THE IMPACT OF ORGANISATIONAL LEARNING ON SERVICE EXCELLENCE IN THE DEPARTMENT OF SCIENCE AND TECHNOLOGY

by

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DECLARATION

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I declare that the impact of organisational learning on service excellence in the Department of Science and Technology is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

________________________ _____________________
SIGNATURE DATE

(Ms Patricia Seja Tomotomo)
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ABSTRACT

The study focuses on organisational learning in the Department of Science and Technology (DST). Attention is paid to the meaning of the concept organisational learning, prerequisites for and factors of organisational learning for service excellence, organisational learning as an important phenomenon in a knowledge based organisation such as the DST. To determine the impact of organisational learning on service excellence in the DST, the study adopted a formalised, communicative, experimental and cross-sectional form of research design. The research methodology adopted in the study is that of qualitative research method in order to find substantial evidence. The study also employs a quantitative research method to complement the qualitative method. Both non-probability and probability sampling methods were employed in the study. The sample included 55 respondents from five programmes of the DST across all levels of the organisational structure. The results indicated that the DST leadership does support service excellence, thus highlighting the importance of communication in organisational learning.
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CHAPTER 1: GENERAL INTRODUCTION

1.1 Introduction

The purpose of the study is to evaluate the current approaches towards organisational learning in order to determine the extent to which the Department of Science and Technology (DST) follows and exhibits this culture. The study focuses on the DST’s approach towards organisational learning with attention being paid to the meaning of the concept, which is one of the prerequisites for service excellence. Practicing organisational learning as a strategic focus would ensure that the DST would learn efficiently and effectively from its own experiences, and in turn improve its quality of service, thus ensuring service excellence.

1.2 Background and Rationale

Since 1994, various policies have been promulgated to promote service delivery. These policies appear in the White Paper on the Transformation of the Public Service (1995) the Batho Pele White Paper (1997), and the White Paper on Public Service Training and Education (1998). The DST is the national department responsible for science and technology policy in South Africa. Its mission is to develop, coordinate and manage a national system of innovation that will bring about maximum human capital, sustainable economic growth and improved quality of life in the country (White Paper on Science and Technology, 1996:5).

The DST has developed strategic policy documents such as the White Paper on Science and Technology (1996), National Research and Development Strategy (NRDS) (2002), and the Ten-Year Innovation Plan (TYIP) (2008). The purpose of the TYIP is to guide South Africa’s transformation towards a knowledge-based economy in which production and dissemination of knowledge lead to economic benefits and enriches all fields of human endeavour (Department of Science and Technology, 2008:8). It can be argued that the TYIP is one of the DST’s means to respond to the demands of the changing world and environment as influenced by external factors. For example, most countries, including
South Africa, have prioritised innovation as a tool for economic growth and development. The gap between research NRDS results and commercialised products (innovation chasm) has been an ongoing issue in South Africa for decades and TYIP strategy is aimed at addressing this gap.

This study evaluates whether the current culture, including the DST systems, exhibits the values of organisational learning. The study also assists in determining whether skills learned are being transferred in the workplace, and if this results in continuous improvement and service excellence. The DST invests significantly in the training and development of its employees and in ensuring that they are continuously empowered. However, little attention is focused on the returns on this investment and how these might influence the internal processes, the systems and outputs, and the outcomes and impacts of its services. Employees tend to maintain the status quo even after returning from training interventions that are aimed at improving productivity. As such, an evaluation of the DST’s approach toward learning and development could be crucial in order for the DST to maximise its flexibility in responding to strategic objectives leading to the successful implementation of its strategies.

The extent to which the DST’s Human Resources strategy fosters knowledge-sharing, including its organisational strategic policy documents such as the NRDS and TYIP, should in turn inform and improve DST service excellence (or the lack thereof). Knowledge management and organisational learning should be seen as two parallel concepts. The implementation of the strategic policy documents is dependent upon the inherent knowledge which informs the daily behaviours and attitudes that constitute the culture of an organisation. As such, it is important for the DST to give attention to the required skills and competencies that impact on organisational learning for service excellence.

The DST is entrusted with the responsibility to formulate science and technology policies as such; it is mandated to conduct research and development as well as innovation strategies. Therefore this responsibility of being a policy department requires of the DST to adopt an
alternative approach towards learning and development which is outcome and impact based.

1.3 Motivation for the Study

The motivation for the study is to:

(i) Solve an empirical problem
(ii) Assess why the DST spent R100 million on training and development in the 2013/2014 financial year and yet service delivery has not improved
(iii) How the DST could utilise its 300 employees to the benefit of service delivery

While the DST attempts to implement its strategies successfully, alongside these strategies are the daily operations that are embedded in the systems and the behaviours and attitudes that constitute the culture of the organisation. Various authors confirm the possible impact of an institution’s culture on its performance (cf. Smit & Cronje, 1997:447; Hofstede, 2000:23). Organisational culture is defined by Deal and Kennedy (1991:38) as “the way things are done here”. One can argue that the way things are done in an organisation on a daily basis has a direct impact on its strategy implementation, whether successful or not. It can be argued that strategy implementation is dependent upon the knowledge which informs the daily behaviours and attitudes that constitute the culture of an organisation. However, with regard to the DST, it seems that the organisation overlooks its internal skills, competencies and attitudes, despite the fact that these impact on the implementation of the DST strategic initiatives. For example, most employees in the DST do not fully understand the impact of their personal development plans or their learning and development of organisational performance, or the impact that improved service delivery would have. This could signal a problem around the integration of learning and development of initiatives towards improving service delivery.

As a government department, the DST appears not to consider the investment of training its employees, and how this might influence the internal processes, systems, and
organisational culture, and the outputs, outcomes and impacts of its services. An evaluation of the DST’s approach toward learning and development could be crucial for the DST in order to maximise its flexibility in responding to strategic initiatives and thereby leading to the successful implementation of its strategies.

It can be argued that employees have the ability to learn as individuals and in groups within an organisation. However, if there is no proper mechanism in place to integrate newly acquired knowledge and organisational learning, then DST policy implementation, including service delivery, will not improve. Thus, the DST leadership should consider it a key responsibility to encourage this culture.

Leadership in an organisation has to change with the development and maturation of the organisation. Early on, in creating the organisation, the leaders themselves have to serve more as animators. In the building phase; they must be the creators of the organisation’s culture. To successfully maintain the organisation they must sustain the culture that has been put in place, and when changes in the organisation are needed they must become the agents of that change (Schein, 1985:57).

Organisational culture, systems and processes refer to the internal functioning of an organisation. According to Louw and Venter (2006:394), culture, systems and processes are pivotal in the translation of strategy into tangible outcomes and actions, since these elements describe and delineate how things are done and who does what in an organisation. Louw and Venter (2006:394) further state that through the alignment of organisational structure, culture, processes and systems, knowledge and skills-based, strategies are put into action and the expected results are thus delivered. Depending on its framework, an organisation’s structure can promote or inhibit the flow of knowledge – internal and external to the organisation – that enhances its strategic flexibility to effectively respond to strategic initiatives and change (Grant, 2008:182). To support the above notion, Siehl (1985:125) (cited in Holtzhausen 1999:76), states that culture is viewed as being of powerful relevance to the strategy implementation perspective.
Louw and Venter (2006:406), define an organisation’s structure as the formal pattern of interaction and coordination designed by management to link the tasks and patterns of individuals and groups in achievement of organisational goals. Based on this definition, Louw and Venter (2006:407) argue that an organisation’s structure provides a sense of purpose and direction by describing who does what, as well as various levels of commitment and accountability. On the other hand, Louw and Venter (2006:431), refer to an organisation’s culture as a system of norms, values and beliefs which bind its members together, unifying them in purpose. Therefore, an organisation’s culture serves to underline the drivers of the processes by laying the foundation for the type of systems adopted. Louw and Venter (2006:407) argue that when cultures manage to bind members effectively, and are sufficiently wide-spread, accepted and entrenched, they become key influences on both strategic alignment and strategic implementation.

Boojhawon (2006:59) adds another element to Louw and Venter’s above point: that culture exerts a powerful influence on behaviour, decision-making and actions, and thus strongly affects an organisation’s ability to follow its strategy. Johnson and Scholes (1997:53-56), add another dimension to the concept of organisational culture. According to Johnson and Scholes (1997:53-56), organisational culture is the deeper level of basic assumptions and beliefs that are shared by members of an organisation, which operate unconsciously and define in a basic taken-for-granted fashion the organisation’s view of itself and its environment. Appelbaum, Hebert and Leroux (1999:239) define culture as a communication process by which organisational members make sense of their organisation and their roles and duties. They relate culture to employee empowerment, arguing that the concept of empowerment pushes participative management a step further, as it requires that employees internalise their organisation’s culture and make independent decisions. Their discussion of empowerment also emphasises that empowerment is achieved by people developing their own solutions rather than having them imposed or imported from outside. Considering the views of these authors, it can therefore be argued that culture directly supports organisational learning.
1.4 Problem Statement

The discussion of the problem in context and the review thereof, have led to the problem statement which is: The culture of organisational learning in the Department of Science and Technology does not support continuous improvement in the implementation of strategic initiatives. The main research question of this study is: **How could the culture of organisational learning in the DST be improved to support the implementation of strategic objectives?**

1.5 Research Questions

Questions are clustered in the following categories in order to assess the impact of organisational learning on service excellence in the DST:

(i) What are the main factors that constitute the culture of organisational learning?
(ii) What is the current culture of organisational learning at the DST?
(iii) What are the key factors that could contribute to a culture of organisational learning at the DST?
(iv) How could these factors of organisational learning be improved at the DST?

1.6 Research Objectives

The objectives of this research are four fold:

(i) To identify and describe factors that constitute a culture of organisational learning;
(ii) To evaluate the current organisational culture at the DST;
(iii) To identify those factors that could contribute to a culture of organisational learning at the DST; and
(iv) To make recommendations as to how these key factors of organisational learning could be improved.
1.7 Importance of the Study to the DST

The study is aimed at addressing the present barriers to establishing a culture of learning at the DST. The study is necessary because the DST invests considerable financial resources to capacitate its employees. In addition, the study assists in determining whether skills learned are being transferred to the job and if this results in continuous improvement and service excellence. This study seeks to make recommendations that will contribute to performance improvement and assist the Department in service delivery improvement.

The recommendations made in this study, if adopted by the Department, may result in key strategic outcomes such as improvement in service delivery and these recommendations can be considered as improvements in other government departments.

1.8 Demarcation and Scope of Study

The study focuses on organisational learning at the DST by evaluating culture, structures, systems and processes as key drivers of organisational learning. Figueiredo (2003:607-643) states that despite the limitations on the number of analyses and empirical evidence gathered in order to explain the role of learning within organisations, the research author should synthesise several contributions from the literature. A limitation of the study was the inadequate sample size given the size of the Department including the timelines for the study and the unresponsiveness of sampled respondents. From the population sample, 65 respondents were polled and only 55 responded, representing an 85% response rate.

1.9 Research Design

This is an empirical study that determines how the culture of organisational learning in the DST supports continuous improvement in responding to strategic initiatives. Holtzhausen
(2007:20) states that deciding to follow either a quantitative or qualitative approach during research design, determines which research methods are to be chosen. Webb (2010:160) adds that when a researcher aims to answer a specific research question, a decision has to be made as to which methods should be used, while considering the limitations of each of the methods. When selecting a particular paradigm, researchers are influenced by various variables (Mouton in Webb 2010:160).

This study follows a mixed method approach. A quantitative survey quantifies attitudes, opinions, behaviours, and other defined variables and generalises the results (Coldwell & Herbst 2004:16).

1.10 Data Collection Methods

A survey questionnaire with items relating to the culture of organisational learning at the DST was used. According to Coldwell and Herbst (2004:48), surveys and questionnaires allow researchers to gather information from people effectively and efficiently. Webb (2010:152) further states that the survey method is used within the quantitative methodological paradigm and requires the researcher to undertake various sequential steps. This requires a conceptualisation process which includes the design of the questionnaire, identification of indicators, formulation of questionnaire items, and pre-testing the questionnaire. For this study, the author randomly surveyed 55 respondents across all Programmes and employment levels. The findings of the literature review were also used in adopting the survey items.

1.11 Overview of Chapters

Chapter 1 is the introductory chapter. It explains and describes the background and rationale of the study; the motivation for the study; the problem statement and main research question, the subsidiary research questions and objectives of the study; the
importance of the study to the DST; and its demarcation and scope, research design and data collection methods.

In Chapter 2 the literature on organisational learning is reviewed. The chapter takes further themes that emanated from Chapter 1 by reviewing the available literature. The author looks into approaches towards organisational learning through the description of learning within organisations, analysis of a learning organisation, levels of learning, individual and organisational learning as well as attributes of a learning organisation: vision and mission support; empowerment by leaders; culture of experimentation; knowledge transfer; teamwork; systems including leadership. Seminal authors on organisational learning: Argyris, C and Senge, P, will be referenced including all other authors on the topic of organisational learning.

Chapter 3 explains the research design considered appropriate to conduct this study. It explains the research methodology, data collection method and data sources, population sample and sampling methods, data analysis and interpretation, validity and reliability, including ethical considerations. The chapter applies the theory of literature review to relevant research aspects required to ensure that the objectives of this research are achieved with valid and reliable information.

In Chapter 4, the findings of the study are presented. The responses to the questionnaire items were solicited on a 5-point Likert scale. Cronbach’s alpha value was used to test the reliability of items. To determine the variance between and within groups, the items were also subjected to Chi-square tests. The correlation between factors was determined with the Pearson's Correlation Coefficient.

In Chapter 5, the author makes various recommendations to improve the culture of organisational learning in the DST in order to ensure that the Department supports continuous improvement in the implementation of its strategic initiatives.
1.12 Summary

In this chapter, the background and rationale of the study has provided the context in which the topic is relevant for the DST. The research questions have unraveled the research objectives relevant to this study. A business case for this research has been made that organisational learning is a key driver towards service excellence. In Chapter 2, focus will be on the broader issues of the factors that evolved in the problem review.
CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Various scholars and researchers such as Coldwell and Herbst, and Randolph have written about the topic of organisational learning. In this chapter, the author reflects on these views and insights, and examines the approach toward organisational learning through culture, structure, systems and processes. Coldwell and Herbst (2004) define a literature review as an account of what has been published on a topic by accredited scholars and researchers (Coldwell & Herbst, 2004:10). According to Randolph (2007:2), conducting a literature review is a means of demonstrating an author’s knowledge about a particular field of study, including vocabulary, theories, key variables and phenomena, and its methods and history. Randolph further indicates that conducting a literature review also informs the researcher of the influential researchers and research groups in the field.

The purpose of this literature review is to determine what others have written about organisational learning, its knowledge management and leadership and its culture, structure, systems and processes. In this chapter, factors that contribute towards organisational learning are discussed.

2.2 Description of Learning within Organisations

The concept of organisational learning has evolved, but so too has the research focus. Research based on the traditional paradigm considered that learning was a process mainly focused on the acquisition, the distribution and the storing of knowledge in the memory of the learner. The research currently being conducted within the new, recently developed paradigm, focuses on the ways that organisations process information and generate knowledge (Antal, 2003:375-378).
According to Voulalas and Sharpe (2005:196), a learning organisation is one which, as a corporate entity, constantly learns from its past and present experiences and its contemplation of the future, and consciously uses these learnings to continuously change and adapt in such a way as to maximise its outcomes in terms of its purpose in its constantly changing environment.

Goh (2003:5) on the other hand indicates that organisational learning is about the ability of an organisation to apply the accurate and appropriate management practices, its structures as well as the procedures which enhance, facilitate and encourage learning.

2.2.1 The Learning Organisation

A learning organisation is described as continuous processes of change adaptation, development and learning (Swieringa & Wierdsma, 1992:71-72). According to Karkoulian, Messarra and McCarthy, et al. (2008:5), although researchers tend to use the key terms ‘organisational learning’ and ‘learning organisation’ interchangeably, a clear difference exists. Organisational learning is simply a process, while a learning organisation signifies an outcome. A learning organisation is the ultimate goal that an organisation strives to achieve, whereas organisational learning is the means through which a learning organisation is attained; a learning organisation is the normative facet of organisational learning.

The deficiencies in research in the domains of knowledge management, organisational learning and organisational memory remain because of the lack of a common language, and the absence of a unifying paradigm that gathers factors influencing work and knowledge. As a result, there is a necessity for the development of a common vocabulary in this research field (Croasdell, et al. 2003:49-68).
Organisational learning is a process that promotes trust, dialogue and networking among staff that can foster the formation of social capital and thereby contribute to more dynamic communication, knowledge-sharing and management (Argyris, 2001:23).

Stapleton (2006:26) refers to learning organisations as those organisations that are able to respond promptly and consistently to opportunities and threats. In Stapleton’s view, organisational learning as opposed to individual learning involves pooling of information about emerging problems and formulation of new knowledge and beliefs.

For Senge, real learning gets to the heart of what it is to be human. In Senge’s view, we become able to recreate ourselves. This applies to both individuals and organisations. Thus, for a learning organisation it is not enough to survive. Survival learning, or what is more often termed adaptive learning is important, indeed it is necessary. However, for a learning organisation, adaptive learning must be joined by generative learning; learning that enhances our capacity to create (Senge, 1990:14).

Argyris and Schön (in Mkhize, 2011:31) discussed two levels of organisational learning: single-loop and double-loop learning. They defined single-loop learning as responding to changes in the environment without changing the core set of organisational norms, and double-loop learning as responding to changes in the environment by changing the core set of organisational norms and assumptions. In other words, single-loop learning is learning within a given framework and double-loop learning is learning by changing the framework. For the DST, being a national department entrusted with the responsibility to formulate science and technology policies, double-loop learning is required.

Other researchers have discussed a third-order of learning. According to Berman (1981:136), second-order learning is learning about the context one learns within and third-order learning is learning of the contexts of those contexts. For example, in third-order learning, learners question the validity of activities, relationships and meanings posed by context and interactions. Berman (1981:346) also claims that third-order learning is an
experience in which a person suddenly realises the arbitrary nature of his or her own paradigm. They view third-order learning as moving toward a holistic worldview of ultimate truth. On the other hand, McWhinney (1992:8) views third-order learning differently, claiming that third-order learning occurs when one uses multiple realities to reframe one's own and others' experience in alternative frameworks. McWhinney argues that the multiple realities, or the metapraxis, will enrich understanding of a situation far more than when only using a single framework of reality.

There may even be a higher order of learning. Ralph (2000:26) suggested a fourth-order of learning that involves evolutionary change in society. Harman (1988:592-618) argues that societies undergo a radical change in their fundamental belief structure, which he terms a global mind change. Harman believes that society shifts from a positivist metaphysical framework where it learns about reality from studying the measurable world, to a more intuitive metaphysical framework focusing primarily on consciousness and spirituality.

2.2.2 Levels of Learning

The different organisational levels at which organisational learning occurs also introduce some dynamism to the concept. Garvin (1998:47-80) proposes three levels in the development of organisational learning. The first phase corresponds to the cognitive level where organisational members are exposed to new ideas. As a consequence, they expand their knowledge and start thinking in a different way. The second phase is behavioural. Employees start to internalise new perspectives and as a consequence, they alter their behaviours. The third and last phase is when performance improvement occurs. This happens when the change in behaviour leads to measurable improvements in results (superior quality, better delivery, market share value increase, or other tangible profits). The number of analyses and empirical evidence gathered in order to explain the role of learning processes within organisations is limited. Despite this limitation, the researcher synthesised several contributions from the literature into a typology considering four processes. Two processes with a focus on knowledge acquisition mechanisms, and two processes with a focus on knowledge conversion mechanisms (Figueiredo, 2003:607-643).
Regarding the knowledge acquisition mechanisms, the researcher established two organisational learning processes: external knowledge acquisition and internal knowledge acquisition. The first represents the processes through which individuals acquire tacit or codified knowledge from outside the organisation, such as in overseas training programmes. The second represents the processes through which individuals acquire tacit or codified knowledge by performing different tasks within the organisation, such as product development.

With regard to knowledge conversion mechanisms, the author established two organisational learning processes: knowledge socialisation and knowledge coding. The first represents the processes through which individuals share their tacit knowledge – mental models, technical aptitudes – in meetings and shared problem-solving. The second represents the processes through which individual tacit knowledge (or part of it) becomes explicit, articulated in concept, and available to all in organised and accessible support, and is easily understood, such as in systematic documentation and internal seminars. This implies that organisational learning also occurs through different levels or dimensions of an organisation. The dynamics are created through the tension between the organisational assimilation of new knowledge developed at individual level (feed-forward), and the use and individual exploration of organisational pre-existing knowledge, (feed-back). This tension occurs due to organisational learning not only being the innovative process associated with feed-forward, but also due to the feedback process, which generates ways to explore what has already been learnt (Crossan, Lane & White, 1999:529).

Pawlowsky (2003:62-88), describes the process phases of organisational learning in terms of four steps, which continuously repeat themselves and are not necessarily sequential:

(i) The identification of information that seems relevant to learning and to the creation (generation) of new knowledge, or both;
(ii) The exchange and diffusion of knowledge, either from the individual to the collective level or at the collective level itself;
(iii) The integration of knowledge into existing knowledge systems at a collective level, an individual level, or both, or into the procedural rules of an organisation, whereby either integration or modification of the adopted system can take place; and
The transformation of the new knowledge into action, and the reapplication of the knowledge into organisational routines, so that it has an effect on organisational behaviour.

Organisational learning has been defined as the knowledge acquisition made by actors (individuals and groups) when it can and is available to be applied in the decision-making process, or by using it to influence others within the organisation (Miller, 1996:485-505).

Senge (1990:14-356) describes five disciplines for a learning organisation:

1. Personal mastery, which refers to the desire to achieve lifelong learning. In other words, there should be a desire for lifelong learning within the organisation both at individual and organisational level.
2. The creative use of mental models, meaning surfacing challenges and assumptions about the organisation.
3. Leadership is responsible for building a shared vision.
4. Team learning, which implies learning to think, learn and work together.
5. Systems thinking, this involves breadth of view, intellectual flexibility and the ability to recognise trends and patterns in complex circumstances.

Senge adds that because these five disciplines are interconnected in nature, there is no correct formula on which one to start with. As such, these disciplines can be embedded as organisational attributes.

Drejer (2000:16) argues that being a learning organisation requires an understanding of the strategic internal drivers needed to build a learning capability. He suggests that learning organisations have and should have the following core strategic blocks:

1. Mission and vision-clarity and employee support of the mission.
2. Strategy and espoused values of the organisation with leadership that is perceived as empowering employees.
3. Encouraging an experimental culture and showing strong commitment to the organisation.
4. Supporting a strong culture of experimentation which is rewarded and supported at all levels in the organisation.

5. Transfer of knowledge, which is the ability of an organisation to transfer knowledge within and from outside the organisation and to learn from failures.

6. Teamwork, cooperation and group problem-solving as the mode of operation and for developing innovative ideas.

Pearn, et al. (1995:19), describe characteristics of a learning organisation based on the Garratt (1990:77) theory of learning organisations. These characteristics are that learning organisations encourage people at all levels of the organisation to learn regularly and rigorously from their work; learning organisations have systems for capturing learning and moving them to where they are needed; they value learning and are able to continuously transform themselves. In Figure 2.1 two models of organisational learning are described; one that inhibits learning, the other that promotes learning.

<table>
<thead>
<tr>
<th>ARGYRIS AND SCHÖN ON ORGANISATIONAL LEARNING</th>
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<tbody>
<tr>
<td><strong>Model 1</strong></td>
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<tr>
<td><strong>(inhibit Learning)</strong></td>
</tr>
<tr>
<td>keep your views of sensitive issues and enforce the taboo against their public discussion</td>
</tr>
<tr>
<td>do not surface or test differences in views of organisational problems</td>
</tr>
<tr>
<td>avoid seeing the whole picture; allow information about the problem to remain scattered, vague and ambiguous</td>
</tr>
<tr>
<td>protect yourself unilaterally – by avoiding both direct interpersonal confrontation and public discussion of sensitive issues that might expose you to blame</td>
</tr>
<tr>
<td>protect others unilaterally – by avoiding the testing of assumptions where that testing might evoke negative feelings, and by keeping others from exposure</td>
</tr>
<tr>
<td>control the task and situation unilaterally – by making up your own mind about the problem and acting on your view</td>
</tr>
</tbody>
</table>

**Figure 2.1: Argyris and Schön on organisational learning**

Source: Stapleton 2006:26

The theoretical considerations in this framework are that organisations usually have two types of behaviours that inhibit and promote organisational learning.
Senge (1990:69) states that the dimension that distinguishes learning from more traditional organisations is the mastery of certain basic disciplines. The five disciplines that Senge identifies are said to be converging on innovate learning organisations. He adds to this recognition that people are agents, able to act upon the structures and systems of which they are a part. All the disciplines are, in this way, concerned with a mind-shift from seeing parts to seeing wholes; from seeing people as helpless reactors to seeing them as active participants in shaping their reality; from reacting to the present and to creating the future.

Argyris and Schön (1996:16) state that organisational learning occurs when individuals within an organisation experience a problematic situation and inquire into it on the organisation’s behalf. De Geus (1998:71) states that the ability of a workforce in an organisation to learn faster than those in other organisations constitutes the only sustainable competitive advantage at the disposal of a learning organisation. According to Scarborough, Swan and Preston (1998:219), a learning organisation should primarily focus on valuing, managing and enhancing the individual development of its employees.

2.2.3 Individual and Organisational Learning

Stata (1989:63-74) describes several aspects of how organisational learning differs from individual learning. First, organisational learning occurs through shared insights, knowledge, and mental models. Thus, organisations can learn only as fast as the slowest link learns. Change is blocked unless all of the major decision-makers learn together, have shared beliefs and goals, and are committed to take the action to change. Second, learning builds on past knowledge and experience, that is, on memory. Organisational memory depends on the institutional mechanisms (eg policies, strategies, and explicit models) used to retain knowledge. Of course, organisations also depend on the memory of individuals, but relying exclusively on individuals’ memories risks losing hard-won lessons and experiences as people migrate from one job to another.
Senge (1990:340) emphasises that within a learning organisation, its leaders are designers, stewards, and teachers. They are responsible for building organisations where people continually expand their capabilities to understand complexity, clarify their vision, and improve shared mental models: they are responsible for their own learning. Learning organisations will remain simply a good idea until people take a stand for building such organisations. Taking this stand is the first leadership act, the start of inspiring the vision of the learning organisation. Senge argues that learning organisations require a new view of leadership. He sees the traditional view of leaders as special people who set direction, make key decisions and energise the troops; as deriving from a deeply individualistic and non-systemic worldview.

Organisations learn only through individuals who learn. Individual learning does not guarantee organisational learning, but without it no organisational learning occurs (Senge, 1990:139). Senge starts from the position that if any one idea about leadership has inspired organisations for thousands of years, “it’s the capacity to hold a shared picture of the future we seek to create” (Senge, 1990:9). Such a vision has the power to be uplifting and to encourage experimentation and innovation. Crucially, he argues, it can also foster a sense of the long-term.

Probst and Büchel (1996:24) identify the following characteristics in the process of organisational learning:

(i) Change in organisational knowledge;
(ii) Increase in the range of possible actions; and
(iii) Change in inter-subjective constructions of reality.

Several writers draw distinctions between different levels of learning. Senge (1990:57) differentiates between adaptive and generative learning; Argyris and Schön (in Mkhize, 2011:32) present the division between single-loop learning, double-loop learning and deutero-learning; and Fiol and Lyles (1985:807) identify lower-level and higher-level learning. Argyris and Schön indicate that deutero-learning can occur by going meta on single or double-loop learning. They further emphasise that the distinction is important
because the knowledge and skills required to produce double-loop learning are significantly
greater and more complicated than those required for deutero-learning on single-loop
issues. On the other hand, Thomsen and Hoest (2001:474), regard deutero-learning as an
extension beyond double-loop learning that resembles the first conceptualisation of triple-
loop learning. Fiol and Lyles (1985:807) argue that the higher the organisational learning
level, the better its quality. Their hierarchy of lower-level and higher-level is that lower-level
includes remembering and understanding, and higher-level encompasses such factors as
applying, analysing, evaluating, and creating, while including factors in the lower-level.

To become a learning organisation, organisations need to be skilled in the following five
activities:

(i) Systematic problem-solving that relies on scientific methods rather than guesswork;
(ii) Experimentation with new approaches;
(iii) Learning from experience and past history;
(iv) Learning from the best practices of others; and
(v) Transferring knowledge quickly and efficiently through the organisation to minimise
the risk of losing all the newly learnt and acquired knowledge (Garvin, 1993:47-80).

According to Cook and Yanow (1995:430-459), learning is related to knowledge as it is the
act of acquiring knowledge. Cook and Yanow further indicate that learning is the process of
expanding and improving knowledge.

The promotion of organisational learning in the public service encourages public servants
to learn more efficiently and effectively from their own experiences in order to improve the
quality of public management. It is therefore important to put in place an enabling
environment that provides the right incentives for staff to do so (World Public Sector
2.2.4 Attributes of a Learning Organisation

In the following section, the attributes of the learning organisation will be discussed: vision and mission support, empowerment by leaders, culture of experimentation, knowledge transfer, teamwork as well as systems.

2.2.4.1 Vision and Mission Support

Vision is considered the starting point of transformation processes and a crucial basis for action for leaders of learning organisations. Organisational learning, which is an ongoing expansion of the organisation’s ability to influence its future, may assist in the vision implementation process (Senge, 1990:3-4).

In the traditional worldview, leaders cause change by affecting the behaviour of others. This can happen in a number of different ways. Some leaders use power and authority. Others use influence and persuasion. Still others lead by example (Bernhard, 1999:59-65). Leadership means the ability to facilitate the development of a common vision that expresses the aspirations of both staff and key stakeholders, with regard to where they want the organisation to be in the future (Avolio & Yammarino, 1990:193-208).

According to Lane and Wenger (1990:54), leadership style is a key factor in developing a learning culture. A democratic leader can better manage the learning process by sharing his vision with the team members; however, an autocratic leader may impede the learning activity by imposing his authority and ignoring the valuable suggestions offered by the team members.

Fiol and Lyles (1985:804-805) indicate that the organisation's strategic posture partially determines its learning capacity. Thus strategy influences learning by providing a boundary to decision-making and a context for the perception and interpretation of the environment. Similarly, the strategic options that are perceived are a function of the learning capacity within the organisation.
**2.2.4.2 Empowerment by Leaders**

The learning organisation approach must first go through a phase of preparing top and middle management in the basic disciplines of systems thinking, shared mental models, personal mastery, shared vision, and team learning. Building a foundation for these important skills is a slow and demanding process. In this first phase, the initial rate of improvement is modest at best (Dervitsiotis, 1998:14). In the second phase, there is a moderate rate of improvement as most people learn to practice the art of these disciplines with greater skill, creativity and effectiveness, thus crafting a shared vision of the organisation. It is in the third phase of learning that the rate of embracing learning begins to accelerate, with more and more people pursuing a shared vision and operating at their fullest potential. Here, a maximum strategic alignment of all parts of the organisation is observed (Dervitsiotis, 1998:16).

Malhotra (2001:32) and Stacey (1995:16) take a slightly different view on the role of management in relation to learning. They both argue that the most important learning processes within an organisation are precisely those that cannot be managed. They draw on chaos theory to describe “semi-confusing information systems” (Malhotra, 2001:32) and “nonlinear feedback networks” (Stacey, 1995:16). Innovation often takes place in informal ‘shadow’ networks of individuals interested in the same issues. In order to support and strengthen this creativity, Malhotra and Stacey argue that organisations should allow their staff the room to act on incomplete information, trust their own judgement, and to feed input from informal fora into formal structures.

Organisations also need to provide learning for employees that will produce signs and routes that can be taken to achieve transformation, and is linked to a vision of "what could be". However, unless the vision is shared, and employees have a stake in it, the chances are that this will not be achieved (Jones & Hendry, 1992:27). Figure 2.2 shows a model of organisational learning adopted from Pearn, Roderick and Mulrooney (1995:68).
The theoretical consideration inherent in this model is that the type of management style or practice, and control systems in an organisation can either block or facilitate organisational learning. Pearn, et al., (1995:69) argue that organisational learning can be achieved by moving away from a command-and-control style of management to increased involvement and empowerment of everyone in the organisation.

Adding to the issue of strategic thinking, Segal-Horn (2007:228) argues that leaders should understand the distinction between operational thinking and strategic thinking. According to Porter’s view (Porter, 1996:24) operational thinking relates to value-creation activities that characterise the internal functioning of an organisation, such as procedures to control quality, systems for managing recruitment, or performance-related rewards. Effective
management of these activities enhances an organisation’s ability to manage itself effectively. In contrast, he argues that strategic thinking is concerned with how all these activities connect and relate to each other in achieving the strategic objectives and goals of the organisation; that is, successful and sustainable value-creation. He states that operational effectiveness is essential to strategy implementation but should not substitute strategic thinking and strategic decision-making. In his view, the strategy is essential to guide and shape the operational activities in order to achieve superior performance.

Berson, Nemanich, Waldman, Galvin and Keller (2006:577-594) look at leadership from the perspective of organisational learning in crucial contrast to strategy implementation. They define leadership as a process of influencing and teaching others to understand why and how certain activities and goals need to be accomplished. As such, it constitutes a process of facilitating individual and collective efforts to learn and accomplish shared goals in an organisation. Berson et al argue that leaders should play a central role in the organisational learning process in multiple ways. First, by providing contextual support in the organisation, leaders obtain the needed resources for learning to occur through exploitation and exploration. Second, leaders are critical to the integration of learning across groups and organisational levels. Leaders enable and enhance this integration by providing a foundation of shared understanding of needs and purpose at different levels of the organisation. Third, leaders are important in institutionalising learning by integrating new and existing knowledge into the organisation’s policies and practices.

2.2.4.3 Culture of Experimentation

Experimentation is defined as the degree to which new ideas and suggestions are attended to and dealt with sympathetically. Experimentation is the most heavily supported dimension in the literature of organisational learning (Goh, 2003:24). Nevis et al. (1995:10) consider that experimentation involves trying out new ideas, being curious about how things work, or carrying out changes in work processes. Nevis continues to state that experimentation includes the search for innovative solutions to problems, based on the possible use of distinct methods and procedures.
According to Hofstede (2000:42) organisational culture needs to be on the minds of all the members of the organisation. As such, organisational culture can be seen as a set of underlying values and can influence the behaviour of all the members of an organisation and will socialise employees.

On the same note, Senge (1990:14-356) argues that the leaders’ work is to build a learning organisation. Leadership in a learning organisation begins with the principle of creative tension, Mintzberg (1999:332-358). According to Senge (1990:14-356), creative tension comes from seeing clearly where the organisation wants to be, its vision, and being truthful about where the organisation is; in other words, its current reality. This creative tension can be resolved by raising the current reality toward the vision or by lowering the vision to the current reality. Senge argues that individuals, groups and organisations who learn to work with creative tension also learn how to use the energy it generates to move reality more reliably toward their visions. Furthermore, Senge argues that leading through creative tension is different from solving problems. In problem-solving, the energy for change comes from attempting to move away from the current reality that is undesirable, whereas with creative tension, the energy for change comes from the vision, from what is to be created, juxtaposed with the current reality. Senge (1990:230) describes three roles of a leader in a learning organisation: leader as a designer of the organisation, which involves strategies, structures and systems; leader as a teacher, which refers to the leader helping everyone in the organisation to gain more insightful views on the current reality; and lastly, leader as a steward for the people, and for the organisation’s purpose and mission.

Thornhill and Van Dijk et al. (2003:341) state that establishing a learning organisation depends on creating a learning culture. A learning culture does not mean sending employees on as many training courses as possible without evaluating the outcomes of these courses, but rather identifying on a continuous basis those training courses that would satisfy both individual and organisational development needs. A learning culture should support learning and be based on ensuring the free exchange and flow of information in order to put expertise where it is most needed and encourage individuals to
network extensively across organisational boundaries, thus developing their own knowledge and expertise as well as supporting the commitment to learning and personal development, where learning is rewarded and encouraged. The learning culture should be characterised by creativity, diversity and a climate of openness and trust. It supposes that learning from mistakes can often be more rewarding and instructional than learning from success.

Thornhill and Van Dijk et al. (2003:349) argue that the tendency to focus too much on systems and processes to the exclusion of other factors inhibits the management of a learning organisation (Farago & Skyrme 1995:3-4). The challenge is evident when an organisational structure is too hierarchical and the free flow of information is not promoted. Employees hold on to their positions and status, because they do not understand the larger role that they play within the overall organisation. Their territory has to be protected, and innovation or development might just harm their status quo.

2.2.4.4 Knowledge Transfer

Awad and Ghaziri (2010:347) state that knowledge networks view the organisation as a body of knowledge that is at the core of a learning organisation. They point to the fabric of relationships that can make or break knowledge-sharing and knowledge-transfer.

Huizing and Bouman (2002:185-204) give a definition of knowledge management that is a good example of the work being done to involve organisational learning with strategic concepts. According to these authors, knowledge management is the organisational discipline that bridges information demand and supply, and creates support for organisational learning. This relationship has been empirically developed and presented in the literature (Crossan, et al. 1999:522-537; Bontis, 2002:437-469), creating a parallelism between knowledge management strategies and organisational learning flows.

Organisational learning is a social phenomenon. Each individual’s learning depends upon the knowledge that other members of the organisation possess (Figueiredo, 2003:607-643). This social interaction facilitates not only the communication and coordination
between individuals, but also learning. The meaning and understanding of organisational learning is defined according to its context. Learning through identification with the organisation is more powerful than trying to teach individuals by using incentives. Learning is located at an entity level and that is why learning and knowledge management are part of institutional memory (Kogut & Zander, 1996:383-397).

2.2.4.5 Organisational Knowledge

Organisational learning is essentially linked to knowledge creation and thus there is a need to ensure knowledge management in an organisation. Wang and Ahmed (2001:12) indicate that organisational knowledge is stored partly within individuals in the form of experience, skills and personal capability. Therefore, to create a learning environment between individuals and the organisation to facilitate interaction and strengthening of each other’s knowledge base, has become the main risk for management.

According to Probst and Büchel (1996:23), organisational learning is the process perspective of developing organisational knowledge. The organisational knowledge base consists of both individual and collective knowledge, which the organisation can use to perform its tasks. This knowledge base undergoes regular change. While organisational learning primarily focuses on the processes of changing the organisational knowledge base, it does not provide an explicit indication of which elements need to be influenced to bring about learning. Knowledge management, by contrast, provides an explicit framework for intervening in the knowledge base in order for learning to take place.

Levitt and March (1988:319-340) are less positive about the capacity of organisations to manage knowledge effectively and to learn from past experiences. Their oft-quoted 1988 article, and a later article by March (1991:71-87), highlight instead the considerable limitations that impede organisational learning. These include the complexity of organisational experiences, human habits, hierarchical structures, routines, and differing interpretations by different sub-groups within an organisation. Schein (1985:34) touches on many of the same issues as those of Levitt and March, but in a more optimistic manner. He argues that the limitations to learning within an organisation can be overcome through good leadership. By good leadership he means the ability of the leader to guide the organisation
through various stages of a change process, to contain anxiety, and to influence the
organisational culture in a positive way throughout this process.

2.2.4.6 Systems

According to Wang and Ahmed (2001:11), the system view of organisational learning has
been taken mainly from the information processing perspective. There are two streams
within the system view: organisations as a closed system or an open system. Wang and
Ahmed indicate that under the view of a closed system, organisational learning is restricted
within an organisation itself. The viewpoint of organisations as an open system takes into
account the situational factors and includes inter-organisational learning as an important
part of the whole organisational learning system.

In order to leverage knowledge-based resources throughout an organisation, the
organisation should promote organisational learning (Tetrick & Da Silva, 2003:333-359).
Knowledge diffusion and leveraging inside the organisation creates efficiency in addition to
knowledge-transfer (Hitt, 2001:13-28). Through the use of dynamic competencies, the
organisation integrates, builds and reconfigures its internal and external capabilities to face
fast-changing environments (Teece, 1997:509-534). Organisational competence emerges
through time, as a process of organisational learning (Levitt & March, 1988:319-340).

Learning organisations are skilled at creating, acquiring, and transferring of knowledge, and
then being able to modify behaviours to reflect this new knowledge and insight. This implies
a new way of thinking about how people work together, and shows the need for a greater
emphasis on reviewing past practice and experience (Garvin, 1993:47-80). Leadership is a key attribute in promoting a learning organisation. In the following section, the literature on leadership is reviewed.

2.2.5 Leadership in a Learning Organisation
Amos (2006:355) indicates that strategic leadership is about leading the entire organisation, understanding the entire organisation and the environment in which it operates, and using that understanding to create strategic change through other people to position the organisation in its environment for both short-term and long-term stability. He argues that successful strategy implementation is dependent on strategic leadership as a key driver of implementation. He describes two main aspects of effective strategic leadership. The first aspect includes strategic thinking, emotional intelligence and behavioural complexity, and transformational leadership. The second aspect includes the tasks and roles of effective strategic leadership in which the leader is responsible for setting organisational direction, creating organisational alignment and a supportive culture.

On the other hand, Hallinger (2003:330) indicates that the transformational leadership style has been recognised as one of the main conditions, affecting and enhancing successful organisational learning processes. It broadens and elevates the interests and aspirations of employees and is associated with more intensive organisational learning activity with stronger learning facilitative culture than transactional leadership.

2.3 Summary

From the literature mentioned above, it is evident that organisational learning could play a significant role in service excellence, and that organisational learning promotes organisational outcomes. It is worth noting that organisations could improve service delivery by attending to the culture of the institution in the context of this study, thus establishing a learning organisation.

Organisational culture is a significant concept in the literature on organisational learning. Culture can be considered as a basic cornerstone of an integrative and conceptual framework for organisational learning theory, and the basic architecture for knowledge management in promoting organisational learning. In Chapter 3, the author explains the research design considered appropriate to carry out this study. The author applies the theory on organisational learning to the relevant research design aspects required to ensure that the objectives of this research are achieved with valid and reliable information.
CHAPTER 3: RESEARCH DESIGN AND DATA COLLECTION METHOD

3.1 Introduction

In this chapter the author describes the research design that underpins this study. The data collection method followed in conducting this research is also described in detail. The main elements included in this chapter are the research design; research methodology and methods; population sample and sampling technique; data collection method and data types; data analysis and interpretation; validity of the study and ethical considerations. The chapter applies the theory to the relevant aspects required to ensure that the objectives of this study are achieved with valid and reliable information.

3.2 Research Design

Research design is defined by Polonsky and Waller (2011:94) as a framework or blue-print for collecting the information needed for a study in the best possible way. They argue that the correct design will save resources and that it is essential in allowing the researcher to achieve reliable and valid research results.

White (2000:25) defines a research design as a general term that covers a number of separate, but related issues associated with research. He states that research design includes the aims or objectives of the research, the final selection of appropriate methodology, data collection techniques and chosen methods for data analysis and interpretation.

Wessels (1999:361-415) argues that arriving at the most valid findings possible to contribute to scientific knowledge should be the overriding criterion when researchers decide on the most appropriate methodological paradigms, or as he calls them, macro research methods. He further argues that researchers should clearly motivate their choice of methodological paradigm, which – at the level of meta-theory and social inquiry – is differentiated between the positivistic and the interpretivist epistemological approaches to the research object. These two broad categories reflect the basic assumptions upon which
the qualitative and quantitative methodological paradigms are based. Mouton (1996:28) elaborates on the goal of research by stating that the predominant purpose of all research is to arrive at results that are as close to the truth as possible; that is, the most valid findings possible.

According to Rumsey-Johnson (2010:32), designing quantitative research entails a more rigid and demarcated procedure, while designing qualitative research requires a flexible cyclic and ongoing process involving moving back and forth between the different components of the design; assessing the implications of the goals set, and of the theories and research approach chosen; of the research questions, the methods, and the quality implications of the research.

It could be deduced from the main research question - *How could the culture of organisational learning in the DST be improved to support the implementation of strategic objectives?* - that this is an empirical study. It attempts to solve a real problem; that is, to determine how a culture of organisational learning in the DST could support knowledge management and continuous improvement in responding to strategic initiatives. As such, this study adopted a formalised communicative form of design by way of survey questionnaires. Coldwell and Herbst (2004:36-37) describe such designs as once-off study, while longitudinal study is repeated over a period of time, tracking changes in variables.

More details on the research design, its concepts and practices considered in this study are discussed in the following sections.

### 3.3 Research Methodology

Research methods refer to the general techniques employed to examine the problem statement (Hofstee, 2004:13). Hofstee further indicates that research methods describe how one applies research design to investigating the problem. On the other hand, White (2000:20) states that research methodology is the approach that a researcher uses to investigate a subject. It refers to the philosophical bases on which research is founded. For example, a scientist designs and carries out experiments, while a sociologist would
consider the two very broad theoretical approaches in sociological research – positivism and interpretivism. A positivist approach advocates the application of scientific methods to sociological research – similar to the natural sciences, while an interpretivist approach stresses the difference in studying human beings and the need to develop more applicable research strategies.

It is quite clear that there are two types of methodological paradigms; qualitative and quantitative (cf. section 3.2). These methodological paradigms are at a high level of complexity as they represent not merely collections of research methods and techniques, but also include assumptions and values regarding their use under specific circumstances. Webb (2010:181) indicates that qualitative methodologies are particularly relevant in explorative studies. The qualitative researcher studies human action in its natural setting through the eyes of the actor who is the subject of the study. In contrast to the quantitative researcher, who uses somewhat artificial settings of experiments and surveys, the qualitative researcher describes the phenomenon in detail and tries to understand human behaviour within the appropriate context.

Following the discussion in this section, and since this study required information on the opinions, behaviour and views of the DST employees, the research methodology adopted is that of quantitative research in order to obtain substantial evidence. Methods of data collection within the qualitative research design were also used.

3.4 Data Collection Method and Data Sources

There are various methods of collecting data that can be used such as questionnaires, interviews, documentation reviews, observation, focus groups and case studies (Coldwell & Herbst, 2004:54). Polonsky and Waller (2011:96) indicate that data collection is an integral part of the research process and to the success of the research project, and that all research and planning effort is of little use if data is gathered incorrectly or respondents fail to cooperate. Webb and Auriacombe (2006:588-602) indicate that data collection methods in the qualitative methodological paradigm enable the researcher to gain inside knowledge
of the study objective. With the quantitative methodological paradigm, the researcher aims to analyse organisational learning factors and the relationship between them in isolation of the context or setting, with the ultimate aim to arrive at general statements. Whereas the qualitative researcher wants to observe the natural settings of the research object, the quantitative researcher emphasises control, and makes use of artificial settings such as experiments and surveys. Among the data collection methods, the researcher would find personal observation in the natural field setting; personal and group face-to-face interviewing, and documentary sources; whereas experiments and surveys in the form of questionnaires belong to the quantitative methodological paradigm, (Webb 2010:159-160).

There are two types of sources: primary and secondary sources, from which data can be collected (Polonsky & Waller, 2011:97). According to Sekaran (2003:219), primary data refers to information obtained first-hand by the researcher on the variables of interest for the specific purpose of the study, while secondary data refers to the existing information such as information obtained from reports of the organisation. Polonsky and Waller (2011:95) further indicate that primary data can be qualitative or quantitative. They report that qualitative data collection techniques include in-depth interviews, focus groups, projective techniques and observational methods. They argue that qualitative techniques effectively allow the researcher significant insight into the feelings of individuals who are in the sample population.

Wessels and Pauw (1999:374-375) refer to units of observation as sources of data, and categorises them as follows: human behaviour, orientation, and characteristics, and products of human behaviour and characteristics. Webb (2010:157) describes units of observation as a variable to the material or data sources utilised by the particular researcher, and that they are to be distinguished from the unit of analysis, namely the ‘what’ of a study. Units of observation related to this study included documentary evidence such as the Auditor-General’s reports over a three-year period linked to the Medium Term Expenditure Framework, the Annual Report and Performance Management reports.

For this study, focus was on primary data gathering in order to get first-hand information on the behaviours, feelings and experiences of the DST employees. According to White (2000:49), a survey is a way of describing and explaining some aspect of the population
and surveys are carried out by way of interviews, questionnaires or both. White indicates that interviews are used when taking a qualitative approach; however, it is possible to numerically code the findings from interviews so they can be used in quantitative methods. Coldwell and Herbst (2004:48) state that surveys and questionnaires allow researchers to gather information from people quickly and easily in a non-threatening way.

It was for this reason that survey questionnaires were chosen. Each respondent was given a questionnaire with a set of questions relating to the culture of organisational learning in the DST and the impact thereof towards service excellence. Questionnaire items were structured in such a way that they were easy for the respondents to understand, thus preventing ambiguity. Questions were grouped categorically according to the type of information required.

3.5 Population Sample and Sampling Methods

According to Coldwell and Herbst (2004:74), a population sample provides a definite part of a statistical population whose properties are studied to gain information about the whole. They mention that the purpose of sampling is to draw conclusions about populations from samples. In order to do this, inferential statistics must be used. On the other hand, Sekaran (2003:265) indicates that a population refers to the entire group of people, events or items of interest that the researcher wishes to investigate.

Sekaran (2003:265), further states that sampling is the process of selecting a sufficient number of elements from the population so that a study of the sample and an understanding of its properties and characteristics would make it possible for the researcher to generalise such properties to the population elements. The reasons for using a sample instead of the entire population are arguably self-evident (Sekaran, 2003:266). Researchers are often confronted with a study population too large to observe. It therefore becomes necessary to identify a sample for research purposes. Not differing from Sekaran, Coldwell and Herbst (2004:74) refer to sampling as the act or process of selecting a representative part of a population for the purpose of determining parameters or
characteristics of the whole population. Sekaran (2003:267) indicates that each of these sampling designs has different sampling strategies, depending on the extent of generalisation desired, the demands of time, and other resources. However, White (2000:60) argues that random sampling works best with an accurate and up-to-date sampling frame and is a preferred method for carrying out any statistical analysis.

Differentiation is made between the two broad categories of probability and non-probability sampling. In probability sampling, the researcher can specify in advance that each segment of the population is represented in the sample (Leedy & Ormrod 2003:211). This is the distinguishing characteristic that sets probability sampling apart from non-probability sampling. The non-probability sampling strategy can be described, as the selection of a population element, in which the researcher selects participants who are considered to be typical of the wider population, to be part of the sample, based in some part on the judgement of the researcher (Leedy & Ormrod 2003:218).

According to Webb (2010:198), probability sampling refers to identifying a sample of respondents that is representative of the population from which it is selected when all members of the population have an equal chance of being selected. Conversely, non-probability sampling refers to a method by which the researcher identifies a sample based on his knowledge of the elements and attributes of the study population. Random sampling was employed in order to ensure that the outcomes were not biased and that the samples are a true reflection of the entire population. For this study, a sample of 65 employees across the DST was randomly selected and 55 responded; thus an 85% response rate (cf. section 1.8 & 4.2). It must be noted that this is a pilot study to gauge the extent to which the DST embraces the culture of organisational learning.

The sample included junior managers, middle managers, senior managers and executive managers within the DST, as reflected in Table 3.1.

<table>
<thead>
<tr>
<th>DST Programme (also known as Directorate)</th>
<th>Proposed respondents in each programme per level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Corporate Services and Governance</td>
<td>o Deputy Directors General (executive)</td>
</tr>
<tr>
<td>2: Research, Development and Innovation</td>
<td></td>
</tr>
</tbody>
</table>
3: International Cooperation and Resources

4: Human Capital Development and Knowledge Resources

5: Socio-economic Partnerships

<table>
<thead>
<tr>
<th>Table 3.1: Population Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6 Data Analysis and Interpretation</td>
</tr>
</tbody>
</table>

Coldwell and Herbst (2004:54) describe two statistical methods for analysing and interpreting data: descriptive and inferential statistics. The descriptive method involves the use of correlations, comparisons and trends, whereas the inferential method refers to the estimation of population parameters. In descriptive statistics, measurements such as the mean and standard deviation are stated as exact numbers. Inferential statistics start with a sample and then generalises to a population. White (2000:46), states that inferential statistics involve the use of complex mathematical procedures and statistical tests of significance. In general, inferential statistics seek to generalise from available evidence, usually from a sample to a population.

Once data has been collected, it is then directed to being analysed and interpreted for the purpose of generating meaning from the collected raw data (Coldwell & Herbst, 2004:55). Polonsky and Waller (2011:159) report that, analysis and interpretation are frequently misused as being inter-changeable, but they have distinct meanings and roles. According to Polonsky and Waller (2011:159), analysis covers the assembling, cleaning and examining of data whereas interpretation is making sense of the data that has been generated.

To generate meaning from the collected data, an analysis must be done (Coldwell & Herbst, 2004:55). According to Coldwell and Herbst (2004:55), data should be coded by allocating key words and phrases to different sections. In this study, outcomes of the data are presented through charts and graphs, and are analysed using the statistical methods referred to in Chapter 4.
3.7 Descriptions of the Statistical Techniques Employed

In this section, the descriptions of the statistical techniques employed in addressing the research goals are defined.

3.7.1 Descriptive Statistics and Frequency Distributions

According to Fabrigar, Wegener, MacCallum and Strahan (1999: 283) descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. They are used to present quantitative descriptions in a manageable form. Fabrigar, Wegener, MacCallum and Strahan (1999: 285) further indicate that a frequency distribution is a summary of how often different scores occur within a sample of scores. Using the information from a frequency distribution, researchers can then calculate measures of centrality and dispersion (the mean, median, mode, range and standard deviation).

3.7.1.1 Measures of Centrality

According to Zaller and Feldman (1992:579-616), the mean is a measure of the central tendency of a set of numbers. They further indicate that a mean is also referred to as the average, and is calculated by adding up all the numbers and dividing them by a count of numbers in the set. For example, it is a way to describe the centre of a data set. Zaller and Feldman further indicate that there are three measures of central tendency: the mean, the median, and the mode. The mean is calculated in two steps: add the data together to find the sum and take the sum of the data and divide it by the total number of data. The median is the value that cuts the data set in half. There are two steps to finding the median in a sample with an odd number of data: list the data in numerical order and locate the value in the middle of the list. The mode refers to the number or value that appears the most. It is possible to have more than one mode, and it is possible to have no mode. Furthermore, Zaller and Feldman (1992:579-616) indicate that the sample size is often called the n.
3.7.1.2 Measures of Dispersion

According to Daniel (1998:29-32), the standard deviation summarises how far away from the average the data values typically are. Daniel further indicates that standard deviation is perhaps the most frequently used measure of spread. It is also an important concept for descriptive statistics because it reveals the amount of variability of individuals within the data set. Like the mean, the standard deviation is affected by extreme scores. Furthermore, Daniel defines interquartile range (IQR) as a measure of variability, based on dividing a data set into quartiles. Quartiles divide a rank-ordered data set into four equal parts. Daniel further describes an outlier as an observation point that is distant from other observations. According to Daniel, an outlier may be due to variability in the measurement or it may indicate experimental error; the latter is sometimes excluded from the data set. Outliers can occur by chance in any distribution, but they often indicate either measurement error or that the population has a heavy-tailed distribution. Daniel indicates that box plot is a convenient way of graphically depicting groups of numerical data through their quartiles. Box plots may also have lines extending vertically from the boxes (whiskers) indicating variability outside the upper and lower quartiles, hence the terms box-and-whisker plot and box-and-whisker diagram. While outliers may be plotted as individual points, box plots are non-parametric - they display variation in samples of a statistical population without making any assumptions of the underlying statistical distribution.

3.7.2 The Likert Scale

According to Rumsey-Johnson (2010:46) the Likert scale is a method of ascribing quantitative value to qualitative data, to make it amenable to statistical analysis, whereby a numerical value is assigned to each potential choice and a mean figure for all the responses is computed at the end of the evaluation or survey. Likert scales usually have five potential choices (strongly agree, agree, neutral, disagree, strongly disagree), but sometimes go up to ten or more. The final average score represents overall level of accomplishment, or attitude towards the subject matter. It is named after its inventor, the US organisational behaviour psychologist, Dr Rensis Likert (1903-81).
3.7.3 Exploratory Factor Analysis (EFA)

EFA is one method of checking dimensionality. The primary purpose of EFA is to arrive at a more parsimonious conceptual understanding of a set of measured variables by determining the number and nature of common factors needed to account for the pattern of correlations among the measured variables. EFA is used when a researcher wishes to identify a set of latent constructs underlying a battery of measured variables (Fabrigar, Wegener, MacCallum & Strahan 1999: 272).

3.7.4 Cronbach’s Alpha Value

Though Cronbach’s alpha value is not a test, the reliability of constructs is measured by item analysis and one way of measuring the reliability is via the use of Cronbach’s alpha. According to Fabrigar, Wegener, MacCallum and Strahan (1999: 278), Cronbach’s alpha is a measure of internal consistency; that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability; it is a coefficient of reliability (or consistency).

For this study, the 5-point Likert scale, the Cronbach’s alpha value as well as descriptive statistics and distributions were used.

3.7.5 P-Value

The p-value is the probability of obtaining a test statistic at least as extreme as the one that was actually observed, assuming that the null hypothesis is true. In hypothesis testing the null hypothesis is rejected if the p-value is less than the significance level (in most cases 0.05). Such a result indicates that the observed result would be highly unlikely under the null hypothesis (Daniel 1998:23-32). Daniel further indicates that the p-value or calculated probability is the estimated probability of rejecting the null hypothesis (H₀) of a study question when that hypothesis is true. The null hypothesis is usually a hypothesis of ‘no
difference’. The only situation in which to use a one-sided p-value is when a large change in an unexpected direction would have absolutely no relevance to a study. Furthermore, Daniel (1998:29) indicates that the term significance level (alpha) is used to refer to a pre-chosen probability and the term p-value is used to indicate a probability that is calculated after a given study, whereas the alternative hypothesis ($H_1$) is the opposite of the null hypothesis.

### 3.7.6 Chi-Square Tests

According to Wessels (2010:149-142), the Chi-Square test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories of the categorical variables involved. Do the numbers of individuals or objects that fall in each category differ significantly from the number one would expect? Is this a difference between the expected and the observed due to sampling error, or is it a real difference? The Chi-Square statistic ($\chi^2$) is calculated from the sum of the squared difference between the observed and the expected cell frequencies. The critical value for this comparison is determined from the Chi-Square distribution using the significance level of the test (usually 0.05), and the number of degrees of freedom. If this critical value is smaller than the calculated ($\chi^2$) –statistic, it is concluded that there is a significant difference between the observed and the expected cell-frequencies. This difference would then indicate that there is a relationship or association between the categories of the two variables under consideration. Assumptions for the ($\chi^2$) test are that the data values are independent and that each cell has a cell count of at least 5.

Wessels further defines correlational analysis as the use of statistical correlation to evaluate the strength of the relations between variables. The strength of a linear relationship between two continuous variables can be measured with the Pearson’s correlation coefficient. The coefficient value may vary from -1 to +1 which indicates a perfect negative and perfect positive correlation between two variables. A coefficient of 0 indicates a total lack of any linear relationship between two continuous variables.
3.7.7 Comparison of Means

According to Cohen (1988:15), inferential statistics, unlike descriptive statistics, provide a measure of probability to test a hypothesis regarding data or groups of data. With inferential statistics one tries to infer from the sample data how the population may behave. Most of the major inferential statistics come from a general family of statistical models known as the General Linear Model. This includes the t-test, Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), regression analysis, and many of the multivariate methods like factor analysis, multidimensional scaling, cluster analysis, discriminant function analysis.

Cohen (1988:23) further indicates that unlike a t-test, an Analysis of Variance (ANOVA) test compares more than two groups, for example several age categories. However an ANOVA may also be used to compare two categories. Before these parametric tests may be employed, the data or groups of data, has to meet certain conditions. These include normality (normally distributed) of groups of data and equality of the variance of the groups being compared. Failing normally distributed data, use may be made of non-parametric tests which make no assumptions of the underlying distributions involved. Examples of these tests are the Mann-Whitney U-test and the Kruskal-Wallis test. In the software employed in this research, these non-parametric tests are collectively referred to as the Wilcoxon tests. In the event of non-homogenous data, the result of the robust Welch test may be reported. In the tests employed in this research, all three tests were conducted and reported. Where differences in significances occur, the nature of the data is further investigated to ensure that the correct results are reported. Note that the statistical tests were conducted at the 0.05 level of significance to ensure a 95% level of confidence in the results obtained.

The ANOVA tests are accompanied by plots which indicate the relative means and medians of the groups of data. Box-plots contain 50% of the data, and the median is indicated with a bar in the box. Data points beyond the data-whiskers are outliers. An outlier is defined as a value which is beyond 1.5 times the range of the box. The width of the green diamond indicates the relative sample size of the group of data, and the diamond diagonal indicates the mean score of that group. The circles to the right of the plot indicate
results of Tukey tests of comparison between groups. Non-intersecting circles indicate significant differences (Cohen, 1988:56).

### 3.8 Validity and Reliability

Burns and Grove (2005:214) describe validity as a measure of the truth or accuracy of a claim. In the context of this study, the truth and accuracy of the study has been ensured by firstly using or choosing the appropriate design in relation to the purpose of the study. Charlesworth, Lawton, Lewis, Martin and Taylor (2003:17), reported that it is important for researchers to demonstrate that their research methods are reliable and that the conclusions are valid. This is also supported by Lewis, *et al.* (2003:17), as validity relates to the extent to which research findings accurately represent what is really happening in the situation. Validity is concerned with the idea that the research design fully addresses the research questions and objectives the researcher is trying to answer or achieve (White, 2003:25). Coldwell and Herbst (2004:62) state that validity testing can be carried out in three ways: content validity, criterion validity and construct validity.

According to White (2000:25), reliability is about consistency in research and whether another researcher can use the same design to obtain similar results. If other researchers can come up with similar findings, this means that the findings are more likely to be reliable (Charlesworth, *et al.* 2001:51). It refers to the extent through which the results are consistent and true (Coldwell & Herbst, 2004:63). Test-retest reliability was used to determine overall questionnaire reliability (cf. section 4).

In this study, content validity was achieved using the relevant literature review. It was ensured that the questionnaire covered the content of the problem statement and research objectives, i.e. the construction of questions was informed by the available literature (Sekaran, 2003:203).
3.9 Ethical Considerations

Permission (Appendix 1) was granted by the DST to conduct the study. Ethical clearance (Appendix 2) was granted by the Research Ethics Committee of the Department of Public Administration and Management of UNISA. Consent approvals were obtained from each respondent as a covering letter (Appendix 3) was attached to each questionnaire (Appendix 4). All participants were treated equally irrespective of their position. Confidentiality was observed throughout the study and the questionnaire did not require names of the respondents to be provided.

3.10 Summary

Research design methods enable the researcher to gain insider knowledge of the study objectives. The main elements of research design, research methodology and methods, the population sample and sampling technique; data collection methods and data types; data analysis and interpretation; validity of the study and ethical considerations, have been described in this chapter. After reviewing the literature on the research process, the researcher has provided the research design, its concepts and practices that are required to ensure that the objectives of this research are achieved. The literature review has also provided the basis for the results discussed in the next chapter. The research process was adequately conceptualised. This study adopted a formalised, communicative and cross-sectional form of design and also adopted qualitative research by issuing questionnaires to the population sample which consisted of junior managers, middle managers, senior managers and executive managers, in order to determine how a culture of organisational learning in the DST could support knowledge management and continuous improvement to respond to strategic initiatives.
CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

In the previous chapters, the underlying complexities of research into organisational learning at various organisational levels were established (cf. section 2.2). Drawing from the research objectives introduced in Chapter 1 and the research design concepts discussed in Chapter 3, this chapter provides the research results. The author discusses and analyses these results according to the objectives of this research and provides building blocks for the recommendations in the final chapter. In this chapter, the results and findings of the data collected through the survey will be analysed and interpreted.

The details of the results are discussed in the sections below, and are in line with the objectives introduced in Chapter 1.

4.2 Biographic Profile of Respondents

The staff complement (also known as employees) per Programme is as follows:

<table>
<thead>
<tr>
<th>Programme (also known as Directorate)</th>
<th>Staff complement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Services and Governance</td>
<td>102 29.0%</td>
</tr>
<tr>
<td>International Cooperation and Resources</td>
<td>89 22.0%</td>
</tr>
<tr>
<td>Human Capital Development and Knowledge Resources</td>
<td>78 22.0%</td>
</tr>
<tr>
<td>Socio-economic Partnerships</td>
<td>67 18.0%</td>
</tr>
<tr>
<td>Research, Development and Innovation</td>
<td>52 9.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>388 100.0%</strong></td>
</tr>
</tbody>
</table>

The sample was made up of 55 respondents. Of the 55 respondents, 29% were working in the Corporate Services and Governance Programme, 22% were working in the International Cooperation and Resources, and the Human Capital Development and
Knowledge Resources respectively, 18% within the Socio-economic Partnerships Programme and 9% within the Research, Development and Innovation Programme.

The response rates per Programme are shown in Figure 4.1.

![Figure 4.1: Response rates per Programme and per response rate per sample](image)

The sample was made up of 9% Deputy Directors General, 5% Chief Directors, 27% Directors, 38% Deputy Directors, and 20% Assistant Directors (Assistant Director is the entry level for most of the positions in the DST, hence they are representative of junior management employees). The results are illustrated in Figure 4.2.

![Figure 4.2: Response rates per employee level](image)
A majority of the respondents (58%) had been working for the DST for five years or more; 16% had been with the DST for three to five years and the remaining 26% had been with the DST between one and three years. The pie chart in Figure 4.3 represents the response rates per employment period in the DST.

![Figure 4.3: Response rates per employment period](image)

The sample was made up of 25% of respondents aged 26 to 35 years; 42% aged 36 to 45 years; and the remaining 33% were 46 years or older. The pie chart in Figure 4.4 represents the response rates per age group.

![Figure 4.4: Response rates per age group](image)
4.3 Assessing the Impact of Organisational Learning on Service Excellence in the DST

Twenty-two statements (also referred to as items) were posed to respondents. Responses were solicited on a 5-point Likert scale (Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree). The following items form proposed constructs or themes, guided by the literature review on organisational learning (cf. section 2.2):

1. Items 1-4 DST strategic planning
2. Items 5-8 Opportunities for learning and return on investment
3. Items 9-13 Inter-intra Programme communication
4. Items 14-18 Knowledge management and learning from experiences
5. Items 19-22 DST leadership style

Table 4.1 summarises the views of respondents on these statements.

Summary of distribution of respondents’ views on the proposed construct: DST strategic planning

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Innovation Plans are clear and shared with all employees.</td>
<td>3.6%</td>
<td>20.0%</td>
<td>3.6%</td>
<td>34.6%</td>
</tr>
<tr>
<td>2. My daily operations are clearly aligned with the strategic objectives of the DST.</td>
<td>7.3%</td>
<td>0.0%</td>
<td>7.3%</td>
<td>43.6%</td>
</tr>
<tr>
<td>3. In my opinion, information in the DST flows across the Programmes.</td>
<td>16.4%</td>
<td>30.9%</td>
<td>20.0%</td>
<td>30.9%</td>
</tr>
<tr>
<td>4. I am often informed about the activities or engagements of other Programmes in relation to the work done by my Programme.</td>
<td>21.8%</td>
<td>29.1%</td>
<td>9.1%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

Table 4.1: Summary of distribution of respondents’ views on the proposed construct: DST strategic planning
Summary of distribution of respondents’ views on the proposed construct: **Opportunities for learning and return on investment**

### Table 4.2: Summary of distribution of respondents’ views on the proposed construct: Opportunities for learning and return on investment

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. I think that the DST provides enough opportunities for employees to be trained and developed.</td>
<td>3.6%</td>
<td>0.0%</td>
<td>18.2%</td>
<td>20.0%</td>
</tr>
<tr>
<td>6. I believe that the DST has available skills to facilitate service excellence.</td>
<td>3.6%</td>
<td>7.3%</td>
<td>9.1%</td>
<td>47.3%</td>
</tr>
<tr>
<td>7. I believe that the DST has competent employees to facilitate service excellence.</td>
<td>0.0%</td>
<td>1.9%</td>
<td>13.2%</td>
<td>58.5%</td>
</tr>
<tr>
<td>8. Employees are encouraged to be creative and innovative in their work.</td>
<td>3.6%</td>
<td>16.4%</td>
<td>32.7%</td>
<td>41.8%</td>
</tr>
</tbody>
</table>

Summary of distribution of respondents’ views on the proposed construct: **Inter - intra Programme communication**

### Table 4.3: Summary of distribution of respondents’ views on the proposed construct: Inter - intra Programme communication

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Employees in the DST often share information of new knowledge on their work with other colleagues.</td>
<td>20.4%</td>
<td>31.5%</td>
<td>25.9%</td>
<td>18.5%</td>
</tr>
<tr>
<td>10. Employees in the DST often share their learning experiences from their work with their colleagues.</td>
<td>18.2%</td>
<td>25.5%</td>
<td>38.2%</td>
<td>18.2%</td>
</tr>
<tr>
<td>11. Differing views in my Programme or in the DST at large are publicly discussed and tested.</td>
<td>18.2%</td>
<td>25.5%</td>
<td>38.2%</td>
<td>18.2%</td>
</tr>
<tr>
<td>12. In my opinion, mistakes and failures in the DST are regarded as part of learning.</td>
<td>9.1%</td>
<td>23.6%</td>
<td>45.5%</td>
<td>18.2%</td>
</tr>
<tr>
<td>13. Learning experiences from past mistakes and failures in my Programme get incorporated into operational processes and daily routines.</td>
<td>10.9%</td>
<td>16.4%</td>
<td>38.2%</td>
<td>29.1%</td>
</tr>
</tbody>
</table>
Summary of distribution of respondents’ views on the **proposed** construct: **Knowledge management and learning from experiences**

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. I receive regular information about organisational matters.</td>
<td>3.6%</td>
<td>16.4%</td>
<td>25.5%</td>
<td>41.8%</td>
</tr>
<tr>
<td>15. I get sufficient opportunities to make my inputs on all matters of the organisation, especially in my Programme.</td>
<td>7.3%</td>
<td>16.4%</td>
<td>23.6%</td>
<td>43.6%</td>
</tr>
<tr>
<td>16. Even if the DST realises service excellence, it will make no difference to me.</td>
<td>0.0%</td>
<td>7.3%</td>
<td>9.1%</td>
<td>29.1%</td>
</tr>
<tr>
<td>17. Even if the DST realises service excellence, it will make no difference to the South African citizenry.</td>
<td>7.3%</td>
<td>3.6%</td>
<td>9.1%</td>
<td>23.6%</td>
</tr>
<tr>
<td>18. The DST leadership communicates the organisation’s strategic objectives.</td>
<td>3.6%</td>
<td>21.8%</td>
<td>10.9%</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

Table 4.4: Summary of distribution of respondents’ views on the proposed construct: Knowledge management and learning from experiences

Summary of distribution of respondents’ views on the **proposed** construct: **DST leadership style**

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. The DST leadership involves all employees in decision-making processes.</td>
<td>40.0%</td>
<td>21.8%</td>
<td>25.5%</td>
<td>7.3%</td>
</tr>
<tr>
<td>20. The DST leadership recognises and rewards service excellence.</td>
<td>0.0%</td>
<td>14.6%</td>
<td>36.4%</td>
<td>47.3%</td>
</tr>
<tr>
<td>21. There is participatory leadership in the DST.</td>
<td>16.4%</td>
<td>29.1%</td>
<td>30.9%</td>
<td>20.0%</td>
</tr>
<tr>
<td>22. Knowledge management is at the centre of daily operations at the DST.</td>
<td>32.7%</td>
<td>5.5%</td>
<td>32.7%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

Table 4.5: Summary of distribution of respondents’ views on the proposed construct: DST leadership style
It must be noted that within each of the proposed constructs, the distribution of views vary significantly, indicating a divergence in views of respondents on the extent of organisational learning on service excellence at DST.

These were merely proposed constructs and reliability within each proposed construct will be tested in the next section.

4.4 Reliability of the Proposed Constructs

There are several ways of testing the reliability of the items of a construct. One method of testing the internal consistency of the items of a construct is through the calculation of the Cronbach’s alpha coefficient (cf. section 3.7.4).

The following proposed guidelines (George & Mallery, 2003:231) are used in interpreting the Cronbach’s alpha value to determine the extent of internal consistency between the items to accurately represent each construct:

- $<0.6$ unacceptable internal consistency
- $0.6 – 0.7$ is questionable consistency
- $0.7 – 0.8$ indicates acceptable internal consistency
- $0.8 – 0.9$ is good internal consistency
- $>0.9$ is excellent internal consistency

The overall Cronbach’s alpha coefficient for each construct is presented below. This value is accompanied by an exclusion table which provides a recalculated Cronbach’s alpha should an item be removed from a construct.
An increase of greater than 3% is considered sufficient justification for removing an item from a construct. The alpha value of each item in the exclusion table has to be considered before an item is allowed into a construct.

4.4.1 Reliability of Proposed Construct: DST Strategic Planning

An overall Cronbach's alpha value of 0.755 was attained, which is considered as acceptable reliability. The following exclusion table presents a recalculated alpha coefficient should an item be excluded from the proposed construct:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The strategic objectives of the DST such as the Ten-Year Innovation Plan are clear and shared with all employees.</td>
<td>0.678</td>
</tr>
<tr>
<td>2. My daily operations are clearly aligned with the strategic objectives of the DST.</td>
<td>0.726</td>
</tr>
<tr>
<td>3. In my opinion, information in the DST flows across the Programmes.</td>
<td>0.678</td>
</tr>
<tr>
<td>4. I often am informed about the activities or engagements of other Programmes in relation to the work done by my Programme.</td>
<td>0.706</td>
</tr>
</tbody>
</table>

Table 4.6: Excluded items on the reliability of proposed construct: DST Strategic Planning

It is seen from the exclusion table that none of the individual items have an alpha value significantly greater than 0.755. An increase of greater than 3% justifies an exclusion of an item (George & Mallery, et. al. 2003:232). All items are thus retained for this construct.
4.4.2 Reliability of Proposed Construct: Opportunities for Learning and Return on Investment

An overall Cronbach’s alpha value of 0.612 was achieved, which is considered as questionable reliability. The following exclusion table presents the Cronbach’s alpha on excluded items:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. I think that the DST provides enough opportunities for employees to be trained and developed.</td>
<td>0.783</td>
</tr>
<tr>
<td>6. I believe that the DST has available skills to facilitate service excellence.</td>
<td>0.299</td>
</tr>
<tr>
<td>7. I believe that the DST has competent employees to facilitate service excellence.</td>
<td>0.312</td>
</tr>
<tr>
<td>8. Employees are encouraged to be creative and innovative in their work.</td>
<td>0.625</td>
</tr>
</tbody>
</table>

Table 4.7: Excluded items on the reliability of proposed construct: Opportunities for Learning and Return on Investment

Removal of item 5 from this construct will increase the overall alpha value to 0.783 – an increase of 28%. The reliability analysis was repeated without item 5, and even though an overall Cronbach’s alpha value of 0.783 was now achieved, the following exclusion table revealed new exclusion candidates:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. I believe that the DST has available skills to facilitate service excellence.</td>
<td>0.550</td>
</tr>
<tr>
<td>7. I believe that the DST has competent employees to facilitate service excellence.</td>
<td>0.635</td>
</tr>
<tr>
<td>8. Employees are encouraged to be creative and innovative in their work.</td>
<td>0.890</td>
</tr>
</tbody>
</table>

Table 4.8: Excluded items on the reliability analysis with the removal of item 5

It is seen that the exclusion of item 8 will increase the overall alpha value to 0.890, an increase of 12%.
With the exclusion of item 8, only two items remain in the construct (items 6 and 7). A reliability analysis cannot be performed on two items.

The absence of adequate internal consistency between the items of this construct may be due to inappropriate items for this construct, or could be due to wide contrasting views on the issues addressed by these items.

The researcher chose not to use a construct of questionable reliability.

### 4.4.3 Reliability of Proposed Construct: Inter - intra Programme Communication

An overall Cronbach’s alpha value of 0.875 was achieved, which is considered as good reliability. The following exclusion table provides recalculated alpha scores should an item be removed from the analysis:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Employees in the DST often share information on new knowledge on their work with other colleagues.</td>
<td>0.822</td>
</tr>
<tr>
<td>10. Employees in the DST often share their learning experiences from their work with their colleagues.</td>
<td>0.832</td>
</tr>
<tr>
<td>11. Differing views in my Programme or in the DST at large are publicly discussed and tested.</td>
<td>0.825</td>
</tr>
<tr>
<td>12. In my opinion, mistakes and failures in the DST are regarded as part of learning.</td>
<td>0.858</td>
</tr>
<tr>
<td>13. Learning experiences from past mistakes and failures in my Programme get incorporated into operational processes and daily routines.</td>
<td>0.892</td>
</tr>
</tbody>
</table>

Table 4.9: Excluded items on the reliability of proposed construct: Inter – intra Programme Communication
Since the removal of item 13 increases the overall alpha score by only 2%, this item is retained in the construct.

4.4.4 Reliability of Proposed Construct: Knowledge Management and Learning from Past Experiences

An overall Cronbach’s alpha value of 0.749 was achieved, which is considered acceptable reliability. The following exclusion table presents recalculated alpha scores with each item removed:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. I receive regular information about organisational matters.</td>
<td>0.733</td>
</tr>
<tr>
<td>15. I get sufficient opportunities to make my inputs on all matters of the organisation, especially in my Programme.</td>
<td>0.791</td>
</tr>
<tr>
<td>16. Even if the DST realises service excellence, it will make no difference to me.</td>
<td>0.570</td>
</tr>
<tr>
<td>17. Even if the DST realises service excellence, it will make no difference to the South African citizenry.</td>
<td>0.645</td>
</tr>
</tbody>
</table>

Table 4.10: Excluded items on the reliability of proposed construct: Knowledge Management and Learning from Past Experiences

Removal of item 15 increases the alpha score by 5.5%, sufficient justification to remove this item from the construct. A repeat of the analysis without item 15 yielded an overall alpha score of 0.791. The following exclusion table presents new alpha values with excluded items:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. I receive regular information about organisational matters.</td>
<td>0.892</td>
</tr>
<tr>
<td>16. Even if the DST realises service excellence, it will make no difference to me.</td>
<td>0.517</td>
</tr>
<tr>
<td>17. Even if the DST realises service excellence, it will make no difference to the South African citizenry.</td>
<td>0.696</td>
</tr>
</tbody>
</table>
South African citizenry.

Table 4.11: Reliability analysis with the removal of item 15

The removal of item 14 increases the alpha coefficient by 11% but results in only two remaining items with which to measure this construct. A reliability analysis cannot be performed with only two items. A wide divergence contrast in views of the items of this construct is already seen in Table 4.4. There seems to be common consensus between items 16 and 17 since respondents have 83.7% and 80% agreement with these statements.

4.4.5 Reliability of Proposed Construct: DST Leadership Style

An overall Cronbach’s alpha value of 0.749 was achieved, which is considered acceptable reliability. The following exclusion table provides the adapted Cronbach’s alpha value should a particular item be removed from the construct.

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. The DST leadership involves all employees in decision-making processes.</td>
<td>0.643</td>
</tr>
<tr>
<td>20. The DST leadership recognises and rewards service excellence.</td>
<td>0.812</td>
</tr>
<tr>
<td>21. There is participatory leadership in the DST.</td>
<td>0.683</td>
</tr>
<tr>
<td>22. Knowledge management is at the centre of daily operations at the DST.</td>
<td>0.743</td>
</tr>
</tbody>
</table>

Table 4.12: Excluded items on the reliability of proposed construct: DST Leadership Style

The removal of item 20 increased the overall alpha value by 3.7%.

The analysis was repeated without item 20 and provided a new overall alpha score of 0.812 indicating good reliability. The excluded item table provides recalculated alpha scores:
The construct DST Leadership Style now consists of three reliable items that accurately represent this construct.

### 4.4.6 Summary of Reliability Tests on the Items of the Constructs

The following Table summarises the results of the reliability tests on the items of each construct:

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Overall Cronbach’s alpha value</th>
<th>Disqualified items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DST strategic planning</td>
<td>1, 2, 3, 4</td>
<td>0.755 (Acceptable reliability)</td>
<td></td>
</tr>
<tr>
<td>2. Opportunities for learning and return on investment</td>
<td></td>
<td>Unacceptable reliability</td>
<td>5, 6, 7, 8</td>
</tr>
<tr>
<td>3. Inter - intra Programme communication</td>
<td>9, 10, 11, 12, 13</td>
<td>0.875 (Good reliability)</td>
<td></td>
</tr>
<tr>
<td>4. Knowledge management and learning from experiences</td>
<td></td>
<td>Unacceptable reliability</td>
<td>14, 15, 16, 17, 18</td>
</tr>
<tr>
<td>5. DST leadership style</td>
<td>19, 21, 22</td>
<td>0.812 (Good reliability)</td>
<td>20</td>
</tr>
</tbody>
</table>

**Table 4.14: Summary of reliability tests on the items of each construct**

There are only three reliable constructs:

- DST strategic planning
- Inter - intra Programme communication
• DST leadership style

The items of the following constructs have insufficient internal consistency to accurately represent the respective constructs:

• Opportunities for learning and return on investment
• Knowledge management and learning from experiences

This is also seen from the distribution of views of these items:

Opportunities for learning and return on investment

<table>
<thead>
<tr>
<th>Items of construct</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3.6%</td>
<td>0.0%</td>
<td>18.2%</td>
<td>20.0%</td>
<td>58.2%</td>
</tr>
<tr>
<td>6</td>
<td>3.6%</td>
<td>7.3%</td>
<td>9.1%</td>
<td>47.3%</td>
<td>32.7%</td>
</tr>
<tr>
<td>7</td>
<td>0.0%</td>
<td>1.9%</td>
<td>13.2%</td>
<td>58.5%</td>
<td>26.4%</td>
</tr>
<tr>
<td>8</td>
<td>3.6%</td>
<td>16.4%</td>
<td>32.7%</td>
<td>41.8%</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

The distribution of views for the four items is inconsistent, resulting in inadequate correlation in views for accurate representation of a single construct.

Knowledge management and learning from experiences

<table>
<thead>
<tr>
<th>Items of construct</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>3.6%</td>
<td>16.4%</td>
<td>25.5%</td>
<td>41.8%</td>
<td>12.7%</td>
</tr>
<tr>
<td>15</td>
<td>7.3%</td>
<td>16.4%</td>
<td>23.6%</td>
<td>43.6%</td>
<td>9.1%</td>
</tr>
<tr>
<td>16</td>
<td>0.0%</td>
<td>7.3%</td>
<td>9.1%</td>
<td>29.1%</td>
<td>54.6%</td>
</tr>
</tbody>
</table>
There is an inconsistency in the views of respondents for the five items 14, 15, 16, 17 and 18.

It must be further pointed out that the constructs are not necessary valid constructs, as an inadequate sample size prevents the application of an exploratory factor analysis to validate the constructs. A sample of at least (22 statements multiplied by the extent of the Likert-scale) 110 observations is required to perform an EFA.

4.5 Creation of Constructs

Single scores for each of the proposed constructs were determined for each respondent by calculating the mean of the participating (reliable) items of the constructs. The following descriptive statistics and distributions describe the nature of these constructs:

4.5.1 Proposed Construct: DST Strategic Planning

The mean and median scores for the construct: DST Strategic Planning, are 3.39 and 3.5 respectively indicating an average view between neutral and agree. Dispersion of views about these measures of centrality is indicated with a standard deviation of 0.943 and an inter-quartile range of 1.5.

This rather wide variation in views was also seen in Table 4.1 (distribution of views of respondents).
The distribution of scores is negatively skewed with 25% of respondents having a view of agree to strongly agree and 25% of viewing DST strategic planning as less than neutral to strongly disagreeing.

Respondents indicated that the strategic planning process does not make efforts to bring Programmes together, it rather perpetuates the division and therefore efforts are fragmented. In the literature review, it was indicated that being a learning organisation requires an understanding of the strategic internal drivers needed to build a learning capability (Drejer, et al. 2000:16).

4.5.2 Proposed Construct: Inter-Intra Programme Communication

The mean and median scores for the construct: Inter-Intra Programme Communication, are 2.7 and 2.8 respectively indicating an average view between disagree and neutral. Dispersion of views about these measures of centrality is indicated with a standard deviation of 0.872 and an inter-quartile range of 1.0.
This rather wide variation in views was also seen in Table 4.3 (distribution of views of respondents).

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.00%</td>
<td>maximum</td>
<td>4.6</td>
</tr>
<tr>
<td>99.50%</td>
<td></td>
<td>4.6</td>
</tr>
<tr>
<td>97.50%</td>
<td></td>
<td>4.6</td>
</tr>
<tr>
<td>90.00%</td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>75.00%</td>
<td>quartile</td>
<td>3.2</td>
</tr>
<tr>
<td>50.00%</td>
<td>median</td>
<td>2.8</td>
</tr>
<tr>
<td>25.00%</td>
<td>quartile</td>
<td>2.2</td>
</tr>
<tr>
<td>10.00%</td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>2.50%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>0.50%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>0.00%</td>
<td>minimum</td>
<td>1</td>
</tr>
</tbody>
</table>

The distribution of scores is reasonably uniform with 25% of respondents having a view of between neutral and strongly agree and 25% of viewing Inter-Intra Programme Communication as disagree to strongly disagreeing.

The majority of respondents indicated that there is no atmosphere of sharing and learning from the past in the DST. This is in contradiction to Senge, et al. (1990:340) as they emphasise that in a learning organisation, leaders are designers, stewards, and teachers and are responsible for building organisations where people continually expand their capabilities to understand complexity, clarify their vision, and improve shared mental models: that they are responsible for their learning.

### 4.5.3 Proposed Construct: DST Leadership Style

The mean and median scores for the construct: DST Leadership Style, are 2.71 and 2.75 respectively indicating an average view between neutral and disagree. Dispersion of views about these measures of centrality is indicated with a standard deviation of 0.875 and an
inter-quartile range of 1.5. This rather wide variation in views was also seen in Table 4.5 (distribution of views of respondents).

The distribution of scores is positively skewed with 25% of respondents having a view of between neutral and strongly agree and 25% of viewing DST Leadership Style as disagree to strongly disagreeing.

Respondents seem to have a negative view of DST Leadership Style and this can be attributed to the top down management style in the DST. This is contradictory to Pearn, et al. (1995:69) who argue that organisational learning can be achieved by moving away from a command-and-control style of management to increased involvement and empowerment of everyone in the organisation. The command-and-control management style is adopted at the DST, given its hierarchical organisational structure, hence the DST does not engage in organisational learning. Pearn indicates that leadership style and control systems in an organisation can either inhibit or facilitate organisational learning. In the DST context, the leadership style does inhibit organisational learning.
4.5.4 The Relationship between Constructs

As a rough guide the following correlations indicate the relative linear strength between two variables:

±1.0 Perfect correlation
±0.8 Strong correlation
±0.5 Medium correlation
±0.2 Weak correlation
±0.0 No correlation

The following correlation matrix provides a measure of the bivariate strength of linear relationship.

<table>
<thead>
<tr>
<th>Proposed Construct</th>
<th>DST Strategic Planning</th>
<th>Inter - intra Programme Communication</th>
<th>DST Leadership Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>DST Strategic planning</td>
<td>1</td>
<td>0.5637</td>
<td>0.3670</td>
</tr>
<tr>
<td>Inter - intra Programme communication</td>
<td>0.5637</td>
<td>1</td>
<td>0.4849</td>
</tr>
<tr>
<td>DST Leadership style</td>
<td>0.3670</td>
<td>0.4849</td>
<td>1</td>
</tr>
</tbody>
</table>

The linear bivariate relationships (correlations) between the constructs are generally of medium strength and are positive in nature. A positive linear relationship implies that an increase in one construct is associated with an increase in an accompanying construct. If the DST promotes common vision through its strategic planning, inter - intra Programme communication would improve (0.5637). If the DST promotes inter - intra Programme communication, this would be attributed to the DST leadership style that is participatory and inclusive and also recognises and rewards service excellence. Bivariate scatterplot matrix of constructs:
From the correlation coefficients, the 95% density ellipses around the points as well as the straight line through points, it is seen that there is a measure of linear relationship between pairs of constructs.

4.6 The Influence of the Biographic Characteristics of Respondents on their Views on Organisational Learning at the DST

A series of statistical inferential tests (parametric and non-parametric) were performed between the reliable constructs: DST strategic planning, inter – intra Programme communication as well as DST leadership style, and the biographic profile of respondents. These characteristics include the Programme in which a respondent is involved, his/her designation, the number of years at DST and the respondent’s age.
The software employed in the analyses of this research (JMP version 10.2), performs all three tests simultaneously. If differences in significance are observed between these tests regarding acceptance/rejection in the comparison of groups, further investigation will be conducted to establish the most appropriate test. All tests were conducted at a significance level of 0.05 to ensure an accuracy of 95% in the results claimed. All significant results are also accompanied with the Cohen’s effect size (d) to indicate the extent of the practical significance of the differences between groups (Cohen, 1988:273).

Note that only significant results are reported below.

### 4.6.1 One-way ANOVA of the Construct: DST Leadership Style by Designation

![Box plot of DST Leadership Style by Designation](image)

The following Table provides the means scores of DST Leadership Style calculated for the various designation groups.

<table>
<thead>
<tr>
<th>Designation</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Directors</td>
<td>11</td>
<td>3.23</td>
<td>0.553</td>
</tr>
<tr>
<td>Deputy Directors</td>
<td>21</td>
<td>2.65</td>
<td>0.731</td>
</tr>
<tr>
<td>Directors</td>
<td>15</td>
<td>2.97</td>
<td>1.039</td>
</tr>
<tr>
<td>Chief Directors</td>
<td>3</td>
<td>1.67</td>
<td>0.144</td>
</tr>
<tr>
<td>Deputy Directors General</td>
<td>5</td>
<td>1.70</td>
<td>0.112</td>
</tr>
</tbody>
</table>

*Table 4.15: Summary of analysis of DST Leadership Style by designation*
Anova test: F-ratio $4,54 = 5.339$, p-value = 0.0012  
Welch test: F-ratio $4,54 = 27.510$, p-value = 0.0001  
Wilcoxon (Kruskal-Wallis): Chi-Square statistic = 18.912, DF = 4, p-value = 0.0008  
(The Levene’s test rejects equal variances)

It is concluded that significant differences exist between the mean views of the various designations for DST Leadership Style.

The following connected letter report indicates where the differences in views exist:

<table>
<thead>
<tr>
<th>Designation</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Directors</td>
<td>A</td>
<td></td>
<td></td>
<td>3.23</td>
</tr>
<tr>
<td>Directors</td>
<td>A</td>
<td>B</td>
<td></td>
<td>2.97</td>
</tr>
<tr>
<td>Deputy Directors</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>2.65</td>
</tr>
<tr>
<td>Deputy Directors General</td>
<td></td>
<td>C</td>
<td></td>
<td>1.70</td>
</tr>
<tr>
<td>Chief Directors</td>
<td></td>
<td>B</td>
<td>C</td>
<td>1.67</td>
</tr>
</tbody>
</table>

(Levels not connected by same letter are significantly different)

The significant differences in views of DST Leadership Style exist between the three groups:

Assistant Directors;

Directors;

Deputy Directors General;

with Assistant Directors viewing the DST Leadership Style as neutral to positive, Directors slightly less than neutral and the Deputy Directors General with the least positive view. This can be attributed to the fact that Assistant Directors are mainly younger employees as compared to Directors and Deputy Directors General who are mature employees. Another contributing factor could be that an Assistant Director’s years of service or employment period in the DST is mainly less compared to the Directors and Deputy Directors General.

Cohen’s effect size as calculated for ANOVAs with multiple groups, based on group means is $d = 3.37$ which is considered as being of large practical significance.
4.6.2 One-way ANOVA of the Construct: DST Strategic Planning by Age

The following Table provides the means scores of DST Strategic Planning calculated for the various age groups.

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-35 years</td>
<td>14</td>
<td>2.73</td>
<td>1.120</td>
</tr>
<tr>
<td>36-45 years</td>
<td>23</td>
<td>3.96</td>
<td>0.481</td>
</tr>
<tr>
<td>46 and older</td>
<td>18</td>
<td>3.17</td>
<td>0.849</td>
</tr>
</tbody>
</table>

Table 4.16: Summary of means scores of DST Strategic Planning by age

Anova test:  F-ratio$_{2,54}$ = 11.082, p-value = 0.0001
Welch test:  F-ratio$_{2,54}$ = 11.734, p-value = 0.0003
Wilcoxon (Kruskal-Wallis): Ch-Sq statistic = 14.466, DF = 2, p-value = 0.0007
(The Levene’s test rejects equal variances)

It is concluded that significant differences exist between the mean views of the various age groups for the DST Strategic Planning.

The following connected letter report indicates where the differences in views exist:

<table>
<thead>
<tr>
<th>Age</th>
<th>A</th>
<th>B</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-45 years</td>
<td>A</td>
<td></td>
<td>3.96</td>
</tr>
<tr>
<td>46 and older</td>
<td></td>
<td>B</td>
<td>3.17</td>
</tr>
<tr>
<td>26-35 years</td>
<td></td>
<td>B</td>
<td>2.73</td>
</tr>
</tbody>
</table>

(Levels not connected by same letter are significantly different)
The middle age group 36-45 years has strong positive views on DST strategic planning. The young age group (26-35 years) and the older age group (>45 years), have a neutral to negative view on strategic planning.

Cohen’s effect size as calculated for ANOVAs with multiple groups, based on group means is $d = 2.89$ which is considered as being of large practical significance.

### 4.6.3 One-way ANOVA of the Construct: DST Leadership Style by Age

The following Table provides the means scores of DST Leadership Style calculated for the various age groups.

<table>
<thead>
<tr>
<th>Age</th>
<th>n</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-35 years</td>
<td>14</td>
<td>2.73</td>
<td>0.762</td>
</tr>
<tr>
<td>36-45 years</td>
<td>23</td>
<td>3.11</td>
<td>0.839</td>
</tr>
<tr>
<td>46 and older</td>
<td>18</td>
<td>2.19</td>
<td>0.760</td>
</tr>
</tbody>
</table>

Table 4.17: Summary of means scores of DST Leadership Style by age

Anova test: $F$-ratio$_{2,54} = 6.684$, $p$-value = 0.0026

Welch test: $F$-ratio$_{2,54} = 6.574$, $p$-value = 0.0025

Wilcoxon (Kruskal-Wallis): Ch-Sq statistic = 11.986, $DF = 2$, $p$-value = 0.0025
(The Levene’s test accepts equal variances)

It is concluded that significant differences exist between the mean views of the various age groups for the construct: DST Leadership Style.

The following connected letter report indicates where the differences in views exist:

<table>
<thead>
<tr>
<th>Age</th>
<th>A</th>
<th>B</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-45 years</td>
<td>A</td>
<td></td>
<td>3.11</td>
</tr>
<tr>
<td>26-35 years</td>
<td>A</td>
<td>B</td>
<td>2.73</td>
</tr>
<tr>
<td>46 and older</td>
<td></td>
<td>B</td>
<td>2.19</td>
</tr>
</tbody>
</table>

(Levels not connected by same letter are significantly different)

The middle age group (36-45 years), have a rather neutral stance on DST leadership style. The youngest age group (26-35 years), have a less than neutral (tending to negative) view and the older age group (>45 years) have a distinct negative view of DST leadership style.

This can be attributed to the age and designation amongst the two groups of respondents whereby respondents in the age category 36-45 have different expectations on their assessment of whether the DST leadership is participatory and inclusive whereas for respondents in the age category >45 have a firm understanding in their assessment that the DST leadership is not participatory and inclusive.

Cohen’s effect size as calculated for ANOVAs with multiple groups, based on group means is $d = 2.42$ and is considered as being of large practical significance. The following Table provides a breakdown of designation by age.

<table>
<thead>
<tr>
<th>Designation</th>
<th>26-35 years</th>
<th>36-45 years</th>
<th>46 and older</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Col %</td>
<td>Row %</td>
<td>Col %</td>
</tr>
<tr>
<td>Assistant Directors</td>
<td>14.3%</td>
<td>18.2%</td>
<td>39.1%</td>
</tr>
<tr>
<td>Deputy Directors</td>
<td>64.3%</td>
<td>42.9%</td>
<td>30.4%</td>
</tr>
<tr>
<td>Directors</td>
<td>21.4%</td>
<td>20.0%</td>
<td>30.4%</td>
</tr>
</tbody>
</table>
As expected the most senior staff members are in the older age group.

4.7 Interpretation of Individual Items

From the reliability analysis, it was seen that the following items could not accurately represent their respective proposed constructs:

| Q2_5 | I think the DST provides enough opportunities for employees to be trained and developed. |
| Q2_6 | I believe DST has available skills to facilitate service excellence. |
| Q2_7 | I believe DST has competent employees to facilitate service excellence. |
| Q2_8 | Employees are encouraged to be creative and innovative in their work. |
| Q2_14 | I receive regular information about organisational matters. |
| Q2_15 | I get sufficient opportunities to make my inputs on all matters of the organisation especially in my Programme. |
| Q2_16 | Even if the DST realises service excellence, it will make no difference to me. |
| Q2_17 | Even if the DST realises service excellence, it will make no difference to the South African citizenry. |
| Q2_18 | The DST leadership communicates the organisation’s strategic objectives. |
| Q2_20 | The DST leadership recognises and rewards service excellence. |

The influence of the biographic characteristics of respondents was investigated individually on these items using chi-square statistical techniques (cf. section 4.8).

Due to lack of cell density for this investigation, the 5-point Likert scale on which respondents view the extent at which the DST embraces organisational learning, was
reduced to a 3-point scale as follows: Strongly disagree and Disagree was recoded to Disagree, Agree and Strongly agree was recoded to Agree, and Neutral views were retained as originally recorded.

The following Table presents respondent’s views on this scale.

<table>
<thead>
<tr>
<th>Item</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2_5 I think the DST provides enough opportunities for employees to be trained and developed.</td>
<td>3.6%</td>
<td>18.2%</td>
<td>78.2%</td>
</tr>
<tr>
<td>Q2_6 I believe DST has available skills to facilitate service excellence.</td>
<td>10.9%</td>
<td>9.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Q2_7 I believe DST has competent employees to facilitate service excellence.</td>
<td>1.9%</td>
<td>13.2%</td>
<td>84.9%</td>
</tr>
<tr>
<td>Q2_8 Employees are encouraged to be creative and innovative in their work.</td>
<td>20.0%</td>
<td>32.7%</td>
<td>47.3%</td>
</tr>
<tr>
<td>Q2_14 I receive regular information about organisational matters.</td>
<td>20.0%</td>
<td>25.5%</td>
<td>54.6%</td>
</tr>
<tr>
<td>Q2_15 I get sufficient opportunities to make my inputs on all matters of the organisation especially in my Programme.</td>
<td>23.6%</td>
<td>23.6%</td>
<td>52.7%</td>
</tr>
<tr>
<td>Q2_16 Even if the DST realises service excellence, it will make no difference to me.</td>
<td>7.3%</td>
<td>9.1%</td>
<td>83.6%</td>
</tr>
<tr>
<td>Q2_17 Even if the DST realises service excellence, it will make no difference to the South African citizenry.</td>
<td>10.9%</td>
<td>9.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Q2_18 The DST leadership communicates the organisation’s strategic objectives.</td>
<td>25.5%</td>
<td>10.9%</td>
<td>63.6%</td>
</tr>
<tr>
<td>Q2_20 The DST leadership recognises and rewards service excellence.</td>
<td>14.6%</td>
<td>36.4%</td>
<td>49.1%</td>
</tr>
</tbody>
</table>

Table 4.19: Summary of respondents’ views on 3-point scale
4.8 Chi-Square Tests of Association

The results of the chi-square tests are reported in terms of degrees of freedom, number of observations, the Pearson statistic and the probability value eg $X^2(DF,N) = $ Pearson statistic, p-value.

Only significant results are reported below. Also note that in most instances of these tests, there is generally inadequate cell density (minimum cell count should be 5). Consequently most significant results must be viewed with a certain measure of uncertainty. At best it may be stated that there appears to be a measure of association.

There is no association between the Programme in which the respondent works at DST and the 10 statements tabled above.

4.8.1 Chi-Square Tests of Association on Designation

a. Q2_5 I think the DST provides enough opportunities for employees to be trained and developed.
   $X^2 (8,55) = 19.171$, p-value=0.014.
   It appears as though senior staff members (Chief Directors and Deputy Directors General) are non-committal (neutral), whereas junior and middle managers (Assistant and Deputy Directors) agree with this statement.

b. Q2_8 Employees are encouraged to be creative and innovative in their work.
   $X^2 (8,55) = 23.675$, p-value=0.026.
   It appears as the most junior managers (Assistant Directors) tend to be neutral or negative on this statement.

c. Q2_14 I receive regular information about organisational matters.
   $X^2 (8,55) = 15.588$, p-value=0.0487.
The most senior management (Chief Directors and Deputy Directors General) tend to agree with this statement whereas junior and middle managers (Assistant and Deputy Directors) are non-committal (neutral) or disagree.

d. Q2_18 The DST leadership communicates the organisation’s strategic objectives.
   \( \chi^2 (8,55) = 22.562, \text{ p-value}=0.0040. \)
   The most senior management (Chief and Deputy Directors General) tend to agree with this statement whereas junior and middle managers (Assistant and Deputy Directors) are non-committal (neutral) or disagree.

e. Q2_20 The DST leadership recognises and rewards service excellence.
   \( \chi^2 (8,55) = 17.011, \text{ p-value}=0.0300. \)
   The most senior management (Chief and Deputy Directors Generals) tend to disagree or are neutral on this statement whereas junior management (Assistant Directors) agree. Directors tend to agree whereas Deputy Directors about evenly agree or are neutral.

There is no association between the Years at DST in which respondents work at DST and the 10 statements tabled above.

4.8.2 Chi-Square Tests of Association on Age

a. Q2_5 I think the DST provides enough opportunities for employees to be trained and developed.
   \( \chi^2 (4,55) = 13.357, \text{ p-value}=0.0097. \)
   The older age group tends to be more non-committal (neutral), whereas the younger age groups tend to agree.

b. Q2_6 I believe DST has available skills to facilitate service excellence
   \( \chi^2 (4,55) = 13.357, \text{ p-value}=0.0097. \)
Respondents in the age group 36-45 years totally agree with this statement, whereas the younger (26-35 years) and older (>45 years) age groups have a certain measure of neutrality and disagreement.

c. Q2_7 I believe DST has competent employees to facilitate service excellence. 
\[ \chi^2 (4,55) = 12.069, \text{ p-value}=0.0168. \]
Respondents in the age group 36-45 years totally agree with this statement, whereas the younger (26-35 years) and older (>45 years) age groups have a certain measure of neutrality.

d. Q2_14 I receive regular information about organisational matters. 
\[ \chi^2 (4,55) = 9.990, \text{ p-value}=0.0406. \]
Respondents in the older age group (>45 years) totally agree, whereas the other age groups display a measure of neutrality and disagreement.

e. Q2_15 I get sufficient opportunities to make my inputs on all matters of the organisation especially in my Programme. 
\[ \chi^2 (4,55) = 20.625, \text{ p-value}=0.0004. \]
Respondents in the older age group (>45 years) totally agree, whereas the other age groups display a measure of neutrality and disagreement.

f. Q2_18 The DST leadership communicates the organisation’s strategic objectives. 
\[ \chi^2 (4,55) = 9.840, \text{ p-value}=0.0432. \]
Respondents in the younger age groups (<46 years) tend to display a greater measure of neutrality and disagreement than the older age group (>45 years).

g. Q2_20 The DST leadership recognises and rewards service excellence. 
\[ \chi^2 (4,55) = 26.132, \text{ p-value}=0.0001. \]
Respondents in the age group 36-45 years tend to agree, whereas respondents in the other age groups display a significant measure of uncertainty (neutral).
The above reiterates the conclusion that the generation of employees in the age category 36-45 years have a rather neutral to positive view and stance on the DST as an organisation.

4.9 Summary of Open-ended Questions: Section 3 of the Questionnaire

Respondents indicated that the level of trust varies between employees and their supervisors. Trust depends on the working relations and the level of communication between employees themselves and their supervisors. With regard to leadership style followed by senior managers, this was also described as being dependent on the working relations and the trust that exists between the supervisors and their teams. On the other hand, the extent at which innovation is supported by supervisors seemed to be more favourable and existing in the Research, Development and Innovation Directorate as this is the innovation hub and knowledge center of the DST.

4.10 Summary

In this chapter, the objectives of the study as articulated in Chapter 1 have been achieved. The key elements of the literature review in Chapter 2 were tested using the statistical methods described in Chapter 3. It was found that only three constructs are reliable, and these are DST strategic planning, inter - intra Programme communication as well as the DST leadership style (cf. Table 4.6). Single scores for each of these constructs were determined and they each provided the mean of the participating (reliable) items. Furthermore, the influence of the biographic characteristics was tested including the use of Chi-Square tests of association on the biographic profiles of respondents. The findings are discussed in the following chapter.
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter builds on the previous chapters and summarises the findings of this study. Based on the findings, the chapter further provides practical and theoretical recommendations. The conclusions in this chapter will focus first on the integrated results, and then more specifically on the problem statement. For practical purposes, the problem statement is restated here:

The culture of organisational learning in the Department of Science and Technology does not support continuous improvement in the implementation of strategic initiatives (cf. section 1.4).

5.2 Research Findings

Research Question One: *What are the main factors that constitute the culture of organisational learning?* Findings in the literature review revealed that strategic vision, communication as well as leadership style are key factors contributing towards embracing a culture of organisational learning.

Research Question Two: *What is the current culture of organisational learning at the DST?* The study assisted in determining whether in the DST skills learned are transferred to the job and if this results in the continuous improvement and service excellence. Moreover that the DST invests significantly towards training and development of its employees and in ensuring that they are continuously empowered. From the research findings, a number of conclusions that have implications on the DST’s culture of organisational learning have been drawn. The findings indicate that factors such as adequate communication and leadership are significant in the realisation of service excellence (cf. section 4.3).
addition, the following items indicate problem areas at the DST: items 3, 4, 9, 10, 11, 12, 13, 16, 17, 19, 21 and 22 (cf. section 4.3). It has been deduced from the findings that information sharing and communication in the DST is not effective. The DST structure and its degree of role differentiation impacts on effective communication and information flow within the organisation. The Department is responsible for science and technology policy conceptualisation and coordination and is mandated to conduct research and development as well as innovation strategies, thus requiring an alternative approach towards learning and development which is outcome and impact based. The findings suggest that information flow is a major problem in the DST, especially across the organisation. The results therefore support the contention that the DST culture does not support organisational learning (cf. sections 4.4, 4.5, 4.6, 4.7 and 4.8).

Research Question Three: What are the key factors that could contribute to a culture of organisational learning at the DST? It has been concluded that with regard to the strategic planning, most DST employees understand the strategic objectives and initiatives. The level of understanding of the strategic planning varies between Programme and age category (cf. Tables 4.1, 4.2, 4.3, 4.4 and 4.5). Therefore, the DST needs to involve its employees in strategic planning processes, improve on inter – intra Programme communication and also adopt a leadership style which is participatory and is inclusive of all employees in order to create a culture that embraces organisational learning.

Research Question Four: How could these factors of organisational learning be improved at the DST? The literature review indicated that, it is the role of leadership to enforce and encourage employee involvement (cf. sections 2.2.4.2 and 2.2.5). If DST employees are involved in the strategy planning process, this will enhance their level of understanding of DST strategic initiatives and their personal contribution towards driving service excellence. Employees will know how their daily operations are aligned with the strategic objectives of the DST. The inter – intra Programme communication will ensure that employees share their learning experiences from their work with their colleagues thus contributing towards continuous service delivery improvement. The participatory and inclusive leadership style will ensure that knowledge management is at the centre of daily operations and that leadership recognises and rewards service excellence (cf. section 4.3).
Main Research Question: How could the culture of organisational learning in the DST be improved to support the implementation of strategic objectives? The DST needs to involve all employees in the strategic planning process. The DST objectives need to be shared with all employees and there should be effective and efficient communication across the organisation. The DST leadership style needs to be participatory and inclusive of all employees. According to Schwella (2013:70), the social learning approach to leadership is linked to the recycling step in the transformational approach and requires that organisations continuously learn and experiment in order to improve capacity and performance. Furthermore, Schwella states that leaders should therefore not be directive and authoritarian, but should rather be facilitators creating space for experimentation learning.

5.3 Recommendations

Based on the conclusions made in the above section, the following points are recommended:

- It is suggested that the Department should enhance inter - intra Programme communication. The literature review indicated that horizontal communication plays an important role in organisational learning (c.f. section 2.2). Inter – intra Programme communication should be encouraged through formal coordination and informal gatherings where employees are able to exchange ideas and share information in a more coordinated manner (Pawlowsky, 2003:62-88). This will ensure that the DST becomes a knowledge-based organisation and that it builds internal cooperation and learning capacity (cf. section 4.4.3).

- It is suggested that effective coordination be put in place to ensure that all parts of the organisation work together toward a common purpose, and that they contribute equally to the execution of organisational strategies (cf. section 2.2). The DST can leverage on the positive perception of its employees especially those who are in the age category 36-45 (cf. section 4.6). Senge states that if any one idea about leadership has inspired organisations for thousands of years, it is the capacity to hold and share a picture of the future we seek to create (Senge, 1990:9). Such a
vision has the power to be uplifting and to encourage experimentation and innovation (cf. sections 2.2.4.3 and 4.3).

- Furthermore, it is suggested that the DST should foster a management style that is focused on increasing employee involvement and empowerment at all levels. Involvement of junior employees in strategic planning and decision-making should be encouraged in all parts of the organisation, and more autonomy or responsibility should be given to employees at lower levels. It is recommended that more bottom-up communication should be encouraged. This is supported by the findings in respect of items 19 and 20 (cf. section 4.3). It could be argued that the DST only established in 1996 will gradually develop a culture of organisational learning as the institution matures.

5.4 Future Research

Future research should take a more empirical approach toward further exploring organisational learning factors such as knowledge management, systems and processes that are required by learning organisations in government.

5.5 Summary

This chapter built on the results discussed in Chapter 4 in order to make conclusions on the implications of the results with respect to the problem statement. It further provided theoretical and practical recommendations based on the conclusions made.
LIST OF REFERENCES

6.1 Books


6.2 Journals


### 6.3 Websites


Available from: [http://www.sbleds.ac.za](http://www.sbleds.ac.za)


Available from: [http://www.sbleds.ac.za](http://www.sbleds.ac.za)


Available from: [www.kmnetwork.com](http://www.kmnetwork.com)

### 6.4 Unpublished material


Appendix 3: Letter to respondents

INFORMED CONSENT

My name is Patricia Seja Tomotomo and I am the Director for Talent Management and Organisational Development in the Department of Science and Technology (DST). The focus of the research is on understanding the impact of organisational learning on service excellence in the DST. This research is in partial completion of the requirements for the Master of Public Administration, and a copy of the report will be made available to the executive management of the DST in order to contribute to the continual improvement of service delivery. Participants will be furnished with the report and it will also be available at the DST Knowledge Resources Centre.

You have been selected to participate in this research because of your number of year of service in the DST and the learning and development that the DST has invested in you over the years of your employment. In accordance with the Unisa Policy on Research Ethics (2012), I would like to state that your participation is entirely voluntary and that information collected will not link the data back to you or any of the participants. The questionnaire is herewith attached for your consideration.

If you have any questions or concerns regarding the research, you are welcome to contact the Postgraduate Assistant, Department of Public Administration and Management, by telephone on 012 429 6252, or contact my supervisor, Prof Werner Webb by telephone on 012 429 6909.

If you would like any additional information, please feel free to call me on 071 854 7293, or contact me by email at sejatomotomo@yahoo.com. Thank you for your valuable contribution to this research effort. While your participation is entirely voluntary, it is sincerely appreciated.
Consent and participation

I certify that I have read all the information in this consent form and I hereby give consent to participate in this study

....................................................     ...............................................
Name of participant     Signature of participant

..............................................
Date
Appendix 4: Questionnaire

This is a fact-finding study project with the aim of assessing the impact of organisational learning on service excellence in the DST.

Any information provided in this questionnaire will be treated as strictly confidential.

1. SECTION 1 – DEMOGRAPHIC PROFILE

1.1 What is the Programme that you are working in? Tick or cross appropriate box

<table>
<thead>
<tr>
<th>Programme (also known as Directorate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Services and Governance</td>
</tr>
<tr>
<td>Research, Development and Innovation</td>
</tr>
<tr>
<td>International Cooperation and Resources</td>
</tr>
<tr>
<td>Human Capital Development and Knowledge Resources</td>
</tr>
<tr>
<td>Socio-economic Partnerships</td>
</tr>
</tbody>
</table>

1.2 Designation? Tick or cross appropriate box

<table>
<thead>
<tr>
<th>Assistant Director and below</th>
<th>Deputy Director</th>
<th>Director</th>
<th>Chief Director</th>
<th>Deputy Director General</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.3 How long have you been working for the DST? Tick or cross appropriate box


1.4 In which age category do you belong? Tick or cross appropriate box


SECTION 2 – CLOSED QUESTIONS

Please indicate to what extent you agree or disagree with each question by inserting a “x” in the appropriate box for each of the options below:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th></th>
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<tbody>
<tr>
<td>Disagree</td>
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<tr>
<td>Neutral</td>
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<tr>
<td>Agree</td>
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</tr>
<tr>
<td>Strongly Agree</td>
<td>SA</td>
<td>A</td>
<td>N</td>
</tr>
</tbody>
</table>

- e.g. DST is a learning organisation

| DST Strategic Planning |
|---|---|---|---|

1. The strategic objectives of the DST such as the Ten-Year Innovation Plan are clear and shared with all employees.
2. My daily operations are clearly aligned with the strategic objectives of the DST.

3. In my opinion, information in the DST flows across the Programmes.

4. I am often informed about the activities or engagements of other Programmes in relation to the work done by my Programme.

### Opportunities for learning and return on investment

5. I think the DST provides enough opportunities for employees to be trained and developed.

6. I believe DST has available skills to facilitate service excellence.

7. I believe DST has competent employees to facilitate service excellence.

8. Employees are encouraged to be creative and innovative in their work.

### Inter - intra Programme communication

9. Employees in the DST often share information on new knowledge on their work with other colleagues.

10. Employees in the DST often share their learning experiences from their work with their colleagues.

11. Differences of views in my Programme or the DST at large are publicly discussed and tested.

12. In my opinion, mistakes and failures in the DST are regarded as part of learning.

13. Learning experiences from past mistakes and failures in my Programme get incorporated into operational processes and daily routines.

### Knowledge management and learning from experiences

15. I get sufficient opportunities to make my inputs on all matters of the organisation, especially in my Programme.

16. Even if the DST realizes service excellence, it will make no difference to me.

17. Even if the DST realizes service excellence, it will make no difference to the South African citizenry.

18. The DST leadership communicates the organisation’s strategic objectives.

**DST leadership style**

19. The DST leadership involves all employees in decision-making processes.

20. The DST leadership recognizes and rewards service excellence.

21. There is participatory leadership in the DST.

22. Knowledge management is at the centre of daily operations at the DST.

**SECTION 3 – OPEN-ENDED QUESTIONS**

How would you describe the current organisational culture at the DST. In your answer please refer to:

- the extent to which employees and supervisors TRUST each other;
- the extent to which employees and supervisors are OPEN about difficulties they experience in the institution;
- your experience of the LEADERSHIP style followed by senior management; and
- the extent to which INNOVATION is supported by your immediate supervisor.
Dear Ms Patricia Tomotomo
Bursary holder
Human Resource

RE: Request to conduct a research study in DST for the purpose of completing
MPA qualification at UNISA

Receipt of your request to conduct a research study in the DST hereby refers.

The research study is about the impact of organisational learning on service excellence in the DST.

On the basis of the Department’s investment in your studies and relevance of your research study, which might be invaluable your request is therefore approved.

Please note that it is required that your finalised research report be made available to the Department.

Yours sincerely,

[Signature]
H Setumo
Deputy-Director: Talent Management

20/12/07/17
26 September 2013

REF: PAM/2013/Tomotomo

DEPARTMENT OF PUBLIC ADMINISTRATION AND MANAGEMENT

RESEARCH ETHICS COMMITTEE

This is to certify that the application for ethics compliance submitted by

Patricia Seja Tomotomo
Student Number 34408991

for the masters study

The Impact of Organisational Learning on Service Excellence
In the Department of Science and Technology

has received ethics clearance from the Research Ethics Committee of the Department of Public Administration and Management, CEMS. The committee met and deliberated on 20 September 2013 and found the application for Ethics Clearance met all prerequisites. This approval will be sent to the CEMS Research Ethics Committee for notification.

For the Committee,

Darrell Myrick

Prof. D. Myrick
Acting Chair PAM Ethics Committee
myricd@unisa.ac.za
THE IMPACT OF ORGANISATIONAL LEARNING ON SERVICE EXCELLENCE IN THE
DEPARTMENT OF SCIENCE AND TECHNOLOGY

by

Patricia Seja Tomotomo

submitted in accordance with the requirements for the degree of

MASTER OF PUBLIC ADMINISTRATION

at the

University of South Africa

Supervisor: Prof. WN Webb

Co-supervisor: Dr. M Reddy

May 2016
CHAPTER 1: GENERAL INTRODUCTION

1.1 Introduction

The purpose of the study is to evaluate the current approaches towards organisational learning in order to determine the extent to which the Department of Science and Technology (DST) follows and exhibits this culture. The study focuses on the DST’s approach towards organisational learning with attention being paid to the meaning of the concept, which is one of the prerequisites for service excellence. Practicing organisational learning as a strategic focus would ensure that the DST would learn efficiently and effectively from its own experiences, and in turn improve its quality of service, thus ensuring service excellence.

1.2 Background and Rationale

Since 1994, various policies have been promulgated to promote service delivery. These policies appear in the White Paper on the Transformation of the Public Service (1995) the Batho Pele White Paper (1997), and the White Paper on Public Service Training and Education (1998). The DST is the national department responsible for science and technology policy in South Africa. Its mission is to develop, coordinate and manage a national system of innovation that will bring about maximum human capital, sustainable economic growth and improved quality of life in the country (White Paper on Science and Technology, 1996:5).

The DST has developed strategic policy documents such as the White Paper on Science and Technology (1996), National Research and Development Strategy (NRDS) (2002), and the Ten-Year Innovation Plan (TYIP) (2008). The purpose of the TYIP is to guide South Africa’s transformation towards a knowledge-based economy in which production and dissemination of knowledge lead to economic benefits and enriches all fields of human endeavour (Department of Science and Technology, 2008:8). It can be argued that the TYIP is one of the DST’s means to respond to the demands of the changing world and environment as influenced by external factors. For example, most countries, including
South Africa, have prioritised innovation as a tool for economic growth and development. The gap between research NRDS results and commercialised products (innovation chasm) has been an ongoing issue in South Africa for decades and TYIP strategy is aimed at addressing this gap.

This study evaluates whether the current culture, including the DST systems, exhibits the values of organisational learning. The study also assists in determining whether skills learned are being transferred in the workplace, and if this results in continuous improvement and service excellence. The DST invests significantly in the training and development of its employees and in ensuring that they are continuously empowered. However, little attention is focused on the returns on this investment and how these might influence the internal processes, the systems and outputs, and the outcomes and impacts of its services. Employees tend to maintain the status quo even after returning from training interventions that are aimed at improving productivity. As such, an evaluation of the DST’s approach toward learning and development could be crucial in order for the DST to maximise its flexibility in responding to strategic objectives leading to the successful implementation of its strategies.

The extent to which the DST’s Human Resources strategy fosters knowledge-sharing, including its organisational strategic policy documents such as the NRDS and TYIP, should in turn inform and improve DST service excellence (or the lack thereof). Knowledge management and organisational learning should be seen as two parallel concepts. The implementation of the strategic policy documents is dependent upon the inherent knowledge which informs the daily behaviours and attitudes that constitute the culture of an organisation. As such, it is important for the DST to give attention to the required skills and competencies that impact on organisational learning for service excellence.

The DST is entrusted with the responsibility to formulate science and technology policies as such; it is mandated to conduct research and development as well as innovation strategies. Therefore this responsibility of being a policy department requires of the DST to adopt an
alternative approach towards learning and development which is outcome and impact based.

1.3 Motivation for the Study

The motivation for the study is to:

(i) Solve an empirical problem
(ii) Assess why the DST spent R100 million on training and development in the 2013/2014 financial year and yet service delivery has not improved
(iii) How the DST could utilise its 300 employees to the benefit of service delivery

While the DST attempts to implement its strategies successfully, alongside these strategies are the daily operations that are embedded in the systems and the behaviours and attitudes that constitute the culture of the organisation. Various authors confirm the possible impact of an institution’s culture on its performance (cf. Smit & Cronje, 1997:447; Hofstede, 2000:23). Organisational culture is defined by Deal and Kennedy (1991:38) as “the way things are done here”. One can argue that the way things are done in an organisation on a daily basis has a direct impact on its strategy implementation, whether successful or not. It can be argued that strategy implementation is dependent upon the knowledge which informs the daily behaviours and attitudes that constitute the culture of an organisation. However, with regard to the DST, it seems that the organisation overlooks its internal skills, competencies and attitudes, despite the fact that these impact on the implementation of the DST strategic initiatives. For example, most employees in the DST do not fully understand the impact of their personal development plans or their learning and development of organisational performance, or the impact that improved service delivery would have. This could signal a problem around the integration of learning and development of initiatives towards improving service delivery.

As a government department, the DST appears not to consider the investment of training its employees, and how this might influence the internal processes, systems, and
organisational culture, and the outputs, outcomes and impacts of its services. An evaluation of the DST’s approach toward learning and development could be crucial for the DST in order to maximise its flexibility in responding to strategic initiatives and thereby leading to the successful implementation of its strategies.

It can be argued that employees have the ability to learn as individuals and in groups within an organisation. However, if there is no proper mechanism in place to integrate newly acquired knowledge and organisational learning, then DST policy implementation, including service delivery, will not improve. Thus, the DST leadership should consider it a key responsibility to encourage this culture.

Leadership in an organisation has to change with the development and maturation of the organisation. Early on, in creating the organisation, the leaders themselves have to serve more as animators. In the building phase; they must be the creators of the organisation’s culture. To successfully maintain the organisation they must sustain the culture that has been put in place, and when changes in the organisation are needed they must become the agents of that change (Schein, 1985:57).

Organisational culture, systems and processes refer to the internal functioning of an organisation. According to Louw and Venter (2006:394), culture, systems and processes are pivotal in the translation of strategy into tangible outcomes and actions, since these elements describe and delineate how things are done and who does what in an organisation. Louw and Venter (2006:394) further state that through the alignment of organisational structure, culture, processes and systems, knowledge and skills-based, strategies are put into action and the expected results are thus delivered. Depending on its framework, an organisation’s structure can promote or inhibit the flow of knowledge – internal and external to the organisation – that enhances its strategic flexibility to effectively respond to strategic initiatives and change (Grant, 2008:182). To support the above notion, Siehl (1985:125) (cited in Holtzhausen 1999:76), states that culture is viewed as being of powerful relevance to the strategy implementation perspective.
Louw and Venter (2006:406), define an organisation’s structure as the formal pattern of interaction and coordination designed by management to link the tasks and patterns of individuals and groups in achievement of organisational goals. Based on this definition, Louw and Venter (2006:407) argue that an organisation’s structure provides a sense of purpose and direction by describing who does what, as well as various levels of commitment and accountability. On the other hand, Louw and Venter (2006:431), refer to an organisation’s culture as a system of norms, values and beliefs which bind its members together, unifying them in purpose. Therefore, an organisation’s culture serves to underline the drivers of the processes by laying the foundation for the type of systems adopted. Louw and Venter (2006:407) argue that when cultures manage to bind members effectively, and are sufficiently wide-spread, accepted and entrenched, they become key influences on both strategic alignment and strategic implementation.

Boojhawon (2006:59) adds another element to Louw and Venter’s above point: that culture exerts a powerful influence on behaviour, decision-making and actions, and thus strongly affects an organisation’s ability to follow its strategy. Johnson and Scholes (1997:53-56), add another dimension to the concept of organisational culture. According to Johnson and Scholes (1997:53-56), organisational culture is the deeper level of basic assumptions and beliefs that are shared by members of an organisation, which operate unconsciously and define in a basic taken-for-granted fashion the organisation’s view of itself and its environment. Appelbaum, Hebert and Leroux (1999:239) define culture as a communication process by which organisational members make sense of their organisation and their roles and duties. They relate culture to employee empowerment, arguing that the concept of empowerment pushes participative management a step further, as it requires that employees internalise their organisation’s culture and make independent decisions. Their discussion of empowerment also emphasises that empowerment is achieved by people developing their own solutions rather than having them imposed or imported from outside. Considering the views of these authors, it can therefore be argued that culture directly supports organisational learning.
1.4 Problem Statement

The discussion of the problem in context and the review thereof, have led to the problem statement which is: The culture of organisational learning in the Department of Science and Technology does not support continuous improvement in the implementation of strategic initiatives. The main research question of this study is: **How could the culture of organisational learning in the DST be improved to support the implementation of strategic objectives?**

1.5 Research Questions

Questions are clustered in the following categories in order to assess the impact of organisational learning on service excellence in the DST:

(i) What are the main factors that constitute the culture of organisational learning?
(ii) What is the current culture of organisational learning at the DST?
(iii) What are the key factors that could contribute to a culture of organisational learning at the DST?
(iv) How could these factors of organisational learning be improved at the DST?

1.6 Research Objectives

The objectives of this research are four fold:

(i) To identify and describe factors that constitute a culture of organisational learning;
(ii) To evaluate the current organisational culture at the DST;
(iii) To identify those factors that could contribute to a culture of organisational learning at the DST; and
(iv) To make recommendations as to how these key factors of organisational learning could be improved.
1.7 Importance of the Study to the DST

The study is aimed at addressing the present barriers to establishing a culture of learning at the DST. The study is necessary because the DST invests considerable financial resources to capacitate its employees. In addition, the study assists in determining whether skills learned are being transferred to the job and if this results in continuous improvement and service excellence. This study seeks to make recommendations that will contribute to performance improvement and assist the Department in service delivery improvement.

The recommendations made in this study, if adopted by the Department, may result in key strategic outcomes such as improvement in service delivery and these recommendations can be considered as improvements in other government departments.

1.8 Demarcation and Scope of Study

The study focuses on organisational learning at the DST by evaluating culture, structures, systems and processes as key drivers of organisational learning. Figueiredo (2003:607-643) states that despite the limitations on the number of analyses and empirical evidence gathered in order to explain the role of learning within organisations, the research author should synthesise several contributions from the literature. A limitation of the study was the inadequate sample size given the size of the Department including the timelines for the study and the unresponsiveness of sampled respondents. From the population sample, 65 respondents were polled and only 55 responded, representing an 85% response rate.

1.9 Research Design

This is an empirical study that determines how the culture of organisational learning in the DST supports continuous improvement in responding to strategic initiatives. Holtzhausen
(2007:20) states that deciding to follow either a quantitative or qualitative approach during research design, determines which research methods are to be chosen. Webb (2010:160) adds that when a researcher aims to answer a specific research question, a decision has to be made as to which methods should be used, while considering the limitations of each of the methods. When selecting a particular paradigm, researchers are influenced by various variables (Mouton in Webb 2010:160).

This study follows a mixed method approach. A quantitative survey quantifies attitudes, opinions, behaviours, and other defined variables and generalises the results (Coldwell & Herbst 2004:16).

1.10 Data Collection Methods

A survey questionnaire with items relating to the culture of organisational learning at the DST was used. According to Coldwell and Herbst (2004:48), surveys and questionnaires allow researchers to gather information from people effectively and efficiently. Webb (2010:152) further states that the survey method is used within the quantitative methodological paradigm and requires the researcher to undertake various sequential steps. This requires a conceptualisation process which includes the design of the questionnaire, identification of indicators, formulation of questionnaire items, and pre-testing the questionnaire. For this study, the author randomly surveyed 55 respondents across all Programmes and employment levels. The findings of the literature review were also used in adopting the survey items.

1.11 Overview of Chapters

Chapter 1 is the introductory chapter. It explains and describes the background and rationale of the study; the motivation for the study; the problem statement and main research question, the subsidiary research questions and objectives of the study; the
importance of the study to the DST; and its demarcation and scope, research design and data collection methods.

In Chapter 2 the literature on organisational learning is reviewed. The chapter takes further themes that emanated from Chapter 1 by reviewing the available literature. The author looks into approaches towards organisational learning through the description of learning within organisations, analysis of a learning organisation, levels of learning, individual and organisational learning as well as attributes of a learning organisation: vision and mission support; empowerment by leaders; culture of experimentation; knowledge transfer; teamwork; systems including leadership. Seminal authors on organisational learning: Argyris, C and Senge, P, will be referenced including all other authors on the topic of organisational learning.

Chapter 3 explains the research design considered appropriate to conduct this study. It explains the research methodology, data collection method and data sources, population sample and sampling methods, data analysis and interpretation, validity and reliability, including ethical considerations. The chapter applies the theory of literature review to relevant research aspects required to ensure that the objectives of this research are achieved with valid and reliable information.

In Chapter 4, the findings of the study are presented. The responses to the questionnaire items were solicited on a 5-point Likert scale. Cronbach’s alpha value was used to test the reliability of items. To determine the variance between and within groups, the items were also subjected to Chi-square tests. The correlation between factors was determined with the Pearson's Correlation Coefficient.

In Chapter 5, the author makes various recommendations to improve the culture of organisational learning in the DST in order to ensure that the Department supports continuous improvement in the implementation of its strategic initiatives.
1.12 Summary

In this chapter, the background and rationale of the study has provided the context in which the topic is relevant for the DST. The research questions have unraveled the research objectives relevant to this study. A business case for this research has been made that organisational learning is a key driver towards service excellence. In Chapter 2, focus will be on the broader issues of the factors that evolved in the problem review.
CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Various scholars and researchers such as Coldwell and Herbst, and Randolph have written about the topic of organisational learning. In this chapter, the author reflects on these views and insights, and examines the approach toward organisational learning through culture, structure, systems and processes. Coldwell and Herbst (2004) define a literature review as an account of what has been published on a topic by accredited scholars and researchers (Coldwell & Herbst, 2004:10). According to Randolph (2007:2), conducting a literature review is a means of demonstrating an author’s knowledge about a particular field of study, including vocabulary, theories, key variables and phenomena, and its methods and history. Randolph further indicates that conducting a literature review also informs the researcher of the influential researchers and research groups in the field.

The purpose of this literature review is to determine what others have written about organisational learning, its knowledge management and leadership and its culture, structure, systems and processes. In this chapter, factors that contribute towards organisational learning are discussed.

2.2 Description of Learning within Organisations

The concept of organisational learning has evolved, but so too has the research focus. Research based on the traditional paradigm considered that learning was a process mainly focused on the acquisition, the distribution and the storing of knowledge in the memory of the learner. The research currently being conducted within the new, recently developed paradigm, focuses on the ways that organisations process information and generate knowledge (Antal, 2003:375-378).
According to Voulalas and Sharpe (2005:196), a learning organisation is one which, as a corporate entity, constantly learns from its past and present experiences and its contemplation of the future, and consciously uses these learnings to continuously change and adapt in such a way as to maximise its outcomes in terms of its purpose in its constantly changing environment.

Goh (2003:5) on the other hand indicates that organisational learning is about the ability of an organisation to apply the accurate and appropriate management practices, its structures as well as the procedures which enhance, facilitate and encourage learning.

### 2.2.1 The Learning Organisation

A learning organisation is described as continuous processes of change adaptation, development and learning (Swieringa & Wierdsma, 1992:71-72). According to Karkoulian, Messarra and McCarthy, et al. (2008:5), although researchers tend to use the key terms ‘organisational learning’ and ‘learning organisation’ interchangeably, a clear difference exists. Organisational learning is simply a process, while a learning organisation signifies an outcome. A learning organisation is the ultimate goal that an organisation strives to achieve, whereas organisational learning is the means through which a learning organisation is attained; a learning organisation is the normative facet of organisational learning.

The deficiencies in research in the domains of knowledge management, organisational learning and organisational memory remain because of the lack of a common language, and the absence of a unifying paradigm that gathers factors influencing work and knowledge. As a result, there is a necessity for the development of a common vocabulary in this research field (Croasdell, et al. 2003:49-68).
Organisational learning is a process that promotes trust, dialogue and networking among staff that can foster the formation of social capital and thereby contribute to more dynamic communication, knowledge-sharing and management (Argyris, 2001:23).

Stapleton (2006:26) refers to learning organisations as those organisations that are able to respond promptly and consistently to opportunities and threats. In Stapleton’s view, organisational learning as opposed to individual learning involves pooling of information about emerging problems and formulation of new knowledge and beliefs.

For Senge, real learning gets to the heart of what it is to be human. In Senge’s view, we become able to recreate ourselves. This applies to both individuals and organisations. Thus, for a learning organisation it is not enough to survive. Survival learning, or what is more often termed adaptive learning is important, indeed it is necessary. However, for a learning organisation, adaptive learning must be joined by generative learning; learning that enhances our capacity to create (Senge, 1990:14).

Argyris and Schön (in Mkhize, 2011:31) discussed two levels of organisational learning: single-loop and double-loop learning. They defined single-loop learning as responding to changes in the environment without changing the core set of organisational norms, and double-loop learning as responding to changes in the environment by changing the core set of organisational norms and assumptions. In other words, single-loop learning is learning within a given framework and double-loop learning is learning by changing the framework. For the DST, being a national department entrusted with the responsibility to formulate science and technology policies, double-loop learning is required.

Other researchers have discussed a third-order of learning. According to Berman (1981:136), second-order learning is learning about the context one learns within and third-order learning is learning of the contexts of those contexts. For example, in third-order learning, learners question the validity of activities, relationships and meanings posed by context and interactions. Berman (1981:346) also claims that third-order learning is an
experience in which a person suddenly realises the arbitrary nature of his or her own paradigm. They view third-order learning as moving toward a holistic worldview of ultimate truth. On the other hand, McWhinney (1992:8) views third-order learning differently, claiming that third-order learning occurs when one uses multiple realities to reframe one's own and others' experience in alternative frameworks. McWhinney argues that the multiple realities, or the metapraxis, will enrich understanding of a situation far more than when only using a single framework of reality.

There may even be a higher order of learning. Ralph (2000:26) suggested a fourth-order of learning that involves evolutionary change in society. Harman (1988:592-618) argues that societies undergo a radical change in their fundamental belief structure, which he terms a global mind change. Harman believes that society shifts from a positivist metaphysical framework where it learns about reality from studying the measurable world, to a more intuitive metaphysical framework focusing primarily on consciousness and spirituality.

2.2.2 Levels of Learning

The different organisational levels at which organisational learning occurs also introduce some dynamism to the concept. Garvin (1998:47-80) proposes three levels in the development of organisational learning. The first phase corresponds to the cognitive level where organisational members are exposed to new ideas. As a consequence, they expand their knowledge and start thinking in a different way. The second phase is behavioural. Employees start to internalise new perspectives and as a consequence, they alter their behaviours. The third and last phase is when performance improvement occurs. This happens when the change in behaviour leads to measurable improvements in results (superior quality, better delivery, market share value increase, or other tangible profits). The number of analyses and empirical evidence gathered in order to explain the role of learning processes within organisations is limited. Despite this limitation, the researcher synthesised several contributions from the literature into a typology considering four processes. Two processes with a focus on knowledge acquisition mechanisms, and two processes with a focus on knowledge conversion mechanisms (Figueiredo, 2003:607-643).
Regarding the knowledge acquisition mechanisms, the researcher established two organisational learning processes: external knowledge acquisition and internal knowledge acquisition. The first represents the processes through which individuals acquire tacit or codified knowledge from outside the organisation, such as in overseas training programmes. The second represents the processes through which individuals acquire tacit or codified knowledge by performing different tasks within the organisation, such as product development.

With regard to knowledge conversion mechanisms, the author established two organisational learning processes: knowledge socialisation and knowledge coding. The first represents the processes through which individuals share their tacit knowledge – mental models, technical aptitudes – in meetings and shared problem-solving. The second represents the processes through which individual tacit knowledge (or part of it) becomes explicit, articulated in concept, and available to all in organised and accessible support, and is easily understood, such as in systematic documentation and internal seminars. This implies that organisational learning also occurs through different levels or dimensions of an organisation. The dynamics are created through the tension between the organisational assimilation of new knowledge developed at individual level (feed-forward), and the use and individual exploration of organisational pre-existing knowledge, (feed-back). This tension occurs due to organisational learning not only being the innovative process associated with feed-forward, but also due to the feedback process, which generates ways to explore what has already been learnt (Crossan, Lane & White, 1999:529).

Pawlowsky (2003:62-88), describes the process phases of organisational learning in terms of four steps, which continuously repeat themselves and are not necessarily sequential:

(i) The identification of information that seems relevant to learning and to the creation (generation) of new knowledge, or both;

(ii) The exchange and diffusion of knowledge, either from the individual to the collective level or at the collective level itself;

(iii) The integration of knowledge into existing knowledge systems at a collective level, an individual level, or both, or into the procedural rules of an organisation, whereby either integration or modification of the adopted system can take place; and
(iv) The transformation of the new knowledge into action, and the reapplication of the knowledge into organisational routines, so that it has an effect on organisational behaviour.

Organisational learning has been defined as the knowledge acquisition made by actors (individuals and groups) when it can and is available to be applied in the decision-making process, or by using it to influence others within the organisation (Miller, 1996:485-505).

Senge (1990:14-356) describes five disciplines for a learning organisation:

1. Personal mastery, which refers to the desire to achieve lifelong learning. In other words, there should be a desire for lifelong learning within the organisation both at individual and organisational level.
2. The creative use of mental models, meaning surfacing challenges and assumptions about the organisation.
3. Leadership is responsible for building a shared vision.
4. Team learning, which implies learning to think, learn and work together.
5. Systems thinking, this involves breadth of view, intellectual flexibility and the ability to recognise trends and patterns in complex circumstances.

Senge adds that because these five disciplines are interconnected in nature, there is no correct formula on which one to start with. As such, these disciplines can be embedded as organisational attributes.

Drejer (2000:16) argues that being a learning organisation requires an understanding of the strategic internal drivers needed to build a learning capability. He suggests that learning organisations have and should have the following core strategic blocks:

1. Mission and vision-clarity and employee support of the mission.
2. Strategy and espoused values of the organisation with leadership that is perceived as empowering employees.
3. Encouraging an experimental culture and showing strong commitment to the organisation.
4. Supporting a strong culture of experimentation which is rewarded and supported at all levels in the organisation.
5. Transfer of knowledge, which is the ability of an organisation to transfer knowledge within and from outside the organisation and to learn from failures.
6. Teamwork, cooperation and group problem-solving as the mode of operation and for developing innovative ideas.

Pearn, *et al.* (1995:19), describe characteristics of a learning organisation based on the Garratt (1990:77) theory of learning organisations. These characteristics are that learning organisations encourage people at all levels of the organisation to learn regularly and rigorously from their work; learning organisations have systems for capturing learning and moving them to where they are needed; they value learning and are able to continuously transform themselves. In Figure 2.1 two models of organisational learning are described; one that inhibits learning, the other that promotes learning.

<table>
<thead>
<tr>
<th>ARGYRIS AND SCHÖN ON ORGANISATIONAL LEARNING</th>
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<tbody>
<tr>
<td>Model 1</td>
</tr>
<tr>
<td>(inhibit Learning)</td>
</tr>
<tr>
<td>keep your views of sensitive issues and enforce the taboo against their public discussion</td>
</tr>
<tr>
<td>do not surface or test differences in views of organisational problems</td>
</tr>
<tr>
<td>avoid seeing the whole picture; allow information about the problem to remain scattered, vague and ambiguous</td>
</tr>
<tr>
<td>protect yourself unilaterally – by avoiding both direct interpersonal confrontation and public discussion of sensitive issues that might expose you to blame</td>
</tr>
<tr>
<td>protect others unilaterally – by avoiding the testing of assumptions where that testing might evoke negative feelings, and by keeping others from exposure</td>
</tr>
<tr>
<td>control the task and situation unilaterally – by making up your own mind about the problem and acting on your view</td>
</tr>
</tbody>
</table>

**Figure 2.1: Argyris and Schön on organisational learning**

Source: Stapleton 2006:26

The theoretical considerations in this framework are that organisations usually have two types of behaviours that inhibit and promote organisational learning.
Senge (1990:69) states that the dimension that distinguishes learning from more traditional organisations is the mastery of certain basic disciplines. The five disciplines that Senge identifies are said to be converging on innovate learning organisations. He adds to this recognition that people are agents, able to act upon the structures and systems of which they are a part. All the disciplines are, in this way, concerned with a mind-shift from seeing parts to seeing wholes; from seeing people as helpless reactors to seeing them as active participants in shaping their reality; from reacting to the present and to creating the future.

Argyris and Schön (1996:16) state that organisational learning occurs when individuals within an organisation experience a problematic situation and inquire into it on the organisation’s behalf. De Geus (1998:71) states that the ability of a workforce in an organisation to learn faster than those in other organisations constitutes the only sustainable competitive advantage at the disposal of a learning organisation. According to Scarborough, Swan and Preston (1998:219), a learning organisation should primarily focus on valuing, managing and enhancing the individual development of its employees.

### 2.2.3 Individual and Organisational Learning

Stata (1989:63-74) describes several aspects of how organisational learning differs from individual learning. First, organisational learning occurs through shared insights, knowledge, and mental models. Thus, organisations can learn only as fast as the slowest link learns. Change is blocked unless all of the major decision-makers learn together, have shared beliefs and goals, and are committed to take the action to change. Second, learning builds on past knowledge and experience, that is, on memory. Organisational memory depends on the institutional mechanisms (eg policies, strategies, and explicit models) used to retain knowledge. Of course, organisations also depend on the memory of individuals, but relying exclusively on individuals’ memories risks losing hard-won lessons and experiences as people migrate from one job to another.
Senge (1990:340) emphasises that within a learning organisation, its leaders are designers, stewards, and teachers. They are responsible for building organisations where people continually expand their capabilities to understand complexity, clarify their vision, and improve shared mental models: they are responsible for their own learning. Learning organisations will remain simply a good idea until people take a stand for building such organisations. Taking this stand is the first leadership act, the start of inspiring the vision of the learning organisation. Senge argues that learning organisations require a new view of leadership. He sees the traditional view of leaders as special people who set direction, make key decisions and energise the troops; as deriving from a deeply individualistic and non-systemic worldview.

Organisations learn only through individuals who learn. Individual learning does not guarantee organisational learning, but without it no organisational learning occurs (Senge, 1990:139). Senge starts from the position that if any one idea about leadership has inspired organisations for thousands of years, “it’s the capacity to hold a shared picture of the future we seek to create” (Senge, 1990:9). Such a vision has the power to be uplifting and to encourage experimentation and innovation. Crucially, he argues, it can also foster a sense of the long-term.

Probst and Büchel (1996:24) identify the following characteristics in the process of organisational learning:

(i) Change in organisational knowledge;
(ii) Increase in the range of possible actions; and
(iii) Change in inter-subjective constructions of reality.

Several writers draw distinctions between different levels of learning. Senge (1990:57) differentiates between adaptive and generative learning; Argyris and Schön (in Mkhize, 2011:32) present the division between single-loop learning, double-loop learning and deutero-learning; and Fiol and Lyles (1985:807) identify lower-level and higher-level learning. Argyris and Schön indicate that deutero-learning can occur by going meta on single or double-loop learning. They further emphasise that the distinction is important
because the knowledge and skills required to produce double-loop learning are significantly greater and more complicated than those required for deutero-learning on single-loop issues. On the other hand, Thomsen and Hoest (2001:474), regard deutero-learning as an extension beyond double-loop learning that resembles the first conceptualisation of triple-loop learning. Fiol and Lyles (1985:807) argue that the higher the organisational learning level, the better its quality. Their hierarchy of lower-level and higher-level is that lower-level includes remembering and understanding, and higher-level encompasses such factors as applying, analysing, evaluating, and creating, while including factors in the lower-level.

To become a learning organisation, organisations need to be skilled in the following five activities:

(i) Systematic problem-solving that relies on scientific methods rather than guesswork;
(ii) Experimentation with new approaches;
(iii) Learning from experience and past history;
(iv) Learning from the best practices of others; and
(v) Transferring knowledge quickly and efficiently through the organisation to minimise the risk of losing all the newly learnt and acquired knowledge (Garvin, 1993:47-80).

According to Cook and Yanow (1995:430-459), learning is related to knowledge as it is the act of acquiring knowledge. Cook and Yanow further indicate that learning is the process of expanding and improving knowledge.

The promotion of organisational learning in the public service encourages public servants to learn more efficiently and effectively from their own experiences in order to improve the quality of public management. It is therefore important to put in place an enabling environment that provides the right incentives for staff to do so (World Public Sector Report, 2005:102).
2.2.4 Attributes of a Learning Organisation

In the following section, the attributes of the learning organisation will be discussed: vision and mission support, empowerment by leaders, culture of experimentation, knowledge transfer, teamwork as well as systems.

2.2.4.1 Vision and Mission Support

Vision is considered the starting point of transformation processes and a crucial basis for action for leaders of learning organisations. Organisational learning, which is an ongoing expansion of the organisation's ability to influence its future, may assist in the vision implementation process (Senge, 1990:3-4).

In the traditional worldview, leaders cause change by affecting the behaviour of others. This can happen in a number of different ways. Some leaders use power and authority. Others use influence and persuasion. Still others lead by example (Bernhard, 1999:59-65). Leadership means the ability to facilitate the development of a common vision that expresses the aspirations of both staff and key stakeholders, with regard to where they want the organisation to be in the future (Avolio & Yammarino, 1990:193-208).

According to Lane and Wenger (1990:54), leadership style is a key factor in developing a learning culture. A democratic leader can better manage the learning process by sharing his vision with the team members; however, an autocratic leader may impede the learning activity by imposing his authority and ignoring the valuable suggestions offered by the team members.

Fiol and Lyles (1985:804-805) indicate that the organisation's strategic posture partially determines its learning capacity. Thus strategy influences learning by providing a boundary to decision-making and a context for the perception and interpretation of the environment. Similarly, the strategic options that are perceived are a function of the learning capacity within the organisation.
2.2.4.2 Empowerment by Leaders

The learning organisation approach must first go through a phase of preparing top and middle management in the basic disciplines of systems thinking, shared mental models, personal mastery, shared vision, and team learning. Building a foundation for these important skills is a slow and demanding process. In this first phase, the initial rate of improvement is modest at best (Dervitsiotis, 1998:14). In the second phase, there is a moderate rate of improvement as most people learn to practice the art of these disciplines with greater skill, creativity and effectiveness, thus crafting a shared vision of the organisation. It is in the third phase of learning that the rate of embracing learning begins to accelerate, with more and more people pursuing a shared vision and operating at their fullest potential. Here, a maximum strategic alignment of all parts of the organisation is observed (Dervitsiotis, 1998:16).

Malhotra (2001:32) and Stacey (1995:16) take a slightly different view on the role of management in relation to learning. They both argue that the most important learning processes within an organisation are precisely those that cannot be managed. They draw on chaos theory to describe “semi-confusing information systems” (Malhotra, 2001:32) and “nonlinear feedback networks” (Stacey, 1995:16). Innovation often takes place in informal ‘shadow’ networks of individuals interested in the same issues. In order to support and strengthen this creativity, Malhotra and Stacey argue that organisations should allow their staff the room to act on incomplete information, trust their own judgement, and to feed input from informal fora into formal structures.

Organisations also need to provide learning for employees that will produce signs and routes that can be taken to achieve transformation, and is linked to a vision of "what could be". However, unless the vision is shared, and employees have a stake in it, the chances are that this will not be achieved (Jones & Hendry, 1992:27). Figure 2.2 shows a model of organisational learning adopted from Pearn, Roderick and Mulrooney (1995:68).
Figure 2.2: A model of organisational learning adopted from Pearn, Roderick and Mulrooney, (1995:68)
Source: Pearn, Roderick and Mulrooney, 1995:68

The theoretical consideration inherent in this model is that the type of management style or practice, and control systems in an organisation can either block or facilitate organisational learning. Pearn, et al., (1995:69) argue that organisational learning can be achieved by moving away from a command-and-control style of management to increased involvement and empowerment of everyone in the organisation.

Adding to the issue of strategic thinking, Segal-Horn (2007:228) argues that leaders should understand the distinction between operational thinking and strategic thinking. According to Porter’s view (Porter, 1996:24) operational thinking relates to value-creation activities that characterise the internal functioning of an organisation, such as procedures to control quality, systems for managing recruitment, or performance-related rewards. Effective
management of these activities enhances an organisation’s ability to manage itself effectively. In contrast, he argues that strategic thinking is concerned with how all these activities connect and relate to each other in achieving the strategic objectives and goals of the organisation; that is, successful and sustainable value-creation. He states that operational effectiveness is essential to strategy implementation but should not substitute strategic thinking and strategic decision-making. In his view, the strategy is essential to guide and shape the operational activities in order to achieve superior performance.

Berson, Nemanich, Waldman, Galvin and Keller (2006:577-594) look at leadership from the perspective of organisational learning in crucial contrast to strategy implementation. They define leadership as a process of influencing and teaching others to understand why and how certain activities and goals need to be accomplished. As such, it constitutes a process of facilitating individual and collective efforts to learn and accomplish shared goals in an organisation. Berson et al argue that leaders should play a central role in the organisational learning process in multiple ways. First, by providing contextual support in the organisation, leaders obtain the needed resources for learning to occur through exploitation and exploration. Second, leaders are critical to the integration of learning across groups and organisational levels. Leaders enable and enhance this integration by providing a foundation of shared understanding of needs and purpose at different levels of the organisation. Third, leaders are important in institutionalising learning by integrating new and existing knowledge into the organisation’s policies and practices.

2.2.4.3 Culture of Experimentation

Experimentation is defined as the degree to which new ideas and suggestions are attended to and dealt with sympathetically. Experimentation is the most heavily supported dimension in the literature of organisational learning (Goh, 2003:24). Nevis et al. (1995:10) consider that experimentation involves trying out new ideas, being curious about how things work, or carrying out changes in work processes. Nevis continues to state that experimentation includes the search for innovative solutions to problems, based on the possible use of distinct methods and procedures.
According to Hofstede (2000:42) organisational culture needs to be on the minds of all the members of the organisation. As such, organisational culture can be seen as a set of underlying values and can influence the behaviour of all the members of an organisation and will socialise employees.

On the same note, Senge (1990:14-356) argues that the leaders’ work is to build a learning organisation. Leadership in a learning organisation begins with the principle of creative tension, Mintzberg (1999:332-358). According to Senge (1990:14-356), creative tension comes from seeing clearly where the organisation wants to be, its vision, and being truthful about where the organisation is; in other words, its current reality. This creative tension can be resolved by raising the current reality toward the vision or by lowering the vision to the current reality. Senge argues that individuals, groups and organisations who learn to work with creative tension also learn how to use the energy it generates to move reality more reliably toward their visions. Furthermore, Senge argues that leading through creative tension is different from solving problems. In problem-solving, the energy for change comes from attempting to move away from the current reality that is undesirable, whereas with creative tension, the energy for change comes from the vision, from what is to be created, juxtaposed with the current reality. Senge (1990:230) describes three roles of a leader in a learning organisation: leader as a designer of the organisation, which involves strategies, structures and systems; leader as a teacher, which refers to the leader helping everyone in the organisation to gain more insightful views on the current reality; and lastly, leader as a steward for the people, and for the organisation’s purpose and mission.

Thornhill and Van Dijk et al. (2003:341) state that establishing a learning organisation depends on creating a learning culture. A learning culture does not mean sending employees on as many training courses as possible without evaluating the outcomes of these courses, but rather identifying on a continuous basis those training courses that would satisfy both individual and organisational development needs. A learning culture should support learning and be based on ensuring the free exchange and flow of information in order to put expertise where it is most needed and encourage individuals to
network extensively across organisational boundaries, thus developing their own knowledge and expertise as well as supporting the commitment to learning and personal development, where learning is rewarded and encouraged. The learning culture should be characterised by creativity, diversity and a climate of openness and trust. It supposes that learning from mistakes can often be more rewarding and instructional than learning from success.

Thornhill and Van Dijk et al. (2003:349) argue that the tendency to focus too much on systems and processes to the exclusion of other factors inhibits the management of a learning organisation (Farago & Skyrme 1995:3-4). The challenge is evident when an organisational structure is too hierarchical and the free flow of information is not promoted. Employees hold on to their positions and status, because they do not understand the larger role that they play within the overall organisation. Their territory has to be protected, and innovation or development might just harm their status quo.

2.2.4.4 Knowledge Transfer

Awad and Ghaziri (2010:347) state that knowledge networks view the organisation as a body of knowledge that is at the core of a learning organisation. They point to the fabric of relationships that can make or break knowledge-sharing and knowledge-transfer.

Huizing and Bouman (2002:185-204) give a definition of knowledge management that is a good example of the work being done to involve organisational learning with strategic concepts. According to these authors, knowledge management is the organisational discipline that bridges information demand and supply, and creates support for organisational learning. This relationship has been empirically developed and presented in the literature (Crossan, et al. 1999:522-537; Bontis, 2002:437-469), creating a parallelism between knowledge management strategies and organisational learning flows.

Organisational learning is a social phenomenon. Each individual’s learning depends upon the knowledge that other members of the organisation possess (Figueiredo, 2003:607-643). This social interaction facilitates not only the communication and coordination
between individuals, but also learning. The meaning and understanding of organisational learning is defined according to its context. Learning through identification with the organisation is more powerful than trying to teach individuals by using incentives. Learning is located at an entity level and that is why learning and knowledge management are part of institutional memory (Kogut & Zander, 1996:383-397).

2.2.4.5 Organisational Knowledge

Organisational learning is essentially linked to knowledge creation and thus there is a need to ensure knowledge management in an organisation. Wang and Ahmed (2001:12) indicate that organisational knowledge is stored partly within individuals in the form of experience, skills and personal capability. Therefore, to create a learning environment between individuals and the organisation to facilitate interaction and strengthening of each other’s knowledge base, has become the main risk for management.

According to Probst and Büchel (1996:23), organisational learning is the process perspective of developing organisational knowledge. The organisational knowledge base consists of both individual and collective knowledge, which the organisation can use to perform its tasks. This knowledge base undergoes regular change. While organisational learning primarily focuses on the processes of changing the organisational knowledge base, it does not provide an explicit indication of which elements need to be influenced to bring about learning. Knowledge management, by contrast, provides an explicit framework for intervening in the knowledge base in order for learning to take place.

Levitt and March (1988:319-340) are less positive about the capacity of organisations to manage knowledge effectively and to learn from past experiences. Their oft-quoted 1988 article, and a later article by March (1991:71-87), highlight instead the considerable limitations that impede organisational learning. These include the complexity of organisational experiences, human habits, hierarchical structures, routines, and differing interpretations by different sub-groups within an organisation. Schein (1985:34) touches on many of the same issues as those of Levitt and March, but in a more optimistic manner. He argues that the limitations to learning within an organisation can be overcome through good leadership. By good leadership he means the ability of the leader to guide the organisation
through various stages of a change process, to contain anxiety, and to influence the organisational culture in a positive way throughout this process.

2.2.4.6 Systems

According to Wang and Ahmed (2001:11), the system view of organisational learning has been taken mainly from the information processing perspective. There are two streams within the system view: organisations as a closed system or an open system. Wang and Ahmed indicate that under the view of a closed system, organisational learning is restricted within an organisation itself. The viewpoint of organisations as an open system takes into account the situational factors and includes inter-organisational learning as an important part of the whole organisational learning system.

In order to leverage knowledge-based resources throughout an organisation, the organisation should promote organisational learning (Tetrick & Da Silva, 2003:333-359). Knowledge diffusion and leveraging inside the organisation creates efficiency in addition to knowledge-transfer (Hitt, 2001:13-28). Through the use of dynamic competencies, the organisation integrates, builds and reconfigures its internal and external capabilities to face fast-changing environments (Teece, 1997:509-534). Organisational competence emerges through time, as a process of organisational learning (Levitt & March, 1988:319-340).

Learning organisations are skilled at creating, acquiring, and transferring of knowledge, and then being able to modify behaviours to reflect this new knowledge and insight. This implies a new way of thinking about how people work together, and shows the need for a greater emphasis on reviewing past practice and experience (Garvin, 1993:47-80). Leadership is a key attribute in promoting a learning organisation. In the following section, the literature on leadership is reviewed.

2.2.5 Leadership in a Learning Organisation
Amos (2006:355) indicates that strategic leadership is about leading the entire organisation, understanding the entire organisation and the environment in which it operates, and using that understanding to create strategic change through other people to position the organisation in its environment for both short-term and long-term stability. He argues that successful strategy implementation is dependent on strategic leadership as a key driver of implementation. He describes two main aspects of effective strategic leadership. The first aspect includes strategic thinking, emotional intelligence and behavioural complexity, and transformational leadership. The second aspect includes the tasks and roles of effective strategic leadership in which the leader is responsible for setting organisational direction, creating organisational alignment and a supportive culture.

On the other hand, Hallinger (2003:330) indicates that the transformational leadership style has been recognised as one of the main conditions, affecting and enhancing successful organisational learning processes. It broadens and elevates the interests and aspirations of employees and is associated with more intensive organisational learning activity with stronger learning facilitative culture than transactional leadership.

2.3 Summary

From the literature mentioned above, it is evident that organisational learning could play a significant role in service excellence, and that organisational learning promotes organisational outcomes. It is worth noting that organisations could improve service delivery by attending to the culture of the institution in the context of this study, thus establishing a learning organisation.

Organisational culture is a significant concept in the literature on organisational learning. Culture can be considered as a basic cornerstone of an integrative and conceptual framework for organisational learning theory, and the basic architecture for knowledge management in promoting organisational learning. In Chapter 3, the author explains the research design considered appropriate to carry out this study. The author applies the theory on organisational learning to the relevant research design aspects required to ensure that the objectives of this research are achieved with valid and reliable information.
CHAPTER 3: RESEARCH DESIGN AND DATA COLLECTION METHOD

3.1 Introduction

In this chapter the author describes the research design that underpins this study. The data collection method followed in conducting this research is also described in detail. The main elements included in this chapter are the research design; research methodology and methods; population sample and sampling technique; data collection method and data types; data analysis and interpretation; validity of the study and ethical considerations. The chapter applies the theory to the relevant aspects required to ensure that the objectives of this study are achieved with valid and reliable information.

3.2 Research Design

Research design is defined by Polonsky and Waller (2011:94) as a framework or blue-print for collecting the information needed for a study in the best possible way. They argue that the correct design will save resources and that it is essential in allowing the researcher to achieve reliable and valid research results.

White (2000:25) defines a research design as a general term that covers a number of separate, but related issues associated with research. He states that research design includes the aims or objectives of the research, the final selection of appropriate methodology, data collection techniques and chosen methods for data analysis and interpretation.

Wessels (1999:361-415) argues that arriving at the most valid findings possible to contribute to scientific knowledge should be the overriding criterion when researchers decide on the most appropriate methodological paradigms, or as he calls them, macro research methods. He further argues that researchers should clearly motivate their choice of methodological paradigm, which – at the level of meta-theory and social inquiry – is differentiated between the positivistic and the interpretivist epistemological approaches to the research object. These two broad categories reflect the basic assumptions upon which
the qualitative and quantitative methodological paradigms are based. Mouton (1996:28) elaborates on the goal of research by stating that the predominant purpose of all research is to arrive at results that are as close to the truth as possible; that is, the most valid findings possible.

According to Rumsey-Johnson (2010:32), designing quantitative research entails a more rigid and demarcated procedure, while designing qualitative research requires a flexible cyclic and ongoing process involving moving back and forth between the different components of the design; assessing the implications of the goals set, and of the theories and research approach chosen; of the research questions, the methods, and the quality implications of the research.

It could be deduced from the main research question - *How could the culture of organisational learning in the DST be improved to support the implementation of strategic objectives?* - that this is an empirical study. It attempts to solve a real problem; that is, to determine how a culture of organisational learning in the DST could support knowledge management and continuous improvement in responding to strategic initiatives. As such, this study adopted a formalised communicative form of design by way of survey questionnaires. Coldwell and Herbst (2004:36-37) describe such designs as once-off study, while longitudinal study is repeated over a period of time, tracking changes in variables.

More details on the research design, its concepts and practices considered in this study are discussed in the following sections.

### 3.3 Research Methodology

Research methods refer to the general techniques employed to examine the problem statement (Hofstee, 2004:13). Hofstee further indicates that research methods describe how one applies research design to investigating the problem. On the other hand, White (2000:20) states that research methodology is the approach that a researcher uses to investigate a subject. It refers to the philosophical bases on which research is founded. For example, a scientist designs and carries out experiments, while a sociologist would
consider the two very broad theoretical approaches in sociological research – positivism and interpretivism. A positivist approach advocates the application of scientific methods to sociological research – similar to the natural sciences, while an interpretivist approach stresses the difference in studying human beings and the need to develop more applicable research strategies.

It is quite clear that there are two types of methodological paradigms; qualitative and quantitative (cf. section 3.2). These methodological paradigms are at a high level of complexity as they represent not merely collections of research methods and techniques, but also include assumptions and values regarding their use under specific circumstances. Webb (2010:181) indicates that qualitative methodologies are particularly relevant in explorative studies. The qualitative researcher studies human action in its natural setting through the eyes of the actor who is the subject of the study. In contrast to the quantitative researcher, who uses somewhat artificial settings of experiments and surveys, the qualitative researcher describes the phenomenon in detail and tries to understand human behaviour within the appropriate context.

Following the discussion in this section, and since this study required information on the opinions, behaviour and views of the DST employees, the research methodology adopted is that of quantitative research in order to obtain substantial evidence. Methods of data collection within the qualitative research design were also used.

3.4 Data Collection Method and Data Sources

There are various methods of collecting data that can be used such as questionnaires, interviews, documentation reviews, observation, focus groups and case studies (Coldwell & Herbst, 2004:54). Polonsky and Waller (2011:96) indicate that data collection is an integral part of the research process and to the success of the research project, and that all research and planning effort is of little use if data is gathered incorrectly or respondents fail to cooperate. Webb and Auriacombe (2006:588-602) indicate that data collection methods in the qualitative methodological paradigm enable the researcher to gain inside knowledge.
of the study objective. With the quantitative methodological paradigm, the researcher aims to analyse organisational learning factors and the relationship between them in isolation of the context or setting, with the ultimate aim to arrive at general statements. Whereas the qualitative researcher wants to observe the natural settings of the research object, the quantitative researcher emphasises control, and makes use of artificial settings such as experiments and surveys. Among the data collection methods, the researcher would find personal observation in the natural field setting; personal and group face-to-face interviewing, and documentary sources; whereas experiments and surveys in the form of questionnaires belong to the quantitative methodological paradigm, (Webb 2010:159-160).

There are two types of sources: primary and secondary sources, from which data can be collected (Polonsky & Waller, 2011:97). According to Sekaran (2003:219), primary data refers to information obtained first-hand by the researcher on the variables of interest for the specific purpose of the study, while secondary data refers to the existing information such as information obtained from reports of the organisation. Polonsky and Waller (2011:95) further indicate that primary data can be qualitative or quantitative. They report that qualitative data collection techniques include in-depth interviews, focus groups, projective techniques and observational methods. They argue that qualitative techniques effectively allow the researcher significant insight into the feelings of individuals who are in the sample population.

Wessels and Pauw (1999:374-375) refer to units of observation as sources of data, and categorises them as follows: human behaviour, orientation, and characteristics, and products of human behaviour and characteristics. Webb (2010:157) describes units of observation as a variable to the material or data sources utilised by the particular researcher, and that they are to be distinguished from the unit of analysis, namely the ‘what’ of a study. Units of observation related to this study included documentary evidence such as the Auditor-General’s reports over a three-year period linked to the Medium Term Expenditure Framework, the Annual Report and Performance Management reports.

For this study, focus was on primary data gathering in order to get first-hand information on the behaviours, feelings and experiences of the DST employees. According to White (2000:49), a survey is a way of describing and explaining some aspect of the population
and surveys are carried out by way of interviews, questionnaires or both. White indicates that interviews are used when taking a qualitative approach; however, it is possible to numerically code the findings from interviews so they can be used in quantitative methods. Coldwell and Herbst (2004:48) state that surveys and questionnaires allow researchers to gather information from people quickly and easily in a non-threatening way.

It was for this reason that survey questionnaires were chosen. Each respondent was given a questionnaire with a set of questions relating to the culture of organisational learning in the DST and the impact thereof towards service excellence. Questionnaire items were structured in such a way that they were easy for the respondents to understand, thus preventing ambiguity. Questions were grouped categorically according to the type of information required.

3.5 Population Sample and Sampling Methods

According to Coldwell and Herbst (2004:74), a population sample provides a definite part of a statistical population whose properties are studied to gain information about the whole. They mention that the purpose of sampling is to draw conclusions about populations from samples. In order to do this, inferential statistics must be used. On the other hand, Sekaran (2003:265) indicates that a population refers to the entire group of people, events or items of interest that the researcher wishes to investigate.

Sekaran (2003:265), further states that sampling is the process of selecting a sufficient number of elements from the population so that a study of the sample and an understanding of its properties and characteristics would make it possible for the researcher to generalise such properties to the population elements. The reasons for using a sample instead of the entire population are arguably self-evident (Sekaran, 2003:266). Researchers are often confronted with a study population too large to observe. It therefore becomes necessary to identify a sample for research purposes. Not differing from Sekaran, Coldwell and Herbst (2004:74) refer to sampling as the act or process of selecting a representative part of a population for the purpose of determining parameters or
characteristics of the whole population. Sekaran (2003:267) indicates that each of these sampling designs has different sampling strategies, depending on the extent of generalisation desired, the demands of time, and other resources. However, White (2000:60) argues that random sampling works best with an accurate and up-to-date sampling frame and is a preferred method for carrying out any statistical analysis.

Differentiation is made between the two broad categories of probability and non-probability sampling. In probability sampling, the researcher can specify in advance that each segment of the population is represented in the sample (Leedy & Ormrod 2003:211). This is the distinguishing characteristic that sets probability sampling apart from non-probability sampling. The non-probability sampling strategy can be described, as the selection of a population element, in which the researcher selects participants who are considered to be typical of the wider population, to be part of the sample, based in some part on the judgement of the researcher (Leedy & Ormrod 2003:218).

According to Webb (2010:198), probability sampling refers to identifying a sample of respondents that is representative of the population from which it is selected when all members of the population have an equal chance of being selected. Conversely, non-probability sampling refers to a method by which the researcher identifies a sample based on his knowledge of the elements and attributes of the study population. Random sampling was employed in order to ensure that the outcomes were not biased and that the samples are a true reflection of the entire population. For this study, a sample of 65 employees across the DST was randomly selected and 55 responded; thus an 85% response rate (cf. section 1.8 & 4.2). It must be noted that this is a pilot study to gauge the extent to which the DST embraces the culture of organisational learning.

The sample included junior managers, middle managers, senior managers and executive managers within the DST, as reflected in Table 3.1.

<table>
<thead>
<tr>
<th>DST Programme (also known as Directorate)</th>
<th>Proposed respondents in each programme per level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Corporate Services and Governance</td>
<td>o Deputy Directors General (executive)</td>
</tr>
<tr>
<td>2: Research, Development and Innovation</td>
<td></td>
</tr>
</tbody>
</table>
Coldwell and Herbst (2004:54) describe two statistical methods for analysing and interpreting data: descriptive and inferential statistics. The descriptive method involves the use of correlations, comparisons and trends, whereas the inferential method refers to the estimation of population parameters. In descriptive statistics measurements such as the mean and standard deviation are stated as exact numbers. Inferential statistics start with a sample and then generalises to a population. White (2000:46), states that inferential statistics involve the use of complex mathematical procedures and statistical tests of significance. In general, inferential statistics seek to generalise from available evidence, usually from a sample to a population.

Once data has been collected, it is then directed to being analysed and interpreted for the purpose of generating meaning from the collected raw data (Coldwell & Herbst, 2004:55). Polonsky and Waller (2011:159) report that, analysis and interpretation are frequently misused as being inter-changeable, but they have distinct meanings and roles. According to Polonsky and Waller (2011:159), analysis covers the assembling, cleaning and examining of data whereas interpretation is making sense of the data that has been generated.

To generate meaning from the collected data, an analysis must be done (Coldwell & Herbst, 2004:55). According to Coldwell and Herbst (2004:55), data should be coded by allocating key words and phrases to different sections. In this study, outcomes of the data are presented through charts and graphs, and are analysed using the statistical methods referred to in Chapter 4.
3.7 Descriptions of the Statistical Techniques Employed

In this section, the descriptions of the statistical techniques employed in addressing the research goals are defined.

3.7.1 Descriptive Statistics and Frequency Distributions

According to Fabrigar, Wegener, MacCallum and Strahan (1999: 283) descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. They are used to present quantitative descriptions in a manageable form. Fabrigar, Wegener, MacCallum and Strahan (1999: 285) further indicate that a frequency distribution is a summary of how often different scores occur within a sample of scores. Using the information from a frequency distribution, researchers can then calculate measures of centrality and dispersion (the mean, median, mode, range and standard deviation).

3.7.1.1 Measures of Centrality

According to Zaller and Feldman (1992:579-616), the mean is a measure of the central tendency of a set of numbers. They further indicate that a mean is also referred to as the average, and is calculated by adding up all the numbers and dividing them by a count of numbers in the set. For example, it is a way to describe the centre of a data set. Zaller and Feldman further indicate that there are three measures of central tendency: the mean, the median, and the mode. The mean is calculated in two steps: add the data together to find the sum and take the sum of the data and divide it by the total number of data. The median is the value that cuts the data set in half. There are two steps to finding the median in a sample with an odd number of data: list the data in numerical order and locate the value in the middle of the list. The mode refers to the number or value that appears the most. It is possible to have more than one mode, and it is possible to have no mode. Furthermore, Zaller and Feldman (1992:579-616) indicate that the sample size is often called the n.
3.7.1.2 Measures of Dispersion

According to Daniel (1998:29-32), the standard deviation summarises how far away from the average the data values typically are. Daniel further indicates that standard deviation is perhaps the most frequently used measure of spread. It is also an important concept for descriptive statistics because it reveals the amount of variability of individuals within the data set. Like the mean, the standard deviation is affected by extreme scores. Furthermore, Daniel defines interquartile range (IQR) as a measure of variability, based on dividing a data set into quartiles. Quartiles divide a rank-ordered data set into four equal parts. Daniel further describes an outlier as an observation point that is distant from other observations. According to Daniel, an outlier may be due to variability in the measurement or it may indicate experimental error; the latter is sometimes excluded from the data set. Outliers can occur by chance in any distribution, but they often indicate either measurement error or that the population has a heavy-tailed distribution. Daniel indicates that box plot is a convenient way of graphically depicting groups of numerical data through their quartiles. Box plots may also have lines extending vertically from the boxes (whiskers) indicating variability outside the upper and lower quartiles, hence the terms box-and-whisker plot and box-and-whisker diagram. While outliers may be plotted as individual points, box plots are non-parametric - they display variation in samples of a statistical population without making any assumptions of the underlying statistical distribution.

3.7.2 The Likert Scale

According to Rumsey-Johnson (2010:46) the Likert scale is a method of ascribing quantitative value to qualitative data, to make it amenable to statistical analysis, whereby a numerical value is assigned to each potential choice and a mean figure for all the responses is computed at the end of the evaluation or survey. Likert scales usually have five potential choices (strongly agree, agree, neutral, disagree, strongly disagree), but sometimes go up to ten or more. The final average score represents overall level of accomplishment, or attitude towards the subject matter. It is named after its inventor, the US organisational behaviour psychologist, Dr Rensis Likert (1903-81).
3.7.3 Exploratory Factor Analysis (EFA)

EFA is one method of checking dimensionality. The primary purpose of EFA is to arrive at a more parsimonious conceptual understanding of a set of measured variables by determining the number and nature of common factors needed to account for the pattern of correlations among the measured variables. EFA is used when a researcher wishes to identify a set of latent constructs underlying a battery of measured variables (Fabrigar, Wegener, MacCallum & Strahan 1999: 272).

3.7.4 Cronbach’s Alpha Value

Though Cronbach’s alpha value is not a test, the reliability of constructs is measured by item analysis and one way of measuring the reliability is via the use of Cronbach’s alpha. According to Fabrigar, Wegener, MacCallum and Strahan (1999: 278), Cronbach’s alpha is a measure of internal consistency; that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability; it is a coefficient of reliability (or consistency).

For this study, the 5-point Likert scale, the Cronbach’s alpha value as well as descriptive statistics and distributions were used.

3.7.5 P-Value

The p-value is the probability of obtaining a test statistic at least as extreme as the one that was actually observed, assuming that the null hypothesis is true. In hypothesis testing the null hypothesis is rejected if the p-value is less than the significance level (in most cases 0.05). Such a result indicates that the observed result would be highly unlikely under the null hypothesis (Daniel 1998:23-32). Daniel further indicates that the p-value or calculated probability is the estimated probability of rejecting the null hypothesis (H₀) of a study question when that hypothesis is true. The null hypothesis is usually a hypothesis of ‘no
difference’. The only situation in which to use a one-sided p-value is when a large change in an unexpected direction would have absolutely no relevance to a study. Furthermore, Daniel (1998:29) indicates that the term significance level (alpha) is used to refer to a pre-chosen probability and the term p-value is used to indicate a probability that is calculated after a given study, whereas the alternative hypothesis (H₁) is the opposite of the null hypothesis.

3.7.6 Chi-Square Tests

According to Wessels (2010:149-142), the Chi-Square test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories of the categorical variables involved. Do the numbers of individuals or objects that fall in each category differ significantly from the number one would expect? Is this a difference between the expected and the observed due to sampling error, or is it a real difference? The Chi-Square statistic ($\chi^2$) is calculated from the sum of the squared difference between the observed and the expected cell frequencies. The critical value for this comparison is determined from the Chi-Square distribution using the significance level of the test (usually 0.05), and the number of degrees of freedom. If this critical value is smaller than the calculated ($\chi^2$) statistic, it is concluded that there is a significant difference between the observed and the expected cell-frequencies. This difference would then indicate that there is a relationship or association between the categories of the two variables under consideration. Assumptions for the ($\chi^2$) test are that the data values are independent and that each cell has a cell count of at least 5.

Wessels further defines correlational analysis as the use of statistical correlation to evaluate the strength of the relations between variables. The strength of a linear relationship between two continuous variables can be measured with the Pearson’s correlation coefficient. The coefficient value may vary from -1 to +1 which indicates a perfect negative and perfect positive correlation between two variables. A coefficient of 0 indicates a total lack of any linear relationship between two continuous variables.
3.7.7 Comparison of Means

According to Cohen (1988:15), inferential statistics, unlike descriptive statistics, provide a measure of probability to test a hypothesis regarding data or groups of data. With inferential statistics one tries to infer from the sample data how the population may behave. Most of the major inferential statistics come from a general family of statistical models known as the General Linear Model. This includes the t-test, Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), regression analysis, and many of the multivariate methods like factor analysis, multidimensional scaling, cluster analysis, discriminant function analysis.

Cohen (1988:23) further indicates that unlike a t-test, an Analysis of Variance (ANOVA) test compares more than two groups, for example several age categories. However an ANOVA may also be used to compare two categories. Before these parametric tests may be employed, the data or groups of data, has to meet certain conditions. These include normality (normally distributed) of groups of data and equality of the variance of the groups being compared. Failing normally distributed data, use may be made of non-parametric tests which make no assumptions of the underlying distributions involved. Examples of these tests are the Mann-Whitney U-test and the Kruskal-Wallis test. In the software employed in this research, these non-parametric tests are collectively referred to as the Wilcoxon tests. In the event of non-homogenous data, the result of the robust Welch test may be reported. In the tests employed in this research, all three tests were conducted and reported. Where differences in significances occur, the nature of the data is further investigated to ensure that the correct results are reported. Note that the statistical tests were conducted at the 0.05 level of significance to ensure a 95% level of confidence in the results obtained.

The ANOVA tests are accompanied by plots which indicate the relative means and medians of the groups of data. Box-plots contain 50% of the data, and the median is indicated with a bar in the box. Data points beyond the data-whiskers are outliers. An outlier is defined as a value which is beyond 1.5 times the range of the box. The width of the green diamond indicates the relative sample size of the group of data, and the diamond diagonal indicates the mean score of that group. The circles to the right of the plot indicate
results of Tukey tests of comparison between groups. Non-intersecting circles indicate significant differences (Cohen, 1988:56).

3.8 Validity and Reliability

Burns and Grove (2005:214) describe validity as a measure of the truth or accuracy of a claim. In the context of this study, the truth and accuracy of the study has been ensured by firstly using or choosing the appropriate design in relation to the purpose of the study. Charlesworth, Lawton, Lewis, Martin and Taylor (2003:17), reported that it is important for researchers to demonstrate that their research methods are reliable and that the conclusions are valid. This is also supported by Lewis, et al. (2003:17), as validity relates to the extent to which research findings accurately represent what is really happening in the situation. Validity is concerned with the idea that the research design fully addresses the research questions and objectives the researcher is trying to answer or achieve (White, 2003:25). Coldwell and Herbst (2004:62) state that validity testing can be carried out in three ways: content validity, criterion validity and construct validity.

According to White (2000:25), reliability is about consistency in research and whether another researcher can use the same design to obtain similar results. If other researchers can come up with similar findings, this means that the findings are more likely to be reliable (Charlesworth, et al. 2001:51). It refers to the extent through which the results are consistent and true (Coldwell & Herbst, 2004:63). Test-retest reliability was used to determine overall questionnaire reliability (cf. section 4).

In this study, content validity was achieved using the relevant literature review. It was ensured that the questionnaire covered the content of the problem statement and research objectives, i.e. the construction of questions was informed by the available literature (Sekaran, 2003:203).
3.9 Ethical Considerations

Permission (Appendix 1) was granted by the DST to conduct the study. Ethical clearance (Appendix 2) was granted by the Research Ethics Committee of the Department of Public Administration and Management of UNISA. Consent approvals were obtained from each respondent as a covering letter (Appendix 3) was attached to each questionnaire (Appendix 4). All participants were treated equally irrespective of their position. Confidentiality was observed throughout the study and the questionnaire did not require names of the respondents to be provided.

3.10 Summary

Research design methods enable the researcher to gain insider knowledge of the study objectives. The main elements of research design, research methodology and methods, the population sample and sampling technique; data collection methods and data types; data analysis and interpretation; validity of the study and ethical considerations, have been described in this chapter. After reviewing the literature on the research process, the researcher has provided the research design, its concepts and practices that are required to ensure that the objectives of this research are achieved. The literature review has also provided the basis for the results discussed in the next chapter. The research process was adequately conceptualised. This study adopted a formalised, communicative and cross-sectional form of design and also adopted qualitative research by issuing questionnaires to the population sample which consisted of junior managers, middle managers, senior managers and executive managers, in order to determine how a culture of organisational learning in the DST could support knowledge management and continuous improvement to respond to strategic initiatives.
CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

In the previous chapters, the underlying complexities of research into organisational learning at various organisational levels were established (cf. section 2.2). Drawing from the research objectives introduced in Chapter 1 and the research design concepts discussed in Chapter 3, this chapter provides the research results. The author discusses and analyses these results according to the objectives of this research and provides building blocks for the recommendations in the final chapter. In this chapter, the results and findings of the data collected through the survey will be analysed and interpreted.

The details of the results are discussed in the sections below, and are in line with the objectives introduced in Chapter 1.

4.2 Biographic Profile of Respondents

The staff complement (also known as employees) per Programme is as follows:

<table>
<thead>
<tr>
<th>Programme (also known as Directorate)</th>
<th>Staff complement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Services and Governance</td>
<td>102 29.0%</td>
</tr>
<tr>
<td>International Cooperation and Resources</td>
<td>89 22.0%</td>
</tr>
<tr>
<td>Human Capital Development and Knowledge Resources</td>
<td>78 22.0%</td>
</tr>
<tr>
<td>Socio-economic Partnerships</td>
<td>67 18.0%</td>
</tr>
<tr>
<td>Research, Development and Innovation</td>
<td>52  9.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>388 100.0%</strong></td>
</tr>
</tbody>
</table>

The sample was made up of 55 respondents. Of the 55 respondents, 29% were working in the Corporate Services and Governance Programme, 22% were working in the International Cooperation and Resources, and the Human Capital Development and
Knowledge Resources respectively, 18% within the Socio-economic Partnerships Programme and 9% within the Research, Development and Innovation Programme.

The response rates per Programme are shown in Figure 4.1.

![Figure 4.1: Response rates per Programme and per response rate per sample](image)

The sample was made up of 9% Deputy Directors General, 5% Chief Directors, 27% Directors, 38% Deputy Directors, and 20% Assistant Directors (Assistant Director is the entry level for most of the positions in the DST, hence they are representative of junior management employees). The results are illustrated in Figure 4.2.

![Figure 4.2: Response rates per employee level](image)
A majority of the respondents (58%) had been working for the DST for five years or more; 16% had been with the DST for three to five years and the remaining 26% had been with the DST between one and three years. The pie chart in Figure 4.3 represents the response rates per employment period in the DST.

![Figure 4.3: Response rates per employment period](image)

The sample was made up of 25% of respondents aged 26 to 35 years; 42% aged 36 to 45 years; and the remaining 33% were 46 years or older. The pie chart in Figure 4.4 represents the response rates per age group.

![Figure 4.4: Response rates per age group](image)
4.3 Assessing the Impact of Organisational Learning on Service Excellence in the DST

Twenty-two statements (also referred to as items) were posed to respondents. Responses were solicited on a 5-point Likert scale (Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree). The following items form proposed constructs or themes, guided by the literature review on organisational learning (cf. section 2.2):

1. Items 1-4  DST strategic planning
2. Items 5-8  Opportunities for learning and return on investment
3. Items 9-13  Inter - intra Programme communication
4. Items 14-18  Knowledge management and learning from experiences
5. Items 19-22  DST leadership style

Table 4.1 summarises the views of respondents on these statements.

Summary of distribution of respondents’ views on the proposed construct: DST strategic planning

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Innovation Plans are clear and shared with all employees.</td>
<td>3.6%</td>
<td>20.0%</td>
<td>3.6%</td>
<td>34.6%</td>
</tr>
<tr>
<td>2. My daily operations are clearly aligned with the strategic objectives of the DST.</td>
<td>7.3%</td>
<td>0.0%</td>
<td>7.3%</td>
<td>43.6%</td>
</tr>
<tr>
<td>3. In my opinion, information in the DST flows across the Programmes.</td>
<td>16.4%</td>
<td>30.9%</td>
<td>20.0%</td>
<td>30.9%</td>
</tr>
<tr>
<td>4. I am often informed about the activities or engagements of other Programmes in relation to the work done by my Programme.</td>
<td>21.8%</td>
<td>29.1%</td>
<td>9.1%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

Table 4.1: Summary of distribution of respondents’ views on the proposed construct: DST strategic planning
Summary of distribution of respondents’ views on the **proposed** construct: **Opportunities for learning and return on investment**

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. I think that the DST provides enough opportunities for employees to be trained and developed.</td>
<td>3.6%</td>
<td>0.0%</td>
<td>18.2%</td>
<td>20.0%</td>
</tr>
<tr>
<td>6. I believe that the DST has available skills to facilitate service excellence.</td>
<td>3.6%</td>
<td>7.3%</td>
<td>9.1%</td>
<td>47.3%</td>
</tr>
<tr>
<td>7. I believe that the DST has competent employees to facilitate service excellence.</td>
<td>0.0%</td>
<td>1.9%</td>
<td>13.2%</td>
<td>58.5%</td>
</tr>
<tr>
<td>8. Employees are encouraged to be creative and innovative in their work.</td>
<td>3.6%</td>
<td>16.4%</td>
<td>32.7%</td>
<td>41.8%</td>
</tr>
</tbody>
</table>

Table 4.2: Summary of distribution of respondents’ views on the proposed construct: Opportunities for learning and return on investment

Summary of distribution of respondents’ views on the **proposed** construct: **Inter - intra Programme communication**

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Employees in the DST often share information of new knowledge on their work with other colleagues.</td>
<td>20.4%</td>
<td>31.5%</td>
<td>25.9%</td>
<td>18.5%</td>
</tr>
<tr>
<td>10. Employees in the DST often share their learning experiences from their work with their colleagues.</td>
<td>18.2%</td>
<td>25.5%</td>
<td>38.2%</td>
<td>18.2%</td>
</tr>
<tr>
<td>11. Differing views in my Programme or in the DST at large are publicly discussed and tested.</td>
<td>18.2%</td>
<td>25.5%</td>
<td>38.2%</td>
<td>18.2%</td>
</tr>
<tr>
<td>12. In my opinion, mistakes and failures in the DST are regarded as part of learning.</td>
<td>9.1%</td>
<td>23.6%</td>
<td>45.5%</td>
<td>18.2%</td>
</tr>
<tr>
<td>13. Learning experiences from past mistakes and failures in my Programme get incorporated into operational processes and daily routines.</td>
<td>10.9%</td>
<td>16.4%</td>
<td>38.2%</td>
<td>29.1%</td>
</tr>
</tbody>
</table>

Table 4.3: Summary of distribution of respondents’ views on the proposed construct: Inter - intra Programme communication
Summary of distribution of respondents’ views on the **proposed** construct: **Knowledge management and learning from experiences**

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. I receive regular information about organisational matters.</td>
<td>3.6%</td>
<td>16.4%</td>
<td>25.5%</td>
<td>41.8%</td>
</tr>
<tr>
<td>15. I get sufficient opportunities to make my inputs on all matters of the organisation, especially in my Programme.</td>
<td>7.3%</td>
<td>16.4%</td>
<td>23.6%</td>
<td>43.6%</td>
</tr>
<tr>
<td>16. Even if the DST realises service excellence, it will make no difference to me.</td>
<td>0.0%</td>
<td>7.3%</td>
<td>9.1%</td>
<td>29.1%</td>
</tr>
<tr>
<td>17. Even if the DST realises service excellence, it will make no difference to the South African citizenry.</td>
<td>7.3%</td>
<td>3.6%</td>
<td>9.1%</td>
<td>23.6%</td>
</tr>
<tr>
<td>18. The DST leadership communicates the organisation’s strategic objectives.</td>
<td>3.6%</td>
<td>21.8%</td>
<td>10.9%</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

**Table 4.4:** Summary of distribution of respondents’ views on the proposed construct: Knowledge management and learning from experiences

Summary of distribution of respondents’ views on the **proposed** construct: **DST leadership style**

<table>
<thead>
<tr>
<th>%Strongly Disagree</th>
<th>%Disagree</th>
<th>%Neutral</th>
<th>%Agree</th>
<th>%Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. The DST leadership involves all employees in decision-making processes.</td>
<td>40.0%</td>
<td>21.8%</td>
<td>25.5%</td>
<td>7.3%</td>
</tr>
<tr>
<td>20. The DST leadership recognises and rewards service excellence.</td>
<td>0.0%</td>
<td>14.6%</td>
<td>36.4%</td>
<td>47.3%</td>
</tr>
<tr>
<td>21. There is participatory leadership in the DST.</td>
<td>16.4%</td>
<td>29.1%</td>
<td>30.9%</td>
<td>20.0%</td>
</tr>
<tr>
<td>22. Knowledge management is at the centre of daily operations at the DST.</td>
<td>32.7%</td>
<td>5.5%</td>
<td>32.7%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

**Table 4.5:** Summary of distribution of respondents’ views on the proposed construct: DST leadership style
It must be noted that within each of the proposed constructs, the distribution of views vary significantly, indicating a divergence in views of respondents on the extent of organisational learning on service excellence at DST.

These were merely proposed constructs and reliability within each proposed construct will be tested in the next section.

4.4 Reliability of the Proposed Constructs

There are several ways of testing the reliability of the items of a construct. One method of testing the internal consistency of the items of a construct is through the calculation of the Cronbach’s alpha coefficient (cf. section 3.7.4).

The following proposed guidelines (George & Mallery, 2003:231) are used in interpreting the Cronbach’s alpha value to determine the extent of internal consistency between the items to accurately represent each construct:

- $<0.6$ unacceptable internal consistency
- $0.6 – 0.7$ is questionable consistency
- $0.7 – 0.8$ indicates acceptable internal consistency
- $0.8 – 0.9$ is good internal consistency
- $>0.9$ is excellent internal consistency

The overall Cronbach’s alpha coefficient for each construct is presented below. This value is accompanied by an exclusion table which provides a recalculated Cronbach’s alpha should an item be removed from a construct.
An increase of greater than 3% is considered sufficient justification for removing an item from a construct. The alpha value of each item in the exclusion table has to be considered before an item is allowed into a construct.

### 4.4.1 Reliability of Proposed Construct: DST Strategic Planning

An overall Cronbach’s alpha value of 0.755 was attained, which is considered as acceptable reliability. The following exclusion table presents a recalculated alpha coefficient should an item be excluded from the proposed construct:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The strategic objectives of the DST such as the Ten-Year Innovation Plan are clear and shared with all employees.</td>
<td>0.678</td>
</tr>
<tr>
<td>2. My daily operations are clearly aligned with the strategic objectives of the DST.</td>
<td>0.726</td>
</tr>
<tr>
<td>3. In my opinion, information in the DST flows across the Programmes.</td>
<td>0.678</td>
</tr>
<tr>
<td>4. I often am informed about the activities or engagements of other Programmes in relation to the work done by my Programme.</td>
<td>0.706</td>
</tr>
</tbody>
</table>

**Table 4.6: Excluded items on the reliability of proposed construct: DST Strategic Planning**

It is seen from the exclusion table that none of the individual items have an alpha value significantly greater than 0.755. An increase of greater than 3% justifies an exclusion of an item (George & Mallery, *et. al.* 2003:232). All items are thus retained for this construct.
4.4.2 Reliability of Proposed Construct: Opportunities for Learning and Return on Investment

An overall Cronbach’s alpha value of 0.612 was achieved, which is considered as questionable reliability. The following exclusion table presents the Cronbach’s alpha on excluded items:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. I think that the DST provides enough opportunities for employees to be trained and developed.</td>
<td>0.783</td>
</tr>
<tr>
<td>6. I believe that the DST has available skills to facilitate service excellence.</td>
<td>0.299</td>
</tr>
<tr>
<td>7. I believe that the DST has competent employees to facilitate service excellence.</td>
<td>0.312</td>
</tr>
<tr>
<td>8. Employees are encouraged to be creative and innovative in their work.</td>
<td>0.625</td>
</tr>
</tbody>
</table>

Table 4.7: Excluded items on the reliability of proposed construct: Opportunities for Learning and Return on Investment

Removal of item 5 from this construct will increase the overall alpha value to 0.783 – an increase of 28%. The reliability analysis was repeated without item 5, and even though an overall Cronbach’s alpha value of 0.783 was now achieved, the following exclusion table revealed new exclusion candidates:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. I believe that the DST has available skills to facilitate service excellence.</td>
<td>0.550</td>
</tr>
<tr>
<td>7. I believe that the DST has competent employees to facilitate service excellence.</td>
<td>0.635</td>
</tr>
<tr>
<td>8. Employees are encouraged to be creative and innovative in their work.</td>
<td>0.890</td>
</tr>
</tbody>
</table>

Table 4.8: Excluded items on the reliability analysis with the removal of item 5

It is seen that the exclusion of item 8 will increase the overall alpha value to 0.890, an increase of 12%.
With the exclusion of item 8, only two items remain in the construct (items 6 and 7). A reliability analysis cannot be performed on two items.

The absence of adequate internal consistency between the items of this construct may be due to inappropriate items for this construct, or could be due to wide contrasting views on the issues addressed by these items.

The researcher chose not to use a construct of questionable reliability.

### 4.4.3 Reliability of Proposed Construct: Inter - intra Programme Communication

An overall Cronbach’s alpha value of 0.875 was achieved, which is considered as good reliability. The following exclusion table provides recalculated alpha scores should an item be removed from the analysis:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Employees in the DST often share information on new knowledge on their work with other colleagues.</td>
<td>0.822</td>
</tr>
<tr>
<td>10. Employees in the DST often share their learning experiences from their work with their colleagues.</td>
<td>0.832</td>
</tr>
<tr>
<td>11. Differing views in my Programme or in the DST at large are publicly discussed and tested.</td>
<td>0.825</td>
</tr>
<tr>
<td>12. In my opinion, mistakes and failures in the DST are regarded as part of learning.</td>
<td>0.858</td>
</tr>
<tr>
<td>13. Learning experiences from past mistakes and failures in my Programme get incorporated into operational processes and daily routines.</td>
<td>0.892</td>
</tr>
</tbody>
</table>

Table 4.9: Excluded items on the reliability of proposed construct: Inter – intra Programme Communication
Since the removal of item 13 increases the overall alpha score by only 2%, this item is retained in the construct.

4.4.4 Reliability of Proposed Construct: Knowledge Management and Learning from Past Experiences

An overall Cronbach’s alpha value of 0.749 was achieved, which is considered acceptable reliability. The following exclusion table presents recalculated alpha scores with each item removed:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. I receive regular information about organisational matters.</td>
<td>0.733</td>
</tr>
<tr>
<td>15. I get sufficient opportunities to make my inputs on all matters of the organisation, especially in my Programme.</td>
<td>0.791</td>
</tr>
<tr>
<td>16. Even if the DST realises service excellence, it will make no difference to me.</td>
<td>0.570</td>
</tr>
<tr>
<td>17. Even if the DST realises service excellence, it will make no difference to the South African citizenry.</td>
<td>0.645</td>
</tr>
</tbody>
</table>

Table 4.10: Excluded items on the reliability of proposed construct: Knowledge Management and Learning from Past Experiences

Removal of item 15 increases the alpha score by 5.5%, sufficient justification to remove this item from the construct. A repeat of the analysis without item 15 yielded an overall alpha score of 0.791. The following exclusion table presents new alpha values with excluded items:

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. I receive regular information about organisational matters.</td>
<td>0.892</td>
</tr>
<tr>
<td>16. Even if the DST realises service excellence, it will make no difference to me.</td>
<td>0.517</td>
</tr>
<tr>
<td>17. Even if the DST realises service excellence, it will make no difference to the South African citizenry.</td>
<td>0.696</td>
</tr>
</tbody>
</table>
The removal of item 14 increases the alpha coefficient by 11% but results in only two remaining items with which to measure this construct. A reliability analysis cannot be performed with only two items. A wide divergence contrast in views of the items of this construct is already seen in Table 4.4. There seems to be common consensus between items 16 and 17 since respondents have 83.7% and 80% agreement with these statements.

4.4.5 Reliability of Proposed Construct: DST Leadership Style

An overall Cronbach’s alpha value of 0.749 was achieved, which is considered acceptable reliability. The following exclusion table provides the adapted Cronbach’s alpha value should a particular item be removed from the construct.

<table>
<thead>
<tr>
<th>Excluded items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. The DST leadership involves all employees in decision-making processes.</td>
<td>0.643</td>
</tr>
<tr>
<td>20. The DST leadership recognises and rewards service excellence.</td>
<td>0.812</td>
</tr>
<tr>
<td>21. There is participatory leadership in the DST.</td>
<td>0.683</td>
</tr>
<tr>
<td>22. Knowledge management is at the centre of daily operations at the DST.</td>
<td>0.743</td>
</tr>
</tbody>
</table>

The removal of item 20 increased the overall alpha value by 3.7%.

The analysis was repeated without item 20 and provided a new overall alpha score of 0.812 indicating good reliability. The excluded item table provides recalculated alpha scores:
Excluded items

<table>
<thead>
<tr>
<th>Item ID</th>
<th>Item Description</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.</td>
<td>The DST leadership involves all employees in decision-making processes</td>
<td>0.684</td>
</tr>
<tr>
<td>21.</td>
<td>There is participatory leadership in the DST.</td>
<td>0.738</td>
</tr>
<tr>
<td>22.</td>
<td>Knowledge management is at the centre of daily operations at the DST.</td>
<td>0.808</td>
</tr>
</tbody>
</table>

Table 4.13: Reliability analysis with the exclusion of item 20

The construct DST Leadership Style now consists of three reliable items that accurately represent this construct.

4.4.6 Summary of Reliability Tests on the Items of the Constructs

The following Table summarises the results of the reliability tests on the items of each construct:

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Overall Cronbach’s alpha value</th>
<th>Disqualified items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DST strategic planning</td>
<td>1, 2, 3, 4</td>
<td>0.755 (Acceptable reliability)</td>
<td></td>
</tr>
<tr>
<td>2. Opportunities for learning and return on investment</td>
<td>Unacceptable reliability</td>
<td>5, 6, 7, 8</td>
<td></td>
</tr>
<tr>
<td>3. Inter - intra Programme communication</td>
<td>9, 10, 11, 12, 13</td>
<td>0.875 (Good reliability)</td>
<td></td>
</tr>
<tr>
<td>4. Knowledge management and learning from experiences</td>
<td>Unacceptable reliability</td>
<td>14, 15, 16, 17, 18</td>
<td></td>
</tr>
<tr>
<td>5. DST leadership style</td>
<td>19, 21, 22</td>
<td>0.812 (Good reliability)</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 4.14: Summary of reliability tests on the items of each construct

There are only three reliable constructs:

- DST strategic planning
- Inter - intra Programme communication
- DST leadership style

The items of the following constructs have insufficient internal consistency to accurately represent the respective constructs:

- Opportunities for learning and return on investment
- Knowledge management and learning from experiences

This is also seen from the distribution of views of these items:

### Opportunities for learning and return on investment

<table>
<thead>
<tr>
<th>Items of construct</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3.6%</td>
<td>0.0%</td>
<td>18.2%</td>
<td>20.0%</td>
<td>58.2%</td>
</tr>
<tr>
<td>6</td>
<td>3.6%</td>
<td>7.3%</td>
<td>9.1%</td>
<td>47.3%</td>
<td>32.7%</td>
</tr>
<tr>
<td>7</td>
<td>0.0%</td>
<td>1.9%</td>
<td>13.2%</td>
<td>58.5%</td>
<td>26.4%</td>
</tr>
<tr>
<td>8</td>
<td>3.6%</td>
<td>16.4%</td>
<td>32.7%</td>
<td>41.8%</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

The distribution of views for the four items is inconsistent, resulting in inadequate correlation in views for accurate representation of a single construct.

### Knowledge management and learning from experiences

<table>
<thead>
<tr>
<th>Items of construct</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>3.6%</td>
<td>16.4%</td>
<td>25.5%</td>
<td>41.8%</td>
<td>12.7%</td>
</tr>
<tr>
<td>15</td>
<td>7.3%</td>
<td>16.4%</td>
<td>23.6%</td>
<td>43.6%</td>
<td>9.1%</td>
</tr>
<tr>
<td>16</td>
<td>0.0%</td>
<td>7.3%</td>
<td>9.1%</td>
<td>29.1%</td>
<td>54.6%</td>
</tr>
</tbody>
</table>
There is an inconsistency in the views of respondents for the five items 14, 15, 16, 17 and 18.

It must be further pointed out that the constructs are not necessary valid constructs, as an inadequate sample size prevents the application of an exploratory factor analysis to validate the constructs. A sample of at least (22 statements multiplied by the extent of the Likert-scale) 110 observations is required to perform an EFA.

### 4.5 Creation of Constructs

Single scores for each of the proposed constructs were determined for each respondent by calculating the mean of the participating (reliable) items of the constructs. The following descriptive statistics and distributions describe the nature of these constructs:

#### 4.5.1 Proposed Construct: DST Strategic Planning

The mean and median scores for the construct: DST Strategic Planning, are 3.39 and 3.5 respectively indicating an average view between neutral and agree. Dispersion of views about these measures of centrality is indicated with a standard deviation of 0.943 and an inter-quartile range of 1.5.

This rather wide variation in views was also seen in Table 4.1 (distribution of views of respondents).
The distribution of scores is negatively skewed with 25% of respondents having a view of agree to strongly agree and 25% of viewing DST strategic planning as less than neutral to strongly disagreeing.

Respondents indicated that the strategic planning process does not make efforts to bring Programmes together, it rather perpetuates the division and therefore efforts are fragmented. In the literature review, it was indicated that being a learning organisation requires an understanding of the strategic internal drivers needed to build a learning capability (Drejer, et al. 2000:16).

### 4.5.2 Proposed Construct: Inter-Intra Programme Communication

The mean and median scores for the construct: Inter-Intra Programme Communication, are 2.7 and 2.8 respectively indicating an average view between disagree and neutral. Dispersion of views about these measures of centrality is indicated with a standard deviation of 0.872 and an inter-quartile range of 1.0.
This rather wide variation in views was also seen in Table 4.3 (distribution of views of respondents).

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.00%</td>
<td>maximum</td>
<td>4.6</td>
</tr>
<tr>
<td>99.50%</td>
<td></td>
<td>4.6</td>
</tr>
<tr>
<td>97.50%</td>
<td></td>
<td>4.6</td>
</tr>
<tr>
<td>90.00%</td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>75.00%</td>
<td>quartile</td>
<td>3.2</td>
</tr>
<tr>
<td>50.00%</td>
<td>median</td>
<td>2.8</td>
</tr>
<tr>
<td>25.00%</td>
<td>quartile</td>
<td>2.2</td>
</tr>
<tr>
<td>10.00%</td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>2.50%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>0.50%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>0.00%</td>
<td>minimum</td>
<td>1</td>
</tr>
</tbody>
</table>

The distribution of scores is reasonably uniform with 25% of respondents having a view of between neutral and strongly agree and 25% of viewing Inter-Intra Programme Communication as disagree to strongly disagreeing.

The majority of respondents indicated that there is no atmosphere of sharing and learning from the past in the DST. This is in contradiction to Senge, et al. (1990:340) as they emphasise that in a learning organisation, leaders are designers, stewards, and teachers and are responsible for building organisations where people continually expand their capabilities to understand complexity, clarify their vision, and improve shared mental models: that they are responsible for their learning.

4.5.3 Proposed Construct: DST Leadership Style

The mean and median scores for the construct: DST Leadership Style, are 2.71 and 2.75 respectively indicating an average view between neutral and disagree. Dispersion of views about these measures of centrality is indicated with a standard deviation of 0.875 and an
inter-quartile range of 1.5. This rather wide variation in views was also seen in Table 4.5 (distribution of views of respondents).

The distribution of scores is positively skewed with 25% of respondents having a view of between neutral and strongly agree and 25% of viewing DST Leadership Style as disagree to strongly disagreeing.

Respondents seem to have a negative view of DST Leadership Style and this can be attributed to the top down management style in the DST. This is contradictory to Pearn, et al. (1995:69) who argue that organisational learning can be achieved by moving away from a command-and-control style of management to increased involvement and empowerment of everyone in the organisation. The command-and-control management style is adopted at the DST, given its hierarchical organisational structure, hence the DST does not engage in organisational learning. Pearn indicates that leadership style and control systems in an organisation can either inhibit or facilitate organisational learning. In the DST context, the leadership style does inhibit organisational learning.
4.5.4 The Relationship between Constructs

As a rough guide the following correlations indicate the relative linear strength between two variables:

±1.0 Perfect correlation
±0.8 Strong correlation
±0.5 Medium correlation
±0.2 Weak correlation
±0.0 No correlation

The following correlation matrix provides a measure of the bivariate strength of linear relationship.

<table>
<thead>
<tr>
<th>Proposed Construct</th>
<th>DST Strategic Planning</th>
<th>Inter - intra Programme Communication</th>
<th>DST Leadership Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>DST Strategic planning</td>
<td>1</td>
<td>0.5637</td>
<td>0.3670</td>
</tr>
<tr>
<td>Inter - intra Programme communication</td>
<td>0.5637</td>
<td>1</td>
<td>0.4849</td>
</tr>
<tr>
<td>DST Leadership style</td>
<td>0.3670</td>
<td>0.4849</td>
<td>1</td>
</tr>
</tbody>
</table>

The linear bivariate relationships (correlations) between the constructs are generally of medium strength and are positive in nature. A positive linear relationship implies that an increase in one construct is associated with an increase in an accompanying construct. If the DST promotes common vision through its strategic planning, inter - intra Programme communication would improve (0.5637). If the DST promotes inter - intra Programme communication, this would be attributed to the DST leadership style that is participatory and inclusive and also recognises and rewards service excellence. Bivariate scatterplot matrix of constructs:
From the correlation coefficients, the 95% density ellipses around the points as well as the straight line through points, it is seen that there is a measure of linear relationship between pairs of constructs.

### 4.6 The Influence of the Biographic Characteristics of Respondents on their Views on Organisational Learning at the DST

A series of statistical inferential tests (parametric and non-parametric) were performed between the reliable constructs: DST strategic planning, inter – intra Programme communication as well as DST leadership style, and the biographic profile of respondents. These characteristics include the Programme in which a respondent is involved, his/her designation, the number of years at DST and the respondent’s age.
The software employed in the analyses of this research (JMP version 10.2), performs all three tests simultaneously. If differences in significance are observed between these tests regarding acceptance/rejection in the comparison of groups, further investigation will be conducted to establish the most appropriate test. All tests were conducted at a significance level of 0.05 to ensure an accuracy of 95% in the results claimed. All significant results are also accompanied with the Cohen’s effect size (d) to indicate the extent of the practical significance of the differences between groups (Cohen, 1988:273).

Note that only significant results are reported below.

4.6.1 One-way ANOVA of the Construct: DST Leadership Style by Designation

The following Table provides the means scores of DST Leadership Style calculated for the various designation groups.

<table>
<thead>
<tr>
<th>Designation</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Directors</td>
<td>11</td>
<td>3.23</td>
<td>0.553</td>
</tr>
<tr>
<td>Deputy Directors</td>
<td>21</td>
<td>2.65</td>
<td>0.731</td>
</tr>
<tr>
<td>Directors</td>
<td>15</td>
<td>2.97</td>
<td>1.039</td>
</tr>
<tr>
<td>Chief Directors</td>
<td>3</td>
<td>1.67</td>
<td>0.144</td>
</tr>
<tr>
<td>Deputy Directors General</td>
<td>5</td>
<td>1.70</td>
<td>0.112</td>
</tr>
</tbody>
</table>

Table 4.15: Summary of analysis of DST Leadership Style by designation
Anova test: F-ratio $4,54 = 5.339$, p-value = 0.0012
Welch test: F-ratio $4,54 = 27.510$, p-value = 0.0001
Wilcoxon (Kruskal-Wallis): Chi-Squire statistic = 18.912, DF = 4, p-value = 0.0008
(The Levene’s test rejects equal variances)

It is concluded that significant differences exist between the mean views of the various designations for DST Leadership Style.

The following connected letter report indicates where the differences in views exist:

<table>
<thead>
<tr>
<th>Designation</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Directors</td>
<td>A</td>
<td></td>
<td></td>
<td>3.23</td>
</tr>
<tr>
<td>Directors</td>
<td>A</td>
<td>B</td>
<td></td>
<td>2.97</td>
</tr>
<tr>
<td>Deputy Directors</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>2.65</td>
</tr>
<tr>
<td>Deputy Directors General</td>
<td></td>
<td></td>
<td>C</td>
<td>1.70</td>
</tr>
<tr>
<td>Chief Directors</td>
<td></td>
<td>B</td>
<td>C</td>
<td>1.67</td>
</tr>
</tbody>
</table>

(Levels not connected by same letter are significantly different)

The significant differences in views of DST Leadership Style exist between the three groups:

Assistant Directors;
Directors;
Deputy Directors General;

with Assistant Directors viewing the DST Leadership Style as neutral to positive, Directors slightly less than neutral and the Deputy Directors General with the least positive view. This can be attributed to the fact that Assistant Directors are mainly younger employees as compared to Directors and Deputy Directors General who are mature employees. Another contributing factor could be that an Assistant Director’s years of service or employment period in the DST is mainly less compared to the Directors and Deputy Directors General.

Cohen’s effect size as calculated for ANOVAs with multiple groups, based on group means is $d = 3.37$ which is considered as being of large practical significance.
4.6.2 One-way ANOVA of the Construct: DST Strategic Planning by Age

The following Table provides the means scores of DST Strategic Planning calculated for the various age groups.

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-35 years</td>
<td>14</td>
<td>2.73</td>
<td>1.120</td>
</tr>
<tr>
<td>36-45 years</td>
<td>23</td>
<td>3.96</td>
<td>0.481</td>
</tr>
<tr>
<td>46 and older</td>
<td>18</td>
<td>3.17</td>
<td>0.849</td>
</tr>
</tbody>
</table>

Table 4.16: Summary of means scores of DST Strategic Planning by age

Anova test: $F_{ratio_{2,54}} = 11.082$, $p-value = 0.0001$

Welch test: $F_{ratio_{2,54}} = 11.734$, $p-value = 0.0003$

Wilcoxon (Kruskal-Wallis): $Ch-Sq$ statistic $= 14.466$, $DF = 2$, $p-value = 0.0007$

(The Levene’s test rejects equal variances)

It is concluded that significant differences exist between the mean views of the various age groups for the DST Strategic Planning.

The following connected letter report indicates where the differences in views exist:

<table>
<thead>
<tr>
<th>Age</th>
<th>A</th>
<th>B</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-45 years</td>
<td>A</td>
<td></td>
<td>3.96</td>
</tr>
<tr>
<td>46 and older</td>
<td></td>
<td>B</td>
<td>3.17</td>
</tr>
<tr>
<td>26-35 years</td>
<td></td>
<td>B</td>
<td>2.73</td>
</tr>
</tbody>
</table>

(Levels not connected by same letter are significantly different)
The middle age group 36-45 years has strong positive views on DST strategic planning. The young age group (26-35 years) and the older age group (>45 years), have a neutral to negative view on strategic planning.

Cohen’s effect size as calculated for ANOVAs with multiple groups, based on group means is $d = 2.89$ which is considered as being of large practical significance.

### 4.6.3 One-way ANOVA of the Construct: DST Leadership Style by Age

The following Table provides the means scores of DST Leadership Style calculated for the various age groups.

<table>
<thead>
<tr>
<th>Age</th>
<th>n</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-35 years</td>
<td>14</td>
<td>2.73</td>
<td>0.762</td>
</tr>
<tr>
<td>36-45 years</td>
<td>23</td>
<td>3.11</td>
<td>0.839</td>
</tr>
<tr>
<td>46 and older</td>
<td>18</td>
<td>2.19</td>
<td>0.760</td>
</tr>
</tbody>
</table>

**Table 4.17: Summary of means scores of DST Leadership Style by age**

Anova test: $F$-ratio$\_2,54 = 6.684$, p-value $= 0.0026$

Welch test: $F$-ratio$\_2,54 = 6.574$, p-value $= 0.0025$

Wilcoxon (Kruskal-Wallis): Ch-Sq statistic $= 11.986$, DF $= 2$, p-value $= 0.0025$
(The Levene’s test accepts equal variances)

It is concluded that significant differences exist between the mean views of the various age groups for the construct: DST Leadership Style.

The following connected letter report indicates where the differences in views exist:

<table>
<thead>
<tr>
<th>Age</th>
<th>A</th>
<th>B</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-45 years</td>
<td>A</td>
<td></td>
<td>3.11</td>
</tr>
<tr>
<td>26-35 years</td>
<td>A</td>
<td>B</td>
<td>2.73</td>
</tr>
<tr>
<td>46 and older</td>
<td></td>
<td>B</td>
<td>2.19</td>
</tr>
</tbody>
</table>

(Levels not connected by same letter are significantly different)

The middle age group (36-45 years), have a rather neutral stance on DST leadership style. The youngest age group (26-35 years), have a less than neutral (tending to negative) view and the older age group (>45 years) have a distinct negative view of DST leadership style.

This can be attributed to the age and designation amongst the two groups of respondents whereby respondents in the age category 36-45 have different expectations on their assessment of whether the DST leadership is participatory and inclusive whereas for respondents in the age category >45 have a firm understanding in their assessment that the DST leadership is not participatory and inclusive.

Cohen’s effect size as calculated for ANOVAs with multiple groups, based on group means is $d = 2.42$ and is considered as being of large practical significance. The following Table provides a breakdown of designation by age.

<table>
<thead>
<tr>
<th>Designation</th>
<th>26-35 years</th>
<th>36-45 years</th>
<th>46 and older</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Col %</td>
<td>Row %</td>
<td>Col %</td>
</tr>
<tr>
<td>Assistant Directors</td>
<td>14.3%</td>
<td>18.2%</td>
<td>39.1%</td>
</tr>
<tr>
<td>Deputy Directors</td>
<td>64.3%</td>
<td>42.9%</td>
<td>30.4%</td>
</tr>
<tr>
<td>Directors</td>
<td>21.4%</td>
<td>20.0%</td>
<td>30.4%</td>
</tr>
</tbody>
</table>
Table 4.18: Summary of breakdown of designation by age

As expected the most senior staff members are in the older age group.

4.7 Interpretation of Individual Items

From the reliability analysis, it was seen that the following items could not accurately represent their respective proposed constructs:

| Q2_5 | I think the DST provides enough opportunities for employees to be trained and developed. |
| Q2_6 | I believe DST has available skills to facilitate service excellence. |
| Q2_7 | I believe DST has competent employees to facilitate service excellence. |
| Q2_8 | Employees are encouraged to be creative and innovative in their work. |
| Q2_14 | I receive regular information about organisational matters. |
| Q2_15 | I get sufficient opportunities to make my inputs on all matters of the organisation especially in my Programme. |
| Q2_16 | Even if the DST realises service excellence, it will make no difference to me. |
| Q2_17 | Even if the DST realises service excellence, it will make no difference to the South African citizenry. |
| Q2_18 | The DST leadership communicates the organisation’s strategic objectives. |
| Q2_20 | The DST leadership recognises and rewards service excellence. |

The influence of the biographic characteristics of respondents was investigated individually on these items using chi-square statistical techniques (cf. section 4.8).

Due to lack of cell density for this investigation, the 5-point Likert scale on which respondents view the extent at which the DST embraces organisational learning, was
reduced to a 3-point scale as follows: Strongly disagree and Disagree was recoded to Disagree, Agree and Strongly agree was recoded to Agree, and Neutral views were retained as originally recorded.

The following Table presents respondent’s views on this scale.

<table>
<thead>
<tr>
<th>Item</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2_5 I think the DST provides enough opportunities for employees to be trained and developed.</td>
<td>3.6%</td>
<td>18.2%</td>
<td>78.2%</td>
</tr>
<tr>
<td>Q2_6 I believe DST has available skills to facilitate service excellence.</td>
<td>10.9%</td>
<td>9.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Q2_7 I believe DST has competent employees to facilitate service excellence.</td>
<td>1.9%</td>
<td>13.2%</td>
<td>84.9%</td>
</tr>
<tr>
<td>Q2_8 Employees are encouraged to be creative and innovative in their work.</td>
<td>20.0%</td>
<td>32.7%</td>
<td>47.3%</td>
</tr>
<tr>
<td>Q2_14 I receive regular information about organisational matters.</td>
<td>20.0%</td>
<td>25.5%</td>
<td>54.6%</td>
</tr>
<tr>
<td>Q2_15 I get sufficient opportunities to make my inputs on all matters of the organisation especially in my Programme.</td>
<td>23.6%</td>
<td>23.6%</td>
<td>52.7%</td>
</tr>
<tr>
<td>Q2_16 Even if the DST realises service excellence, it will make no difference to me.</td>
<td>7.3%</td>
<td>9.1%</td>
<td>83.6%</td>
</tr>
<tr>
<td>Q2_17 Even if the DST realises service excellence, it will make no difference to the South African citizenry.</td>
<td>10.9%</td>
<td>9.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Q2_18 The DST leadership communicates the organisation’s strategic objectives.</td>
<td>25.5%</td>
<td>10.9%</td>
<td>63.6%</td>
</tr>
<tr>
<td>Q2_20 The DST leadership recognises and rewards service excellence.</td>
<td>14.6%</td>
<td>36.4%</td>
<td>49.1%</td>
</tr>
</tbody>
</table>

Table 4.19: Summary of respondents’ views on 3-point scale
4.8 Chi-Square Tests of Association

The results of the chi-square tests are reported in terms of degrees of freedom, number of observations, the Pearson statistic and the probability value eg $X^2(DF,N)= \text{Pearson statistic, p-value}$.

Only significant results are reported below. Also note that in most instances of these tests, there is generally inadequate cell density (minimum cell count should be 5). Consequently most significant results must be viewed with a certain measure of uncertainty. At best it may be stated that there appears to be a measure of association.

There is no association between the Programme in which the respondent works at DST and the 10 statements tabled above.

4.8.1 Chi-Square Tests of Association on Designation

a. **Q2_5 I think the DST provides enough opportunities for employees to be trained and developed.**

   $X^2 (8,55) = 19.171$, p-value=0.014.

   It appears as though senior staff members (Chief Directors and Deputy Directors General) are non-committal (neutral), whereas junior and middle managers (Assistant and Deputy Directors) agree with this statement.

b. **Q2_8 Employees are encouraged to be creative and innovative in their work.**

   $X^2 (8,55) = 23.675$, p-value=0.026.

   It appears as the most junior managers (Assistant Directors) tend to be neutral or negative on this statement.

c. **Q2_14 I receive regular information about organisational matters.**

   $X^2 (8,55) = 15.588$, p-value=0.0487.
The most senior management (Chief Directors and Deputy Directors General) tend to agree with this statement whereas junior and middle managers (Assistant and Deputy Directors) are non-committal (neutral) or disagree.

d. **Q2_18** The DST leadership communicates the organisation’s strategic objectives.
   \[ X^2 (8,55) = 22.562, \text{ p-value}=0.0040. \]
   The most senior management (Chief and Deputy Directors General) tend to agree with this statement whereas junior and middle managers (Assistant and Deputy Directors) are non-committal (neutral) or disagree.

e. **Q2_20** The DST leadership recognises and rewards service excellence.
   \[ X^2 (8,55) = 17.011, \text{ p-value}=0.0300. \]
   The most senior management (Chief and Deputy Directors Generals) tend to disagree or are neutral on this statement whereas junior management (Assistant Directors) agree. Directors tend to agree whereas Deputy Directors about evenly agree or are neutral.

There is no association between the *Years at DST* in which respondents work at DST and the 10 statements tabled above.

### 4.8.2 Chi-Square Tests of Association on Age

- **a. Q2_5** I think the DST provides enough opportunities for employees to be trained and developed.
  \[ X^2 (4,55) = 13.357, \text{ p-value}=0.0097. \]
  The older age group tends to be more non-committal (neutral), whereas the younger age groups tend to agree.

- **b. Q2_6** I believe DST has available skills to facilitate service excellence
  \[ X^2 (4,55) = 13.357, \text{ p-value}=0.0097. \]
Respondents in the age group 36-45 years totally agree with this statement, whereas the younger (26-35 years) and older (>45 years) age groups have a certain measure of neutrality and disagreement.

c. **Q2_7 I believe DST has competent employees to facilitate service excellence**  
   $X^2 (4, 55) = 12.069$, p-value=0.0168.  
   Respondents in the age group 36-45 years totally agree with this statement, whereas the younger (26-35 years) and older (>45 years) age groups have a certain measure of neutrality.

d. **Q2_14 I receive regular information about organisational matters.**  
   $X^2 (4, 55) = 9.990$, p-value=0.0406.  
   Respondents in the older age group (>45 years) totally agree, whereas the other age groups display a measure of neutrality and disagreement.

e. **Q2_15 I get sufficient opportunities to make my inputs on all matters of the organisation especially in my Programme.**  
   $X^2 (4, 55) = 20.625$, p-value=0.0004.  
   Respondents in the older age group (>45 years) totally agree, whereas the other age groups display a measure of neutrality and disagreement.

f. **Q2_18 The DST leadership communicates the organisation’s strategic objectives.**  
   $X^2 (4, 55) = 9.840$, p-value=0.0432.  
   Respondents in the younger age groups (<46 years) tend to display a greater measure of neutrality and disagreement than the older age group (>45 years).

g. **Q2_20 The DST leadership recognises and rewards service excellence.**  
   $X^2 (4, 55) = 26.132$, p-value=0.0001.  
   Respondents in the age group 36-45 years tend to agree, whereas respondents in the other age groups display a significant measure of uncertainty (neutral).
The above reiterates the conclusion that the generation of employees in the age category 36-45 years have a rather neutral to positive view and stance on the DST as an organisation.

4.9 Summary of Open-ended Questions: Section 3 of the Questionnaire

Respondents indicated that the level of trust varies between employees and their supervisors. Trust depends on the working relations and the level of communication between employees themselves and their supervisors. With regard to leadership style followed by senior managers, this was also described as being dependent on the working relations and the trust that exists between the supervisors and their teams. On the other hand, the extent at which innovation is supported by supervisors seemed to be more favourable and existing in the Research, Development and Innovation Directorate as this is the innovation hub and knowledge center of the DST.

4.10 Summary

In this chapter, the objectives of the study as articulated in Chapter 1 have been achieved. The key elements of the literature review in Chapter 2 were tested using the statistical methods described in Chapter 3. It was found that only three constructs are reliable, and these are DST strategic planning, inter - intra Programme communication as well as the DST leadership style (cf. Table 4.6). Single scores for each of these constructs were determined and they each provided the mean of the participating (reliable) items. Furthermore, the influence of the biographic characteristics was tested including the use of Chi-Square tests of association on the biographic profiles of respondents. The findings are discussed in the following chapter.
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter builds on the previous chapters and summarises the findings of this study. Based on the findings, the chapter further provides practical and theoretical recommendations. The conclusions in this chapter will focus first on the integrated results, and then more specifically on the problem statement. For practical purposes, the problem statement is restated here:

The culture of organisational learning in the Department of Science and Technology does not support continuous improvement in the implementation of strategic initiatives (cf. section 1.4).

5.2 Research Findings

Research Question One: What are the main factors that constitute the culture of organisational learning? Findings in the literature review revealed that strategic vision, communication as well as leadership style are key factors contributing towards embracing a culture of organisational learning.

Research Question Two: What is the current culture of organisational learning at the DST? The study assisted in determining whether in the DST skills learned are transferred to the job and if this results in the continuous improvement and service excellence. Moreover that the DST invests significantly towards training and development of its employees and in ensuring that they are continuously empowered. From the research findings, a number of conclusions that have implications on the DST’s culture of organisational learning have been drawn. The findings indicate that factors such as adequate communication and leadership are significant in the realisation of service excellence (cf. section 4.3).
addition, the following items indicate problem areas at the DST: items 3, 4, 9, 10, 11, 12, 13, 16, 17, 19, 21 and 22 (cf. section 4.3). It has been deduced from the findings that information sharing and communication in the DST is not effective. The DST structure and its degree of role differentiation impacts on effective communication and information flow within the organisation. The Department is responsible for science and technology policy conceptualisation and coordination and is mandated to conduct research and development as well as innovation strategies, thus requiring an alternative approach towards learning and development which is outcome and impact based. The findings suggest that information flow is a major problem in the DST, especially across the organisation. The results therefore support the contention that the DST culture does not support organisational learning (cf. sections 4.4, 4.5, 4.6, 4.7 and 4.8).

Research Question Three: *What are the key factors that could contribute to a culture of organisational learning at the DST?* It has been concluded that with regard to the strategic planning, most DST employees understand the strategic objectives and initiatives. The level of understanding of the strategic planning varies between Programme and age category (cf. Tables 4.1, 4.2, 4.3, 4.4 and 4.5). Therefore, the DST needs to involve its employees in strategic planning processes, improve on inter – intra Programme communication and also adopt a leadership style which is participatory and is inclusive of all employees in order to create a culture that embraces organisational learning.

Research Question Four: *How could these factors of organisational learning be improved at the DST?* The literature review indicated that, it is the role of leadership to enforce and encourage employee involvement (cf. sections 2.2.4.2 and 2.2.5). If DST employees are involved in the strategy planning process, this will enhance their level of understanding of DST strategic initiatives and their personal contribution towards driving service excellence. Employees will know how their daily operations are aligned with the strategic objectives of the DST. The inter – intra Programme communication will ensure that employees share their learning experiences from their work with their colleagues thus contributing towards continuous service delivery improvement. The participatory and inclusive leadership style will ensure that knowledge management is at the centre of daily operations and that leadership recognises and rewards service excellence (cf. section 4.3).
Main Research Question: How could the culture of organisational learning in the DST be improved to support the implementation of strategic objectives? The DST needs to involve all employees in the strategic planning process. The DST objectives need to be shared with all employees and there should be effective and efficient communication across the organisation. The DST leadership style needs to be participatory and inclusive of all employees. According to Schwella (2013:70), the social learning approach to leadership is linked to the recycling step in the transformational approach and requires that organisations continuously learn and experiment in order to improve capacity and performance. Furthermore, Schwella states that leaders should therefore not be directive and authoritarian, but should rather be facilitators creating space for experimentation learning.

5.3 Recommendations

Based on the conclusions made in the above section, the following points are recommended:

- It is suggested that the Department should enhance inter - intra Programme communication. The literature review indicated that horizontal communication plays an important role in organisational learning (c.f. section 2.2). Inter – intra Programme communication should be encouraged through formal coordination and informal gatherings where employees are able to exchange ideas and share information in a more coordinated manner (Pawlowsky, 2003:62-88). This will ensure that the DST becomes a knowledge-based organisation and that it builds internal cooperation and learning capacity (cf. section 4.4.3).

- It is suggested that effective coordination be put in place to ensure that all parts of the organisation work together toward a common purpose, and that they contribute equally to the execution of organisational strategies (cf. section 2.2). The DST can leverage on the positive perception of its employees especially those who are in the age category 36-45 (cf. section 4.6). Senge states that if any one idea about leadership has inspired organisations for thousands of years, it is the capacity to hold and share a picture of the future we seek to create (Senge, 1990:9). Such a
vision has the power to be uplifting and to encourage experimentation and innovation (cf. sections 2.2.4.3 and 4.3).

- Furthermore, it is suggested that the DST should foster a management style that is focused on increasing employee involvement and empowerment at all levels. Involvement of junior employees in strategic planning and decision-making should be encouraged in all parts of the organisation, and more autonomy or responsibility should be given to employees at lower levels. It is recommended that more bottom-up communication should be encouraged. This is supported by the findings in respect of items 19 and 20 (cf. section 4.3). It could be argued that the DST only established in 1996 will gradually develop a culture of organisational learning as the institution matures.

5.4 Future Research

Future research should take a more empirical approach toward further exploring organisational learning factors such as knowledge management, systems and processes that are required by learning organisations in government.

5.5 Summary

This chapter built on the results discussed in Chapter 4 in order to make conclusions on the implications of the results with respect to the problem statement. It further provided theoretical and practical recommendations based on the conclusions made.
LIST OF REFERENCES

6.1 Books


### 6.2 Journals


### 6.3 Websites


Available from: [http://www.sbleds.ac.za](http://www.sbleds.ac.za)


Available from: [http://www.sbleds.ac.za](http://www.sbleds.ac.za)


Available from: [www.kmnetwork.com](http://www.kmnetwork.com)

### 6.4 Unpublished material


Appendix 3: Letter to respondents

INFORMED CONSENT

My name is Patricia Seja Tomotomo and I am the Director for Talent Management and Organisational Development in the Department of Science and Technology (DST). The focus of the research is on understanding the impact of organisational learning on service excellence in the DST. This research is in partial completion of the requirements for the Master of Public Administration, and a copy of the report will be made available to the executive management of the DST in order to contribute to the continual improvement of service delivery. Participants will be furnished with the report and it will also be available at the DST Knowledge Resources Centre.

You have been selected to participate in this research because of your number of year of service in the DST and the learning and development that the DST has invested in you over the years of your employment. In accordance with the Unisa Policy on Research Ethics (2012), I would like to state that your participation is entirely voluntary and that information collected will not link the data back to you or any of the participants. The questionnaire is herewith attached for your consideration.

If you have any questions or concerns regarding the research, you are welcome to contact the Postgraduate Assistant, Department of Public Administration and Management, by telephone on 012 429 6252, or contact my supervisor, Prof Werner Webb by telephone on 012 429 6909.

If you would like any additional information, please feel free to call me on 071 854 7293, or contact me by email at sejatomotomo@yahoo.com. Thank you for your valuable contribution to this research effort. While your participation is entirely voluntary, it is sincerely appreciated.
Consent and participation

I certify that I have read all the information in this consent form and I hereby give consent to participate in this study

....................................................     ...............................................
Name of participant      Signature of participant

..............................................
Date
Appendix 4: Questionnaire

This is a fact-finding study project with the aim of assessing the impact of organisational learning on service excellence in the DST.

Any information provided in this questionnaire will be treated as strictly confidential.

1. SECTION 1 – DEMOGRAPHIC PROFILE

1.1 What is the Programme that you are working in? Tick or cross appropriate box

<table>
<thead>
<tr>
<th>Programme (also known as Directorate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Services and Governance</td>
</tr>
<tr>
<td>Research, Development and Innovation</td>
</tr>
<tr>
<td>International Cooperation and Resources</td>
</tr>
<tr>
<td>Human Capital Development and Knowledge Resources</td>
</tr>
<tr>
<td>Socio-economic Partnerships</td>
</tr>
</tbody>
</table>

1.2 Designation? Tick or cross appropriate box

<table>
<thead>
<tr>
<th>Assistant Director and below</th>
<th>Deputy Director</th>
<th>Director</th>
<th>Chief Director</th>
<th>Deputy Director General</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.3 How long have you been working for the DST? Tick or cross appropriate box

<table>
<thead>
<tr>
<th>1-3 years</th>
<th>3-5 years</th>
<th>5 years or more</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.4 In which age category do you belong? Tick or cross appropriate box

<table>
<thead>
<tr>
<th>younger than 25 years</th>
<th>26-35 years</th>
<th>36-45 years</th>
<th>46 years or older</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SECTION 2 – CLOSED QUESTIONS**

Please indicate to what extent you agree or disagree with each question by inserting a “x” in the appropriate box for each of the options below:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.g. DST is a learning organisation</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

**DST Strategic Planning**

1. The strategic objectives of the DST such as the Ten-Year Innovation Plan are clear and shared with all employees.
2. My daily operations are clearly aligned with the strategic objectives of the DST.

3. In my opinion, information in the DST flows across the Programmes.

4. I am often informed about the activities or engagements of other Programmes in relation to the work done by my Programme.

### Opportunities for learning and return on investment

5. I think the DST provides enough opportunities for employees to be trained and developed.

6. I believe DST has available skills to facilitate service excellence.

7. I believe DST has competent employees to facilitate service excellence.

8. Employees are encouraged to be creative and innovative in their work.

### Inter - intra Programme communication

9. Employees in the DST often share information on new knowledge on their work with other colleagues.

10. Employees in the DST often share their learning experiences from their work with their colleagues.

11. Differences of views in my Programme or the DST at large are publicly discussed and tested.

12. In my opinion, mistakes and failures in the DST are regarded as part of learning.

13. Learning experiences from past mistakes and failures in my Programme get incorporated into operational processes and daily routines.

### Knowledge management and learning from experiences

15. I get sufficient opportunities to make my inputs on all matters of the organisation, especially in my Programme.

16. Even if the DST realizes service excellence, it will make no difference to me.

17. Even if the DST realizes service excellence, it will make no difference to the South African citizenry.

18. The DST leadership communicates the organisation’s strategic objectives.

**DST leadership style**

19. The DST leadership involves all employees in decision-making processes.

20. The DST leadership recognizes and rewards service excellence.

21. There is participatory leadership in the DST.

22. Knowledge management is at the centre of daily operations at the DST.

**SECTION 3 – OPEN-ENDED QUESTIONS**

How would you describe the current organisational culture at the DST. In your answer please refer to:

- the extent to which employees and supervisors TRUST each other;
- the extent to which employees and supervisors are OPEN about difficulties they experience in the institution;
- your experience of the LEADERSHIP style followed by senior management; and
- the extent to which INNOVATION is supported by your immediate supervisor.