of staff in particular areas, or whether staff had just been transferred in and were attempting to negotiate a steep learning curve, there was a real dearth of resources and of time to build knowledge-assets.

Research indicates that a combination of performance-based monetary incentives and non-monetary incentives and rewards are significant in fostering a culture of knowledge-sharing in organizations. Promotions, or any other monetary incentives in the directorate, are not based on the individual's ability to share knowledge. For those who share knowledge, as part of their daily work, none acknowledged any form of recognition of the time spent in knowledge-creation, sharing and distribution. The managers were positive about the trust and concern amongst individuals when sharing knowledge; but this was limited to the activities that are directly linked to the delivery of health infrastructure, and not to the issues that had to do with sharing individual expertise with colleagues.

The WHD is faced with an unprecedented number of potential retirees, particularly in the engineering fields. These employees are highly specialized, and the challenge to replace them is made more difficult by the stiff competition from the private sector.

ICTs are viewed as enablers of KM in the directorate. The department has invested heavily in various systems – with the aim of improving information-management. The first initiative was to implement KM systems to support document management, and to disseminate explicit knowledge. This was a way of making certain that information is obtainable in the form and at the time and place where it is required, in order to support decision-making processes. However, some systems, like dashboard, are free-standing; hence they lack the integration required for information-exchange; and users are forced to capture the existing information from other systems manually. Likewise, KM should be seen as a broader concept with its primary focus on utilizing the technical aspects, as well as the social aspects of KM.

A good organizational design is likely to foster inter-organizational collaboration and knowledge-sharing. The KM literature reveals that in order to reduce formal communication and bureaucracy, modern offices and layouts should be designed in such a way that the offices of professionals and executives are close to each other (Disterer, 2003).

Political changes emerged as a new barrier to the effective implementation of KM. Government organizations experience frequent re-organization as ministers and governments change – thereby leading to changes in management structures, responsibilities and roles. These might affect the KM policy already put in place, hence affecting the overall KM stability. The literature, therefore, favours the introduction of a KM strategy that can be aligned with the organization's long-term goals.

6.6 Explore the KM processes essential for transforming knowledge into a valuable organizational asset

The literature presents an array of activities proposed in different KM system models (as discussed in section 3.4). Through research, this study has identified specific KM processes significant in transforming knowledge into a valuable organizational asset. These processes involve the acquisition, conversion, application and protection of knowledge. The first step considered in the implementation of KM in infrastructural delivery is the acquisition of information and knowledge from experienced government managers and consultants, as well as the documentation of the best practices and lessons learned from projects.

This can be facilitated by building formal networking programmes, such as communities of practice.

Knowledge-conversion processes are important in ensuring that the existing knowledge is useful. Knowledge, after some time, becomes obsolete; and therefore, an organization needs to integrate the existing experience and expertise knowledge from many individuals, in order to maximize efficiency. To do this, certain rules and sequencing should be followed, along with promoting problem-solving and decision-making. Also, knowledge can be stored in a knowledge repository pending its sharing among different entities.

Knowledge-application processes comprise those activities that promote knowledge-use, such as transfer, dissemination and sharing. Effective KM requires an organization to identify mechanisms for making the existing experience and expert knowledge known and used among its employees. An organization can utilize such activities as mentoring, training, coaching, communities of practice (CoP), after-action reviews, creating a knowledge map, job-shadowing programmes, meetings, exit interviews, and process documentation (as discussed in Chapter 3).

Knowledge-protection involves mechanisms utilized by an organization to protect institutional memory, and to safeguard it against damage, abuse, or deterioration. An organization can utilize common instruments, such as copyrights, licensing, and barring access, in order to prevent knowledge from falling into undesirable hands. In addition, an organization can make use of a tracking device attached to computers to notify the management of any information and knowledge misuse.

6.7 Identify tools/techniques that can be utilized for knowledge-acquisition, conversion, application and protection in the directorate

When staff members retire, organizations face the loss of key intellectual capacity and the loss of institutional memory considered crucial for solving problems. Many public sector organizations are now facing this challenge. Some appropriate tools/techniques applied by organizations to prevent the loss of crucial knowledge were discussed in section 3.4. The research also indicated that organizations should identify specific strategies to acquire, store, and transmit institutional memory – often vested in their most experienced employees – and to protect it from leaving.

Even though some of the techniques for transmitting tacit knowledge are not formally recognized as KM techniques, the organizations have a responsibility to formalize

programmes such as *Mzashaki isizwe*, or on-the-job training. Many organizations have formed CoP, special task forces, and coaching – to mention but a few.

6.8 Investigate the potential benefits of implementing knowledge management practices in the WHD

The benefits derived from managing knowledge effectively were firstly identified from the literature and discussed in Chapter one. This was followed by asking government officials about their perception on the potential benefits to be expected from the effective use of KM. The study indicated that saving the knowledge of employees who leave and protecting strategic information from leaving the organization would be highly beneficial.

6.9 Recommend KM strategies for improving hospital infrastructure delivery based on the findings of the study

If KM is to be successful, an organization should consider establishing an encouraging environment. Friendly culture is important in promoting trust, collaboration, learning, and knowledge-sharing. Even though organizational structure was barely mentioned during the interviews, the literature and the researcher propose that knowledge-friendly structures should be put in place. This means that the structures should support creation and sharing processes, and individuals should understand their role and significance in the whole. Top management is necessary to offer vision and drive for KM activities.

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This, however, is not all that is essential. KM requires, firstly, creating enough awareness with regard to KM practices, ensuring that the practice is understood and accepted. This process should be led by a recognised KM strategy or policy. Secondly, KM resources are crucial – especially in people who are recognized as carriers of knowledge and the drivers of all processes and activities. Additionally, a dedicated budget for KM practices should be set aside to cater for KM activities and their improvement. Thirdly, ICT is an essential enabler of KM, since it facilitates easy information and knowledge capture, storage, retrieval, transfer and sharing across organizations, between organizations and national boundaries.

Managing knowledge is not straightforward; it is impeded by a number of barriers, generally identified as: individual, organizational, technological and political. These barriers should be acknowledged and eradicated accordingly, in order boost KM processes. If the above discussed key KM conditions are met, the overall purpose of leveraging knowledge for

innovation, decision-making, and ultimately for improving health-infrastructural delivery can be achieved. The following model (illustrated in Figure **6-1)** presents the factors recommended as fundamental in adopting successful KM initiatives.

6.10 Recommendations for the WHD

Based on the literature review and the empirical findings, the study suggestions a number of recommendations:

Creation of more awareness regarding KM: When asked about their understanding of the term KM, the majority of government managers defined it as information-management. Although the findings also showed that there are pockets of good KM practices, such as the utilization of technology and mentorship programmes, there is also a need for the creation of more awareness regarding KM, through the sharing of best practices and lessons learned in earlier models for the delivery of infrastructure in the public sector.

Better defined and communicated KM portfolio: One of the fundamental challenges to establishing effective KM practices originates from the employee's uncertainty about the real meaning of KM, along with the potential individual and organizational benefits to be derived from it. The portfolio of the profile of KM needs to be better defined and better communicated to employees in general. The KM portfolio is currently handled by an external library team; but an internal team needs to be established in the department. This barrier could be avoided by creating a definitive KM programme: the appointed KM champion should manage the KM programme effectively by initiating education or training for staff at all levels, in order to entrench KM practices and promote more awareness.

Create and implement appropriate policies: The interviews revealed that most government managers acknowledged the existence of a KM policy, while a reduced number did not; and a few knew nothing about it. Having a well-defined KM policy is crucial for any organization embarking on KM initiatives. Given that KM is not an end in itself, but rather a means to realizing organisational goals, then a KM policy or strategy should be designed to help meet the short-term objectives to reach the long-term goals.

Create the right environment for KM: Implementing a clearly defined KM policy/strategy is essential; but equally significant is the creation of the right kind of environment to facilitate the effective implementation of KM. This environment is created by taking into account the

enablers and processes required in laying down a solid foundation for KM initiatives. Barriers to the effective use of KM tools/techniques should be removed; and KM should be built on enablers. Some of the recommended suggestions in this regard are associated with the social aspect of KM, as follows:

- ***Top-management support*:** The support from top management is critical and must be visible.
- ***Design and implement an incentive programme***: The KM caretakers should design an incentive programme for knowledge-sharing aimed to encourage people to share their knowledge. This would probably alleviate employees' tendencies to hoard information. It is important to provide benefits for staff who participate actively in knowledge processes.
- ***Training programmes***: The department ought to design training programmes and workshops that are geared towards building the KM capacity of the public sector. Employees should be educated to abandon the belief that the knowledge they possess belongs exclusively to them, and a culture of passing on expertise and experience needs to be cultivated.
- ***Employ people with adequate skills***: The public sector should create positions for people who will be directly responsible for KM in the directorate and across units.
- ***Link KM to the organisational goals***: Managers should create a clear, tangible picture of the benefits of KM, as they relate to the organisation's specific goals and other circumstances.
- ***Dedicate human resources to KM***: A dedicated team should be assigned the task of ensuring that the lessons learned from projects and through the normal public sector operations are documented and safely preserved for future use.
- ***Dedicate financial resources to KM***: The budget from the department should adequately cater for KM programme financial resources. Particularly, the KM unit should have a dedicated budg*et al*located to it; and ultimately, this should be the subject of conscious decision-making.
- ***Align technologies***: It is important to examine the existing technologies in the department, and see how they could be exploited better to support KM processes. Funding makes it difficult to acquire new technologies in the public sector; but looking for ways – like integrating the systems – to avoid the re-invention of tasks should be considered.

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- ***List and understand current KM activities***: KM processes are likely to thrive in any KM-enabled environment – by putting in place policies and strategies to enhance the processes of knowledge-acquisition, conversion, application and protection. In the WHD there exist some examples of good KM practice, such as the *Mzashaki isizwe* programme, mentorship, the sharing of knowledge on a need-to-know basis, and interviewing process; except that they are not usually thought of as KM activities. It is, therefore, important to search within the organisation for current activities that might already be related to KM – even if this is part of the simple daily activities – and then to use them as a starting point.
- ***Introduce adequate measures for retaining knowledge***: The government managers expressed their fear on the lack of proper measures to prevent knowledge from leaving their organisation. To address the issue of skills loss, it may be important for the directorate to consider having a centralized knowledge repository – on which employees could publish interesting ideas, design, knowledge and share with colleagues across the organization. The project knowledge of WHD is kept in two discrete areas: explicit knowledge deliverables are kept on servers; and the tacit knowledge and experience gained in projects remains in each project team member's memory. Keeping project deliverables, that is, drawings, plans and more does not capture the tacit knowledge of the projects. The existing repository for the storage of electronic drawings is not very well co-ordinated; and consequently, this requires further consideration.
- ***Appropriately manage communications***: One of the key issues the directorate has to deal with is the management of communication and the massive volumes of information generated in the course of infrastructural delivery activities. It is essential to create a repository of various retired employees with an expertise in that domain, in order to regain that knowledge rather than rebuilding it by using other means.

Other means of KM: In addition, the organization should consider establishing other techniques for preserving knowledge (as suggested in Chapter 3.4) such as communities of practice, storytelling, after-action reviews, knowledge map, and job-shadowing programmes among others. Also collaboration tools, like social networking and online discussion forums play an important role in the exchange of tacit knowledge.

6.11 Contributions of this study

This study's findings add to the extant KM research – beneficial to both the public sector and academic communities. This study identified the following:

- The KM drivers applicable to the particular empirical setting of this study;
- The enablers and barriers that might help or hinder KM in the researched organisation (and possible similar organisations);
- The recognized essential areas for improvement of KM practices in the researched organisation;
- This study could be used for further encouragement of KM in this and similar organisations;
- This study has also explored and provided a better understanding of the internal mechanisms necessary to leverage internal resources to develop and implement a KM-enabling environment in this and similar public sector organisations;
- The findings of this study could also indicate how KM could be beneficial to service delivery to citizens and also to organizational performance.

This study contributes to both academic researchers and public-sector organizations in three ways. ***Firstly***, it leads to a better understanding regarding the current status of KM's implementation and readiness to allow and implement KM practices. ***Secondly***, it explains the drivers, enablers and processes associated with KM practices in South African government organisations. Finally, some of the potential benefits derived from successful KM initiatives have been highlighted.

6.12 Limitations of the study

Even though the data for the study were very rich, and measures were taken essentially to address any limitations to the study, a number of issues were identified that call for further examination. The following limitations were determined:

- As described in Chapter 4, one of the limitations of this study is that the sample was limited to nine interviewees, which was caused by the studied department's internal decision regarding the number of available participants. This study focus is on the WHD use of KM practices and principles to enhance the delivery of health infrastructure, in order to meet the client's (DoH) mandate. The findings from the

research, therefore, are directly applicable only to the WHD; but they might be relevant to other similar organisations.

- The small sample limited the possibility that the results could be generalized beyond the specific population from which the sample was drawn without conducting further research. The generalization from a single directorate setting to the entire government service may be questionable. Thus, the results of this study may have to be carefully interpreted, before being applicable to different contexts.
- The questionnaire initially designed to gather quantitative data was not used as a result of the poor response rate. It would be beneficial to widen the study in future to incorporate additional levels of staff, because government managers might have perceived things from a narrow view, and might possibly wish to put a positive spin on their units. Some of the questions may be answered subjectively, according to the respondents' interpretation of the situation – thereby resulting in skewed results.

It is, however, important to state that these limitations did not influence the validity of this study and its contributions.

6.13 Recommendations for future research

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Since it is difficult to draw generalizations from an isolated study of a single directorate, that could be usable for other similar directorates in the public sector, for future research, it is recommended that this study be replicated through several other directorates or even departments at various government levels (e.g. national, provincial, or local).

It is also recommended that quantitative analysis, together with qualitative analysis, be used to create a triangulation of the two approaches. While the researcher believes that the interviews were undoubtedly informative, a complementary survey would have provided the opinions of a wider audience – and hence provide support for the research methods used.

This study generated some interesting results, believed to be consistent with most of the prevailing research on this topic (Davenport *et al*., 1998; Moffett, 2003; Riege, 2005; Yeh *et al*., 2006; Cong *et al*., 2007; Ho, 2009; Anantatmula & Kanungo, 2010). However, the study underlined some areas that require further examination pertaining to KM enablers and processes said to have a direct influence on the success of KM.

One of the enablers requiring further investigation is organizational structure. This enabler was not recognised from the empirical findings as being important. Another area that needs to be explored further is the political factors, such as political changes, ethical-code behaviour, and command and control that emerged as barriers to knowledge-transfer. On this note, more study needs to be done to ascertain how KM success is affected by their existence.

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APPENDICES

Appendix I – Introduction letter from the supervisor

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11 October 2011

Dear Sir/Madam

To whom it may concern

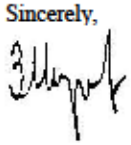
Ms Lydiah Kimani

This is to confirm that Ms Lydiah Kimani is a registered Masters student at the Department of Information Systems, University of the Western Cape.

As Ms Kimani is currently collecting data for her study titled "Knowledge management in the public sector: its role in facilitating the delivery of health infrastructure", your assistance would be greatly appreciated.

I shall be pleased to provide any additional information that might be required.

Sincerely,



Dr Zoran Mitrović

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Appendix II – Interview questions

Section 1: Managers' background information	What is your level of education? What position do you hold in the department? How long have you worked in the department? What division/unit are you working under?
Section 2: Knowledge-management awareness	What is the main purpose of the unit? What are the key functions/work processes performed in the unit? What are the knowledge and skills needed to perform these functions/work processes? What tools are used to assess and determine that the functions/work processes are properly performed and that the knowledge requirements to perform the tasks are met? What do you understand by the term 'knowledge-management'? Has your organization adopted KM practices? If yes, what are the reason(s)? What knowledge-management practices are there in the directorate? What are some of the knowledge-management benefits that you have identified in the directorate?
Section 3: Investigating factors enabling or hindering knowledge-management in the directorate	What factors influence knowledge-management in your organization? What do you think are the major barriers for sharing knowledge in your organization?
Section 4: How knowledge-management can be implemented effectively in the directorate	What strategies are there for effective knowledge-sharing? How do you ensure that your employees have the relevant knowledge to carry out their tasks? How does the organization ensure that this knowledge is adequately captured and utilized? Are there programmes used to facilitate knowledge-transfer? What measures have been put in place to protect organizational knowledge from leaving?

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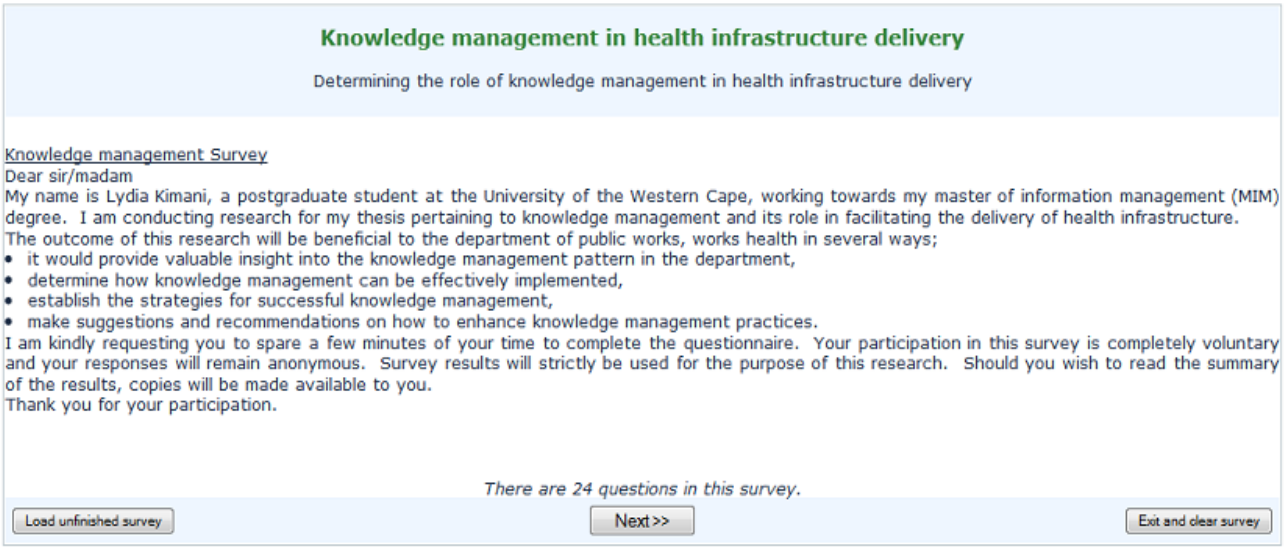
Appendix III – Screenshot of letter of introduction for the online questionnaire



Knowledge management in health infrastructure delivery

Determining the role of knowledge management in health infrastructure delivery

Knowledge management Survey

Dear sir/madam

My name is Lydia Kimani, a postgraduate student at the University of the Western Cape, working towards my master of information management (MIM) degree. I am conducting research for my thesis pertaining to knowledge management and its role in facilitating the delivery of health infrastructure.

The outcome of this research will be beneficial to the department of public works, works health in several ways;

- it would provide valuable insight into the knowledge management pattern in the department,
- determine how knowledge management can be effectively implemented,
- establish the strategies for successful knowledge management,
- make suggestions and recommendations on how to enhance knowledge management practices.

I am kindly requesting you to spare a few minutes of your time to complete the questionnaire. Your participation in this survey is completely voluntary and your responses will remain anonymous. Survey results will strictly be used for the purpose of this research. Should you wish to read the summary of the results, copies will be made available to you.

Thank you for your participation.

There are 24 questions in this survey.

Load unfinished survey | Next >> | Exit and clear survey

Appendix IV – The questionnaire in a word-processor format

1. Knowledge management is the systematic and organized attempt to use knowledge within the organization to provide services to the public and to improve service.
   Please tick the answer that best describes your personal details

PERSONAL INFORMATION							
Gender	M	F					
Age	Less than 26 years	26 - 30 years	31 - 35 years	36 - 40 years	41 - 45 years	46 - 50 years	above 50 years
Highest qualification	Doctor of Philosophy	Master's degree	Others (specify): _____	First degree / Equivalent	Diploma		
Current position	Director	Assistant Director	Manager	Assistant Manager	Administrator	Others (specify): _____	
Division / Unit	Engineering	Quantity Surveyor	Administration	Architecture	Supply Chain	Others (specify): _____	
Work experience	Less than 6 years	6 – 10 years	11 – 15 years	16 – 20 years	More than 20 years		
Number of years in the division / unit	Less than 1 year	1 – 3 years	4 – 6 years	7 – 9 years	More than 10 years		

2. Please tick Yes or No in the box that best suits your response.

Questions	2 Yes	1 No
Does your organization have a formal knowledge management program in place?	**Yes**	**No**
If no, are there plans in place to introduce it?	**Yes**	**No**
If the answer is yes, then does your organization have a knowledge officer or any other person in similar position with the responsibilities of generating, distributing and leveraging the organization's knowledge?	**Yes**	**No**
Does the organization have a written knowledge management policy?	**Yes**	**No**
Is there a dedicated budget allocated to knowledge management program?	**Yes**	**No**

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3. Based on a five point pre-coded scale described as: **1=Strongly agree, 2=agree 3= disagree 4= strongly disagree 5 = I have no opinion**
Please tick the category of the column that best describes your degree of agreement or disagreement. The following factors would motivate my organization to implement or increase its knowledge management practices.

In my organization, knowledge management practices are motivated by:	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
Advances in information and communications technologies					
The shift from paper-based to electronic sources of information					
Pressure from client					
The need to identify and protect strategic knowledge in the organization					
The desire to promote professional satisfaction					
The desire to support and encourage a learning culture					
The desire to promote team work					
The desire to meet information and knowledge needs of the public servants					
Loss of key personnel and their knowledge					
The desire to improve decision making					
The need to improve efficiency in infrastructure delivery process					

What are some other factors that would motivate your organization to implement or increase its knowledge management practices?

_____

_____

4. Based on a five point pre-coded scale described as: **1=Strongly agree, 2=agree 3= disagree 4= strongly disagree 5 = I have no opinion**
Please tick the category of the column that best describes your degree of agreement or disagreement. The following factor influences knowledge management practices in my organization.

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Culture: In my organization …	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
overall organizational vision is clearly stated					
high levels of participation are expected in transferring knowledge					
knowledge sharing is a routine like any other daily work for employees					
employees are encouraged to interact with other groups					
employees are co-operative and supportive when requested for some information					
Knowledge sharing among employees is seen as a strength					
senior management clearly supports the role of knowledge in our organization's success					
managers actively encourages employee to capture lessons learned					
individuals are visibly rewarded for sharing knowledge					
directorate has a monetary incentive system aimed at speeding up employees performance					
the management motivates staff to share knowledge by building trust					
employees are encouraged to ask others for assistance when needed					
Employees are encouraged to use others' knowledge to solve daily work problems					
experts 'contributions are recognized					

5. Based on a five point pre-coded scale described as: **1=Strongly agree, 2=agree 3= disagree 4= strongly disagree 5 = I have no opinion**
Please tick the category of the column that best describes your degree of agreement or disagreement. The following factor influences knowledge management practices in my organization

Organization Structure: In my organization …	1	2	3	4	5

	Strongly agree	Agree	Disagree	Strongly disagree	No opinion
structure*3 of divisions and units inhibits interaction and sharing or knowledge.					
structure facilitates the discovery of new knowledge					
structure allows smooth communication flow within directorate					
there is a standardized reward system for sharing knowledge					
the flow of information in the Directorate fosters innovation					
Strategy					
Top management recognize knowledge management as an important part of the organization strategy					
The directorate has a clear knowledge management strategy regarding organization's knowledge assets					
There are defined responsibilities for knowledge management initiatives					
experts 'contributions are recognized					

6. Based on a five point pre-coded scale described as: **1=Strongly agree, 2=agree 3= disagree 4= strongly disagree 5 = I have no opinion**
Please tick the category of the column that best describes your degree of agreement or disagreement. The following factor influences knowledge management practices in my organization

People resource:	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
The directorate have a structured human resource policies regarding knowledge management					
The organization encourages experienced workers to transfer their knowledge to new or less experienced workers					
The directorate provides formal training related to knowledge management practices to employees					
The organization provides informal training related to knowledge management					
The organization uses formal mentoring practices, including apprenticeships					
The organization offers off-site training to workers in order to keep skills current					

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7. Based on a five point pre-coded scale described as: **1=Strongly agree, 2=agree 3= disagree 4= strongly disagree 5 = I have no opinion**
Please tick the category of the column that best describes your degree of agreement or disagreement. The following factors indicate the significance of lessons learned from the projects

Lesson Learned: In my organization …	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
at the end of each project, we evaluate what can be/has been learned from the project					
at the start of each project we decide which experiences from other projects are relevant for application in this project					
at the end of each project phase we evaluate what can be/has been learned from this phase					
there are formal learning goals on which projects have to be evaluated					
the stored knowledge is used for improvement of other projects					
in case of parallel projects knowledge and experiences are exchanged actively					

3 * *structure is defined as the rules, policies, procedures, processes, hierarchy or reporting relationships, incentive systems, and departmental boundaries that organize tasks with the directorate*

there are procedures that force a project team to define learning goals from the start of the project	**1**	**2**	**3**	**4**	**5**
exchange of experiences between project managers is organized					

8. Based on a five point pre-coded scale described as: **1=Strongly agree, 2=agree 3= disagree 4= strongly disagree 5 = I have no opinion**
Please tick the category of the column that best describes your degree of agreement or disagreement. The following factors indicate how knowledge is created in my organization

In my organization, new knowledge is created through…	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
capturing knowledge obtained from clients, citizens					
using lesson learned obtained from projects, clients					
encouraging employees to participate in project teams with other					
attending conferences					
attending workshops					
writing internal reports					
accessing databases					

Please specify other ways in which knowledge is created in your organization

_____

_____

9. Based on a five point pre-coded scale described as: **1=Strongly agree, 2=agree 3= disagree 4= strongly disagree 5 = I have no opinion**
Please tick the category of the column that best describes your degree of agreement or disagreement. The following factors indicate how knowledge is stored in my organization

In my organization, knowledge is stored in…	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
Knowledge repository					
Filing cabinets					
e-registry					
Knowledge stored in knowledge repository is easily accessible					
Knowledge stored in knowledge repository is easily not accessible					

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Please specify other tools used for storing knowledge

_____

_____

10. Based on a five point pre-coded scale described as: **1=Strongly agree, 2=agree 3= disagree 4= strongly disagree 5 = I have no opinion**
Please tick the category of the column that best describes your degree of agreement or disagreement. The knowledge transfer process in my firm occurs in the following ways

In my organization, knowledge transfer occurs through…	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
team work					
discussions of major projects after conclusion (debriefing)					
informal social net working of employees to exchange views					
organizing formal meetings					
the intranet					
alliances with professional associates					

Please specify other ways in which knowledge is created in your organization

_____

_____

The knowledge sharing process in my firm occurs in the following ways

Knowledge sharing: I feel that ...	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
my organization has a sharing culture					
I have time to chat informally with other colleagues					
my organization conducts events and provides time in which ideas and experiences may be shared					
the organization's layout and design is conducive for discussing with colleagues					
my organization uses intranet sites to share knowledge					
my organization provides opportunities for regular meetings					
my organization provides opportunities for formal and informal social networking of employees					

Please indicate other ways of knowledge transfer in your firm

_____

_____

_____

The following are some of the mentoring opportunities in my organization

Mentoring: My organization…	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
encourages employee to further their education					
encourages employees to attend training	1	2	3	4	5
provides professional development programs					
hires and trains graduates					

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Please indicate other ways of mentoring in your organization

_____

_____

The following are some of factors that promote knowledge management in my organization

	1 Strongly agree	2 Agree	3 Disagree	4 Strongly disagree	5 No opinion
There is monetary and non-monetary rewards for sharing knowledge					
There is special recognition of staff for the time spent in knowledge creation sharing and distribution					
Promotions are based on the ability to share knowledge					
Mutual respect, trust, care and concern amongst individuals					

Please indicate other ways of mentoring in your organization

_____

_____

Thank you for taking your time to fill the questionnaire.